Wroclaw
Medical University

Marta Duda-Sikuła

PERSONALISING STRATEGIES FOR CHRONIC DISEASES PREVENTION

DOCTORAL DISSERTATION

Dissertation supervisor: Professor Donata Kurpas

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I would like to dedicate this work to patients with chronic diseases, in the hope that it may contribute to the development of more effective approaches to their care.

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1. INTRODUCTION

Health policies today are focused on chronic conditions, which are conditions that cannot be cured but can be managed through medication and/or other therapies to prevent further complications by modifying lifestyle factors [1]. Primary health care (PHC) aims to prevent chronic conditions, with active patient participation in health care delivery and self-management being given top priority and is targeted to ensure the highest possible level of health and well-being and their equitable distribution by concentrating on the public needs for a sustainable healthy life without any financial burden on patients [2]. Simply providing advice or education to patients is not sufficient to ensure good self-management or healthy behaviour change and maintenance. Patients need well-developed guidelines for primary care management that are implemented effectively to achieve successful outcomes [3]. However, such guidelines are often inadequately operationalized, which means that they are not translated into practice in a way that can be readily applied by health care providers. This gap can prevent patients from receiving optimal care and may contribute to poor health outcomes [4]. Therefore, it is important to develop guidelines that are not only evidence-based but also practical and easy to implement, taking into account the diverse needs and circumstances of patients [5]. A key issue that needs to be addressed is how primary health care professionals can support self-management in an evidence-based, structured way and how self-management processes can be integrated into clinical practice, as models of care evolve to deliver a person-centred approach [6]. Although experienced General Practitioners (GPs) may often adjust guidelines to their situations, rural communities have worse health outcomes concerning chronic diseases than urban communities. This results in significant health inequalities and a lack of prevention of chronic diseases [7]. The improvement of this situation is feasible by developing tools that enable health care providers to provide personalized interventions within the guidelines [8]. Also supporting patients in achieving and maintaining lifestyle changes on an individualized basis, using defined therapeutic goals and strategies continues to be a substantial challenge [9].

This thesis intends to address gaps and deficiencies in the effectiveness of primary health care in chronic diseases by focusing on the contextualized application

of medical guidelines and the training skills needed to create and execute the best health care strategies. The study emphasizes the non-clinical aspects of the patient journey and their role in the treatment process.

The main objective of the study is to identify strategies within the framework of personalized prevention that intensify the effectiveness of chronic disease management in primary care patients. This will be achieved by identifying and analysing research-to-practice gaps, and also by looking for barriers and facilitators for effective interventions.

The research is based on the premise that the way forward is to produce guidelines and materials for training methods and skills that will enable health care practitioners to design their multi-component interventions, which will be person and context-based. Supporting patients in achieving and maintaining lifestyle changes on an individualized basis could improve prevention results.

The research integrates outcomes from global and national guidelines, and publications, and addresses the gap between research/guidelines and outcome implementation and effectiveness in primary health care patients within primary prevention of hypertension and diabetes. Although experienced health care providers can adapt guidelines to their contexts, little is known about how they do so and how they assess the effectiveness of their adaptations. The thesis examines the inadequacies in operationalising well-developed guidelines for primary care management.

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1.1. NON-COMMUNICABLE DISEASES

Non-communicable diseases (NCDs), commonly known as chronic diseases, are typically long-lasting and result from a combination of genetic, physiological, environmental, and behavioural factors [10]. The primary types of NCDs are cardiovascular diseases (such as heart attacks and strokes), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes.

These diseases tend to disproportionately affect people residing in low- and middle-income countries, where more than 75% of the 31.4 million global NCD-related deaths occur. NCDs are not limited to certain age groups or regions; individuals of all ages and from all countries are at risk. Although NCDs are commonly associated with older age groups, evidence indicates that approximately 17 million NCD-related deaths occur before the age of 70 years, with approximately 86% of these premature deaths occurring in low- and middle-income countries. Children, adults, and the elderly are all susceptible to NCD risk factors, such as unhealthy diets, physical inactivity, exposure to tobacco smoke, and excessive alcohol consumption [1].

The main types of NCDs include cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes, with cardiovascular diseases being responsible for half of NCD-related deaths. NCDs are the leading cause of death and disability worldwide, causing 41 million deaths each year, which is 71% of all deaths globally. Diabetes affects about 422 million people globally, with most cases found in low-and middle-income countries, and causes 1.6 million deaths annually, and its prevalence is increasing steadily. Cardiovascular diseases take the lives of an estimated 17.9 million people each year and are the leading cause of death globally, with heart attacks and strokes responsible for four out of five CVD deaths, and one-third of these deaths occurring prematurely in people under 70 years of age. A critical approach to control chronic diseases is to concentrate on reducing their risk factors [1]. Declining lifestyle factors, particularly increased body weight and alcohol intake, as well as decreased fruit/vegetable consumption is associated with higher odds of incident metabolic syndrome [11].

The World Health Organization issued an Implementation roadmap 2023–2030 for the Global action plan for the prevention and control of NCDs. The roadmap is to be developed in response to the Global action plan for the prevention and control of non-communicable diseases 2013–2030 and the recommendations of the mid-term evaluation of the global action plan. A “Global action plan for the prevention and control of NCDs 2013-2020” features nine global targets that have the most significant impact on global NCD mortality, focusing on the prevention and management of NCDs. The nine targets include: reducing premature mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases by 25%; reducing harmful alcohol use by at least 10%; reducing the prevalence of insufficient physical activity by 10%;

reducing mean population intake of salt/sodium by 30%; reducing current tobacco use in persons aged 15+ years by 30%; reducing the prevalence of raised blood pressure by 25% or maintaining it at national circumstances; halting the rise in diabetes and obesity; ensuring at least 50% of eligible people receive drug therapy and counselling to prevent heart attacks and strokes, and make affordable basic technologies and essential medicines available to treat major non-communicable diseases in both public and private facilities. Adequate hypertension guidelines are crucial to the proper prevention, early detection, evaluation, treatment, and control of hypertension [1].

WHO (2016) in the Action Plan for the Prevention and Control of Non-communicable Diseases in the WHO European Region [12] prioritizes population-level interventions, i.e.:

1. Promoting healthy consumption via fiscal and marketing policies
2. Product reformulation and improvement: salt, fats, and sugars
3. Salt reduction
4. Promoting active living and mobility
5. Promoting clean air by reducing outdoor and indoor air pollution

The other priority is individual-level interventions, i.e.:

1. Cardio-metabolic risk assessment and management
2. Early detection and effective treatment of major NCDs
3. Vaccination and relevant communicable disease control

The WHO released a Discussion Paper in September 2021 regarding the creation of an implementation roadmap for the WHO Global Action Plan for the Prevention and Control of NCDs 2023-2030. Among the priorities for the roadmap is the need to comprehend the factors that contribute to the NCD burden and how it evolves across countries and epidemiological regions [1].

To effectively address NCDs it is advisable for countries to periodically evaluate their progress in implementing evidence-based national guidelines, protocols, and standards. These evaluations should also cover policies related to NCD research and the prioritization of vulnerable populations [12].

The WHO experts suggest in the same document that while some barriers to addressing NCDs are global, and not all of them are relevant in every setting.

Therefore, countries should prioritize and tackle barriers that are specific to their local context [12]. Consistent with WHO recommendations for the 2023-2030 roadmap priorities, efforts should be concentrated on comprehending the factors that contribute to the NCDs burden and how it evolves across countries and epidemiological regions [1].

1.2. EPIDEMIOLOGY OF HYPERTENSION AND DIABETES

GLOBAL EPIDEMIOLOGY OF HYPERTENSION

According to the World Health Organization (WHO), hypertension is a major public health issue affecting millions of people worldwide. As of 2021, the global prevalence of hypertension among adults is estimated to be around 1.13 billion, with the majority of cases found in low- and middle-income countries [13].

The prevalence of hypertension varies significantly by region, with the highest rates found in Africa and the lowest rates in the Americas. In Africa, approximately one-third of adults are estimated to have hypertension, while in the Americas, the estimated prevalence is around 18%. Hypertension is a leading cause of cardiovascular disease and premature death worldwide. In 2019, high blood pressure was identified as a primary or contributing cause of death in approximately 9.4 million people globally [14].

The WHO recognizes hypertension as a major public health issue and emphasizes the importance of prevention and early detection of the condition. Efforts to reduce the burden of hypertension include promoting healthy lifestyles, improving access to affordable and effective treatments, and strengthening health systems to support hypertension management and control [15]. And hypertension guidelines are necessary for proper and adequate prevention, early detection, evaluation, treatment, and control of hypertension [16].

GLOBAL EPIDEMIOLOGY OF DIABETES

According to the World Health Organization (WHO), diabetes is a major global public health issue. As of 2021, an estimated 422 million adults worldwide have

diabetes, with the majority of cases (79%) occurring in low- and middle-income countries. Diabetes is also a leading cause of death, with approximately 1.5 million deaths attributed to diabetes in 2019 [17].

The prevalence of diabetes has been increasing globally, particularly in low- and middle-income countries. The WHO reports that the global prevalence of diabetes has nearly doubled since 1980, driven by various factors including urbanization, unhealthy diets, physical inactivity, and an ageing population [18].

There are two main types of diabetes: type 1 diabetes, which is typically diagnosed in childhood and adolescence, and type 2 diabetes, which accounts for the majority of cases and is often associated with obesity and lifestyle factors. Type 2 diabetes is largely preventable through lifestyle changes, such as a healthy diet and regular physical activity. The WHO emphasizes the importance of prevention, early detection, and effective management of diabetes to reduce its impact on individuals and populations. Strategies to address the diabetes epidemic include promoting healthy lifestyles, strengthening health care systems, and improving access to affordable and effective treatments [19].

Intervention Strategies for Chronic Disease Prevention and Control

In the last ten years, there has been a notable increase in focus on personalized medicine to design effective intervention plans and implement them. However, the current literature on the prevention and control of chronic diseases has not been systematically explored.

According to Poitras et al. [20], interventions can be categorized into seven intervention categories: supporting evidence-based practice and decision-making; providing patient-centred approaches; supporting patient self-management; providing case/care management; enhancing interdisciplinary team approach; developing training for health care providers; and integrating information technology. The scoping review also provides evidence that patient-centred interventions can be adapted for patients with multiple chronic conditions.

Baugh Littlejohns and Wilson [21] propose that effective systems to prevent chronic diseases should possess seven essential features: collaborative capacity, a health

equity paradigm, leadership and governance, sufficient resources, implementation of desired actions, information, and a complex systems paradigm.

The importance of interprofessional primary care teams over physician practices that focus on single professions is emphasized by Wranik et al. [22]. The authors highlight the significance of preventive care and chronic disease management and recommend that researchers explore establishing connections between team attributes and patient health results.

According to Haregu et al. [23] non-communicable disease research capacity-strengthening initiatives in low and middle-income countries prioritize individual capacity-building and give less attention to strengthening institutional-level capacity. Although many of these initiatives yield promising short-term outcomes, there is insufficient evidence to evaluate their long-term impact and sustainability.

Reynolds et al. [24] conducted a review that illustrated the advantages of implementing interventions founded on chronic care model components in primary care. Their findings furnish additional evidence that supports the notion of self-management education as an essential component of high-quality primary care [25].

Some authors note that none of the guidelines reviewed meets all the required criteria, which may contribute to the challenge of controlling hypertension in many parts of the world. They suggest that valuable opportunities for the dissemination and implementation of guidelines are not being fully utilized. The authors call for efforts to develop broad-based, flexible, adaptable, socio-culturally acceptable, and economically feasible guidelines for hypertension in Low and Middle-Income Countries (LMIC) to improve health outcomes in patients with hypertension [26-28].

1.3. SITUATION IN POLAND

PERFORMANCE OF THE POLISH HEALTH CARE SYSTEM

Despite a reduction of approximately 10% in the preventable mortality rate between 2011 and 2016, Poland's rate remains higher than that of most EU member states, surpassing the EU average by more than one-third. This improvement over the last decade is likely attributable in part to investments in cardiac care, as the National Health Fund's expenditure on cardiac care services more than tripled between 2004 and 2014. In 2006, cancer screening was introduced on a national scale as part of a national program, which contributed to the improvement of screening rates. However, health care quality and patient safety are not regularly evaluated in Poland, with most initiatives having focused solely on hospital care and remaining incomplete. While spending on health promotion and disease prevention aligns with the EU average when measured as a share of current health expenditure, preventive care spending per person in Poland amounts to less than half of the EU average (EUR 34 compared to EUR 89). A national audit conducted on preventive activities between 2012 and 2015 further confirmed that financing of prevention was insufficient and inappropriately allocated. To date, minimal attention has been given to policy tools such as legislative change, marketing bans, or fiscal instruments such as taxes or subsidies [29].

Behavioural and environmental risk factors account for nearly half of all deaths One-fifth of all deaths in 2019 can be attributed to tobacco consumption (including direct and second-hand smoking), while another fifth can be attributed to dietary risks, including low fruit and vegetable intake, and high salt and sugar consumption. Although the share of deaths due to alcohol consumption is the same as the EU average (6%), trends in mortality attributable to alcohol consumption show an increase for both men and women and at all ages since the early 2000s [30].

Air pollution in the form of fine particulate matter (PM2.5) and ozone exposure alone accounted for an estimated 8 % of all deaths in 2019 (over 30 000 deaths) – twice the proportion in the EU as a whole (4%). The 2015 Act on Public Health shifted the strategic focus of the National Health Programme from the treatment of common diseases to the promotion of healthier lifestyles and the reduction of important risk factors. The new edition of the Programme for 2021–25 includes operational goals on the prevention of overweight and obesity, healthy ageing, mental health promotion,

addiction prevention, and reduction of health risks arising from environmental factors and infectious diseases [31].

Obesity has been growing slowly but steadily About 18.5% of adults in Poland were obese in 2019 – which is above the EU average (16%) – and rates have been rising slowly since 2004. Overweight and obesity rates among adolescents have also increased over the past two decades, but more slowly than in many other EU countries. The proportion of 15-year-olds in Poland who were overweight or obese in 2018 was below the EU average (16% compared to 19%) [32].

HEALTH CARE SYSTEM

Over the past decade, spending on health in Poland has remained consistently below the EU average, both in per capita terms and as a share of GDP. The COVID-19 pandemic prompted additional funding injections in 2020 to support the health sector response. Around 72% of Poland's health spending comes from public sources, but out-of-pocket spending is high, accounting for just over 20% of current health expenditure – mostly for outpatient medicines [33].

Poland spends less than half the EU average per capita on health. Most health spending goes on inpatient care while spending on long-term care remains low. Poland's health care system is affected by large imbalances in the provision of services, with infrastructure concentrated in the hospital sector; insufficient provision of outpatient care, diagnostics, and long-term care; and weak coordination between inpatient and other care [31]. According to Eurostat data, Poland has the lowest number of practising doctors per1 000 population (2.4) in the EU, and the number of nurses (5.1 per 1 000 population) is also among the lowest. Shortages of health workers have been reported in several regions, leading to difficulties in accessing health services. Shortages are particularly severe in small counties around large cities and in rural areas [31].

INEQUALITIES

Inequalities in self-reported health by income level are substantial in Poland Before the COVID-19 pandemic, about 60% of the Polish population reported being in good health, which is lower than the EU average of 69% The rate was substantially lower among people in the lowest income quintile (48 %) than among those in the

highest (74%). Self-reported health also worsened with age: fewer than one-quarter of Polish people aged over 65 reported being in good health in 2019, compared with two-fifths in the EU [31].

In 2016, Poland introduced exemption mechanisms for outpatient prescription charges, including granting free access to a broad range of medicines for older people. Since 2020, pregnant women have had free access to certain medicines. However, mechanisms to protect the most vulnerable population groups – such as those in low-income households or with chronic conditions – are weak, and spending on outpatient medicines is particularly high among pensioners, people with disabilities, and households in rural areas. According to national statistics, approximately 7.5% of households reported that they were often or sometimes unable to purchase prescribed or recommended medicines in 2016 [31].

The population of Poland was decreasing between 2011-2016, however, in 2017 a slight increase took place and at the end of that year it amounted to 38 343 thousand, 7.4% of the total population of EU28, which placed our country sixth among the EU states. In 2017, the rate of natural increase in Poland had a negative value in cities and a positive one in rural areas. Women constitute over half of the total population (51.6%) [34].

The analysis of life expectancy and mortality of the Polish population indicates that the health condition of the inhabitants of our country is gradually improving concerning all countries in the European Union. However, the situation may be still considered unsatisfactory [34]. The Polish population has one of the lowest life expectancies in Europe and remains three years below the EU average. Life expectancy at birth in Poland increased by four years between 2000 and 2017, from 73.8 to 77.8 years [Figure 1.] On average, women live almost eight years longer than men - 73.9 compared to 81.8 years. This gender gap is much greater than the EU average (5.2 years) and is among the highest in the EU [31].

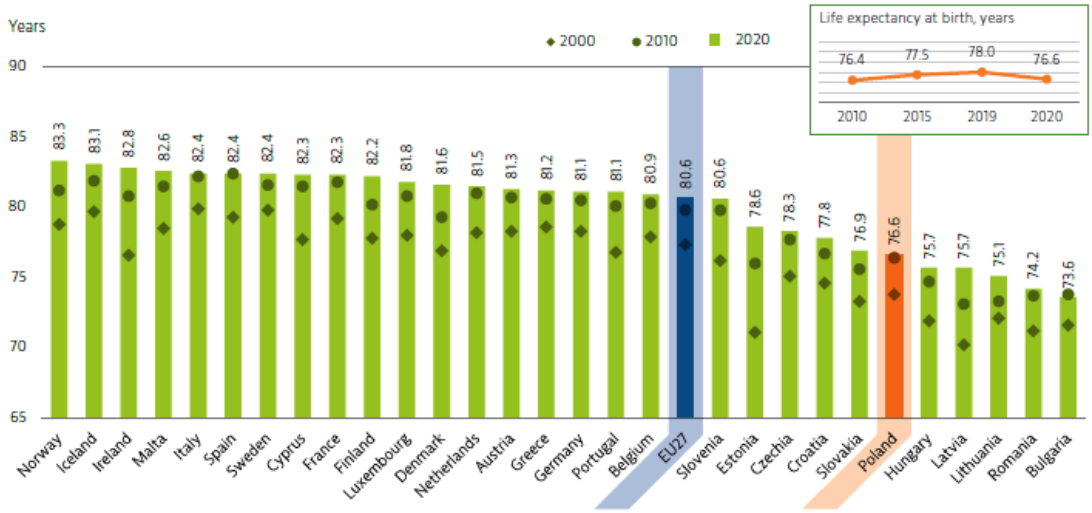

Figure 1. Life expectancy at birth, years comparison between Poland vs. Europe [31]

Inequalities in life expectancy across educational levels are also significant. As shown in Figure 1., at age 30 men with the lowest levels of education live on average 12 years less than those with tertiary education. The education gap is smaller for women (5.1 years). Further inequalities can be seen in geographical differences in life expectancy (up to 5%) and mortality rates (up to 20%) between the districts, with the worst results noted in the Łódzkie voivodeship. It may be assumed that the smallest towns, below 5,000, are the least favourable living environment in Poland since their inhabitants live the shortest; on average, while the longest live inhabitants of the largest cities, except for Łódź, where the residents live even shorter than in small towns. It should be emphasized, however, that the differences in life expectancy related to the place of residence, categories have been gradually diminishing [34]. Reducing geographical health inequalities is one of the goals in the key strategic health policy document for 2014–20201 and measures implemented so far include infrastructure investments, with support from EU funding, particularly in the eastern regions [31].

Ischaemic heart disease is the main cause of death, followed by stroke and lung cancer. Strikingly, more than half of Poles over 65 report symptoms of depression, compared to a fifth in the EU. Mortality from preventable and treatable causes is higher than the EU average [31].

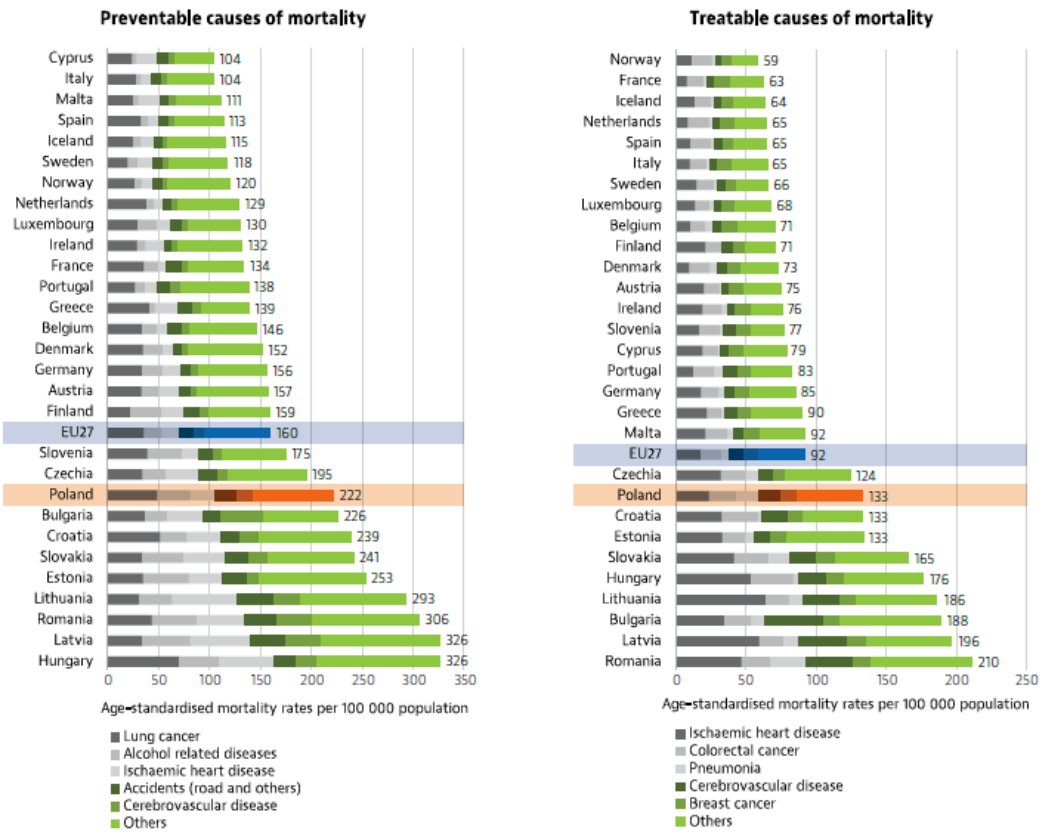

Figure 2. Preventable and treatable causes of mortality in EU countries [31]

Chronically ill patients' visits account for 80% of primary care consultations. Approximately 15%-38% of patients have three or more chronic illnesses [35, 36] and 30% of hospitalizations result from a deteriorating clinical condition in these patients.

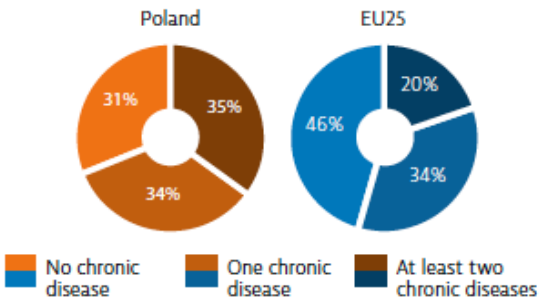

Figure 3. Percentage of people aged 65+ reporting chronic diseases [31]

The burden of chronic disease and multimorbidity is increasing, in combination with an increasingly older population. Worldwide, 18 million deaths annually are attributed to cardiovascular diseases [37].

Nearly two in five adults in Poland have a chronic condition. 39% of Polish adults reported having at least one chronic condition in 2019 – a slightly higher proportion than across the EU as a whole (36%), according to EU-SILC. This proportion increases to 70% for Polish people aged over 65. Many of these chronic conditions increase the risk of severe complications from COVID-19. As with self-reported health, there is a gap in the prevalence of chronic conditions by income group: 47% of Polish adults in the lowest income group report having at least one chronic condition, compared with 32% of those in the highest [31].

Hypertension is a leading risk factor for cardiovascular disease, disability, and death worldwide. Awareness and levels of hypertension control in LMIC are still low when compared to that in HIC. For instance, hypertension control in the United States and 12 European countries was 52% versus 5-10% in Africa [24, 38]. Overall, hypertension appears to affect around 30–45% of the general population, with a steep increase with ageing [39]. In most European countries, hypertension is usually diagnosed and managed in primary care. In Europe, around 8% of the population is affected by diabetes, and 40% of those affected are unaware of their condition [40]. Worldwide, prevalence has increased by 136% since 1990, and diabetes has moved from the 10th to the 7th top cause of Years of Life Lost to Disability [41]. The majority of new cases of Type 2 Diabetes (T2D) occur in the context of Westernized lifestyles, unhealthy diets, and physical inactivity. Emotional stress and significant depression are related to the prevalence and control of diabetes and there is also evidence that these risk factors are increasing. Together, risk factors lead to increasing levels of obesity, insulin resistance, compensatory hyperinsulinemia, and, ultimately, beta-cell failure resulting in T2D.

The greatest threat to life in Poland is cardiovascular disease (CVD), responsible in 2016 for 43.3% of all deaths. The mortality from heart diseases and cerebrovascular diseases (CBVD) is in Poland much higher than in most EU countries, but only in the case of CBVD, the unfavorable difference is decreasing. The high mortality rate due to cardiovascular diseases, including heart diseases, is the main cause of shorter life

expectancy for women and men in Poland compared to most EU countries. The most common cause of death among cardiovascular diseases is heart disease (60.6% of all deaths due to CVD), a much smaller group constitutes CBVD (17.3% of all CVD deaths) [34].

Polish residents have significant inequalities in access to health policy programs. In addition, the number of planned programs is significantly greater in poviats with a lower risk of deprivation and mortality from all causes. Polish residents have significant inequalities in access to health policy programs. In addition, the number of planned programs is significantly greater in poviats with a lower risk of deprivation and mortality from all causes [34].

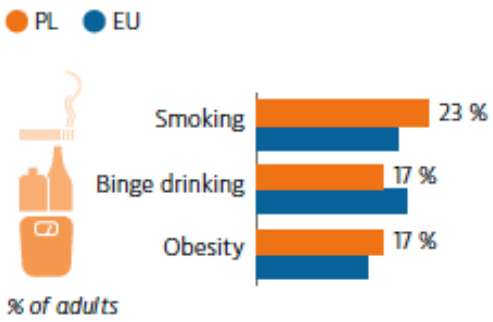

Figure 4. Risk factors [31]

Behavioural risk factors account for almost half of all deaths in Poland. Smoking rates have decreased, contributing to a reduction in mortality from lung cancer, but remain higher than the EU average. Binge drinking among adults is slightly below the EU average but rising among teenagers. The obesity rate is also above the EU average. In particular, the obesity rate in children has more than doubled since 2001. Unhealthy dietary behaviours and low physical activity contribute to this growing public health issue, which has been largely neglected so far [31].

Inequalities in risk factors have a marked impact on health status. Many behavioural risk factors in Poland, such as smoking and obesity, are more common among people with lower education or income. In 2014, around one in five adults (19%) who had not completed secondary education smoked daily, compared to only 12% with a tertiary education. Across income groups, this difference is even greater, with 31%

of people in the lowest income quintile being smokers compared to 18% in the highest quintile. A similar pattern emerges for obesity rates:18% of people without a secondary education were obese in 2014, compared to 10% with a higher education. These differences in the prevalence of risk factors contribute importantly to inequalities in health and life expectancy, with differences of up to 16 years in life expectancy between social groups. According to WHO estimates for 2016, excessive body weight was characteristic for 69% of men and 57% of women in Poland, the percentages for the obese are respectively 25% and 26% [34].

Adult Poles are less physically active than most EU citizens, they do sports much less regularly (once a week or more often - 28% vs. 40%), and they are also less likely to take other forms of physical activity (38% vs. 44%). About 60% of Poles declare a total lack of activity outside of work (daily duties) and transport needs, more often they are rural (64%) than city residents (56%) [34]. Behavioural risk factors are responsible in our country for the loss of 37.3% of disability-adjusted life years (DALY), of which are directly related to diet (without overweight and obesity) for 14.2%, and to smoking –17.2%. Since 2018, a new organizational model has strengthened the role of primary health care in the management of the 11 most prevalent chronic conditions – including chronic heart failure and diabetes – and is expected to contribute to reducing avoidable hospitalization rates [31].

1.4. NON-PHARMACOLOGICAL INTERVENTIONS

Non-pharmacological treatment of hypertension entails the implementation of lifestyle modifications that have been shown to significantly reduce blood pressure levels in individuals with hypertension [42]. These modifications can also enhance the efficacy of hypotensive pharmacotherapy, lower the risk of cardiovascular complications, and prevent the onset of hypertension in patients with a family history of the condition [43]. It is important to note, however, that the inadequate adherence of patients to lifestyle recommendations should not delay the initiation of pharmacotherapy in patients with organ damage or very high cardiovascular risk [44]. Lifestyle changes that meet the aforementioned criteria include achieving and maintaining healthy body weight, following an appropriate diet that involves reducing

the intake of fats (especially saturated fats) and increasing the consumption of fruits and vegetables, reducing alcohol and salt intake, ceasing tobacco smoking, and engaging in regular physical activity [45].

Hypertension is a serious health condition that can lead to the development of cardiovascular diseases and other complications. While pharmacological interventions are typically employed to manage hypertension, non-pharmacological methods are also recognized and recommended by health care professionals. Among these non-pharmacological methods, weight management is an essential component of managing hypertension. Achieving and maintaining a healthy body weight has been shown to significantly reduce blood pressure levels and improve overall cardiovascular health [42]. Also the higher number of preventive consultations had an impact on a statistically significant decrease in mean blood pressure and mean SCORE value [46].

Another important non-pharmacological method is dietary modification. A healthy diet that includes reduced intake of saturated and trans fats, increased consumption of fruits, vegetables, and whole grains, and limited salt intake can help control blood pressure levels. Physical activity is also an important aspect of managing hypertension. Regular physical activity such as brisk walking, cycling, or swimming has been shown to help lower blood pressure and improve overall cardiovascular health [42].

Smoking cessation is another non-pharmacological method that is essential for managing hypertension. The cessation of smoking has been shown to significantly reduce blood pressure levels and lower the risk of developing cardiovascular disease. Limiting alcohol intake is another non-pharmacological method that can help control blood pressure. Excessive alcohol consumption has been shown to raise blood pressure levels, whereas limiting alcohol intake to moderate levels can help maintain healthy blood pressure levels [42].

Finally, stress management is an important non-pharmacological method of managing hypertension. Chronic stress can contribute to the development of hypertension, and strategies for managing stress, such as meditation, deep breathing exercises, and yoga, have been shown to help lower blood pressure levels. Overall,

non-pharmacological methods of managing hypertension are recognized and recommended by health care professionals and should be considered as part of a comprehensive approach to managing hypertension [47].

1.5. PRIMARY HEALTH CARE SYSTEM

Primary health care plays a critical role in the prevention and management of non-communicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular diseases. NCDs are a major cause of morbidity and mortality worldwide, and their burden is increasing in both low- and high-income countries.

One of the key roles of primary health care in NCD management is to provide early detection and diagnosis of these conditions. By conducting regular health screenings and assessments, primary health care providers can identify individuals at risk of developing NCDs and those who have already developed these conditions. In addition, primary health care plays a vital role in managing and treating NCDs. This includes providing appropriate medical treatment, such as medication and lifestyle counselling, to individuals with NCDs [48].

Primary health care, which is often the first point of contact for individuals seeking health care services, plays a crucial role in the prevention, detection, and management of NCDs. Early detection and diagnosis of NCDs is one of the key roles of primary health care. Primary health care providers can conduct regular health screenings and assessments to identify individuals at risk of developing NCDs, such as hypertension, diabetes, and cardiovascular disease. Early identification of individuals at risk can help prevent or delay the onset of NCDs through appropriate lifestyle interventions and medical treatment [48].

Once NCDs are diagnosed, primary health care providers also play a vital role in managing and treating these conditions. This involves providing appropriate medical treatment, such as prescribing medication and lifestyle counselling to help patients manage their condition. Lifestyle counselling can include advice on dietary changes, exercise, and smoking cessation [49].

In addition to medical treatment, primary health care providers can also provide patient education and support to help individuals with NCDs manage their condition effectively [50]. This can involve providing information on self-care and self-management strategies, such as monitoring blood glucose levels, managing medications, and recognizing warning signs of complications.

Primary health care plays a critical role in the prevention, detection, and management of NCDs. By providing early detection and diagnosis of these conditions, and by offering appropriate medical treatment, lifestyle counselling, and patient education and support, primary health care providers can help individuals with NCDs to manage their condition effectively and improve their health outcomes.

Primary health care providers also play an important role in monitoring patients' progress and making appropriate referrals to specialists when needed. Another important role of primary health care in NCD management is health promotion and disease prevention. Educating patients about healthy lifestyle choices, such as regular exercise, healthy eating, and avoiding tobacco and alcohol, primary health care providers can help prevent the development of NCDs in the first place.

Primary health care providers can work with communities to develop and implement programs to promote healthy living and disease prevention. Finally, primary health care plays a crucial role in the management of NCDs at the population level. This includes monitoring disease trends and risk factors, developing policies and programs to prevent and manage NCDs, and advocating for improved access to NCD treatment and care. Primary health care plays a critical role in the prevention, detection, and management of non-communicable diseases. By providing early detection and diagnosis, appropriate medical treatment, health promotion and disease prevention, and population-level management, primary health care can help reduce the burden of NCDs and improve the health and well-being of individuals and communities [51, 52].

1.6. IMPACT OF COVID-19

The COVID-19 pandemic has had a significant impact on post-diagnostic care for people with chronic diseases, according to multiple scientific sources [53].

A study published in The Lancet Digital Health in January 2021 found that there had been a decrease in the number of people with chronic conditions receiving care during the pandemic. The study authors noted that "there is a need for health care systems to mitigate the impact of the COVID-19 pandemic on care for people with chronic conditions" [54].

A report by the World Health Organization (WHO) published in May 2020 noted that "the delivery of essential health services, including diagnosis and treatment of chronic diseases, has been severely impacted" by the pandemic. The report also highlighted the importance of adapting and strengthening health care systems to ensure that people with chronic diseases continue to receive the care they need [55].

A review published in the Journal of Medical Internet Research in September 2020 found that telemedicine had become more widely used during the pandemic as a way to deliver post-diagnostic care for people with chronic conditions. However, the review also noted that there were challenges to the widespread adoption of telemedicine, including limited access to technology and concerns about the quality of care [56].

During pandemics, health care utilization tends to decrease as patients and health care providers defer or skip routine health care, including elective and preventive visits, due to factors such as mobility restrictions, social distancing measures, and fear of contracting the virus within health care facilities. This trend has been repeatedly observed in various studies [57].

The COVID-19 pandemic has had a significant impact on post-diagnostic care for people with chronic diseases, with many patients experiencing delays in care and difficulties accessing the care they need. Efforts are needed to address these challenges and ensure that patients with chronic diseases continue to receive high-quality care during the pandemic and beyond [53].

2. STUDY OBJECTIVES AND RESEARCH HYPOTHESES

2.1. STUDY OBJECTIVES

The main objective of the study was to identify strategies within the framework of personalized prevention that intensify the effectiveness of chronic disease management in primary care patients.

Furthermore, the specific objectives were identified:

O1 To identify opportunities to introduce competencies in primary care for using person-centred and contextual behaviour change as a way to actively engage and empower patients in their care and prevention, increasing patient capacity and understanding their needs

O2 To evaluate the awareness of professionals and other health care system stakeholders of the processes underlying the change and maintenance of healthy lifestyle habits as prevention of chronic diseases

O3 To identify barriers and facilitators to implementing non-medical interventions

O4 To appraise dialogue with health care system stakeholders

2.2. RESEARCH HYPOTHESES

Simple advice or patient education regarding self-monitoring, management of health conditions, and required healthy lifestyle changes, are not enough to ensure good self-management or health behaviour change and maintenance.

Well-developed guidelines for primary care management are often inadequately operationalized. While experienced primary care doctors can often adapt the guidelines to their contexts, how they do this, and how they learn what works is not understood or recorded, and the fact remains that rural populations fare worse than urban counterparts in health outcomes for these chronic diseases.

The study is based on the premise that the way forward is to produce guidelines and materials for training methods and skills that will enable health care practitioners to design their multi-component interventions, which will be person and context-based. Supporting patients in achieving and maintaining lifestyle changes on an individualized basis could improve prevention results.

Hypothesis H1: Simple advice or patient education alone is insufficient for achieving and sustaining good self-management or health behaviour change.

Hypothesis H2: Well-developed guidelines for primary care management are often not effectively implemented, especially in vulnerable populations, which may result in worse health outcomes for chronic diseases.

Hypothesis H3: Providing health care practitioners with training in designing context-specific, multi-component interventions could improve patient outcomes in achieving and maintaining lifestyle changes.

Hypothesis H4: Individualized support for patients in achieving and maintaining lifestyle changes could result in improved prevention outcomes.

3. METHODOLOGY

3.1. DESIGN OF THE RESEARCH

Current health policies focus on ‘chronic conditions’, defined as conditions ‘that cannot be cured but can be managed through medication and/or other therapy’ or further complications prevented by modifiable lifestyle factor changes. A central goal of primary health care is the prevention of chronic conditions, giving high priority to active patient participation in health care provision and self-management. The study addresses gaps and deficiencies in the effectiveness of primary health care in chronic diseases management by focusing on the contextualized application of medical guidelines and training skills needed to develop and employ best-practice health behaviour change strategies.

Stage 1 Systematic review of evaluations of medical interventions using evidence-based guidelines for prevention, treatment, and management of diabetes and hypertension, emphasizing recommendations, and the critical appraisal of eligible guidelines.

Stage 2 Web-based survey to health care system stakeholders to understand barriers, facilitators, and enabling conditions for the success of interventions in different environments and populations.

Stage 3 Focus groups to evaluate priorities, needs, expectations, and concerns of health care system stakeholders (patients, HCPs, NGOs, carers, and intervention payers) to experience existing local strategies, guidelines, and implementation for the prevention and management of diabetes and hypertension.

Stage 4 Epidemiological analysis of diabetes/ hypertension, risk factor prevalence, co- morbidities, resource consumption, and disease burden data, broken down into rural/urban subgroups, gender, and cultural/ethnic differences when available.

3.2. RESEARCH METHODS

Public health research that addresses chronic disease has historically underutilized and undervalued qualitative methods. This has limited the field’s ability

to advance (a) a more in-depth understanding of the factors and processes that shape health behaviours, (b) contextualized explanations of interventions' impacts (e.g., why and how something did or did not work for recipients and systems), and (c) opportunities for building and testing theories [58].

Quantitative research has been incredibly helpful in examining and explaining patterns of chronic disease and related inequities [59]. Nevertheless, these inequities are not just separate issues, but rather they are interconnected, created by society, and deeply ingrained in the larger social systems, structures, and policies. For this reason, it is necessary to use qualitative research to tackle these complex issues. Qualitative research is vital in comprehending the underlying causes of these inequities, including the contextual factors operating at various levels that influence them [60, 61]. It also offers priceless guidance in developing multi-sector and multi-level interventions and policies that focus on promoting health equity and justice. Therefore, qualitative research plays a crucial role in fostering a more thorough and nuanced understanding of chronic disease inequities, while also generating effective solutions that address their underlying causes [58].

The research utilized a combination of rigorous systematic review (Stage 1), surveys (Stage 2), focus group discussion (Stage 3), and epidemiological analysis (Stage 4) to gain a comprehensive understanding of the challenges and opportunities associated with the prevention, treatment, and management of diabetes and hypertension, and to identify strategies for empowering chronic patients to increase their engagement in non-medical interventions.

3.2.1. STAGE 1: SYSTEMATIC REVIEW

For Stage 1 of the research, a systematic review of evaluations of interventions using evidence-based guidelines for the prevention, treatment, and management of diabetes and hypertension was conducted, with a focus on the recommendations provided. This stage involved a comprehensive search of relevant literature, and the review process was conducted in a rigorous and standardized manner.

The systematic review was done according to PRISMA recommendations and rules [62]. The procedure of making the systematic review included the preparation of a detailed Review plan which has been approved by two independently working researchers and assumed searching two databases using the agreed keywords. The review protocol described the rationale, hypothesis, and planned methods of the review. It had been prepared before a review started and used as a guide to carry out the review. In the next step, the initial search of the literature (scoping search) was performed independently by the co-authors.

The search process covered the following keywords: chronic disease, prevention, practice, and policy. Two publicly available/ free resources were used: PubMed and Google Scholar. The authors of the review focused on the most recent sources covering the years 2016 to 2022. The search in the bases was limited to the sources written or translated into English. Also, manual searching was carried out. Manually searching was focused to search for the synonyms to the defined keywords/ MeSH phrases. The authors searched also for papers using the words: intervention, program, initiative, and non-communicable disease. The research refers only to the published data [63].

As a result of the initial search, 524 results were obtained from PubMed. Keywords for searching that were used: chronic disease + prevention + practice + policy. The results included 24 clinical trials, 23 randomised controlled clinical trials, 13 meta-analyses, 75 reviews, 30 systematic reviews, and 3 books and documents. Google Scholar processed 16 900. Keywords used for searching: chronic disease + prevention and control + practice guideline + policy.

Records identified through database searching n= (1) 524 + (2) 16 900

The screening covered:

1. Records screened (1) + (2) by titles: 17 424
2. Records screened by title for a detailed reading of abstracts n= 86
3. Abstracts excluded with reasons: n= 37

Eligibility

1. Full texts assessed for eligibility after the detailed reading of abstracts n= 49

2. Full texts excluded with reasons: the trial is not completed n= 2

Records included

1. Full-text studies included in qualitative synthesis n= 47

The diagram below presents the applied PRISMA process [63].

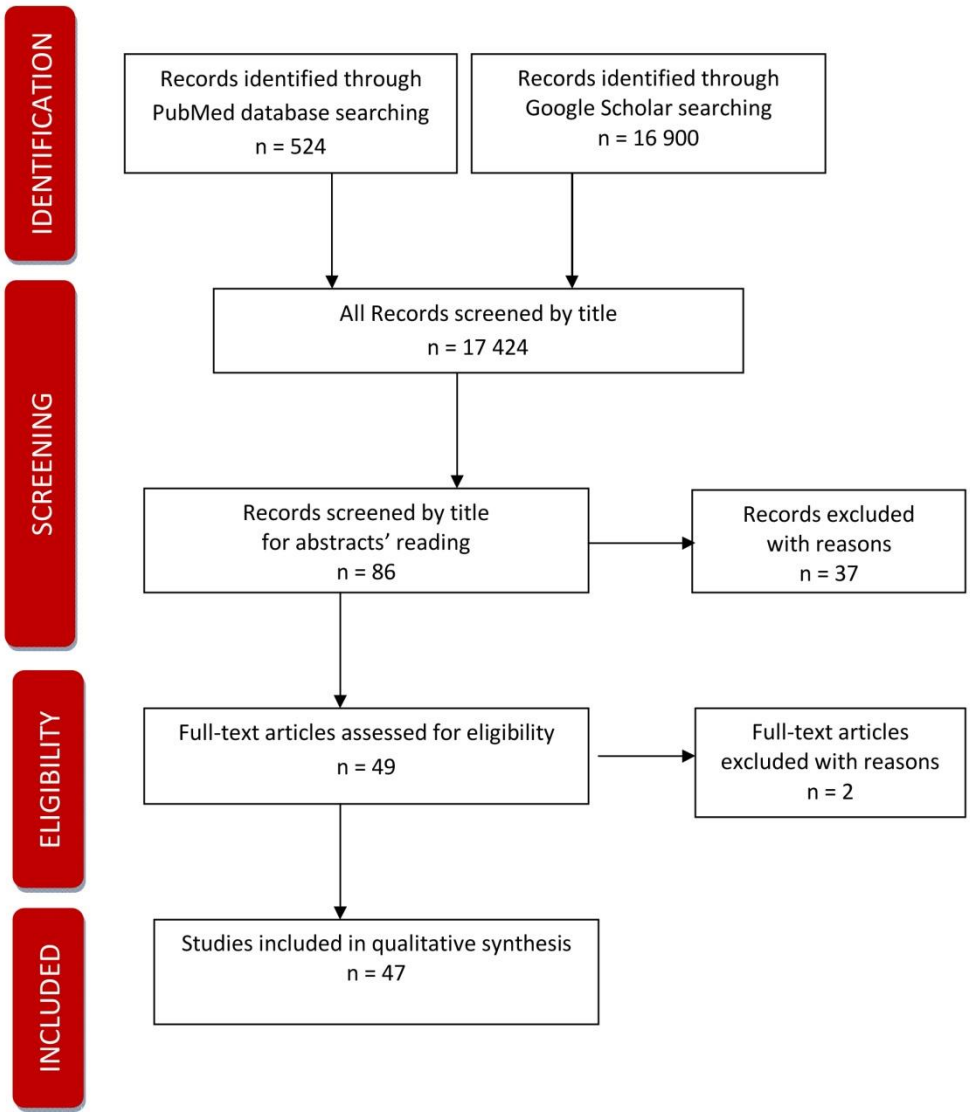

Figure 5. PRISMA diagram [63]

Once the titles were identified in the bases searching and manual searching, the authors decided on the eligible paper inclusion in the three-step process:

1. screening for abstract level
2. screening for full texts level
3. manual searching level

The title and abstract and after that, the full text of the articles were screened by the two authors. The eligible article was supposed to:

1. focus on prevention and control strategies/ interventions
2. address a chronic disease
3. focus on practice guidelines or policies

The selection of papers was based on the PRISMA statement. The critical (quality) appraisal was made on 47 carefully selected papers.

The following exclusion criteria were used to select the most appropriate papers:

1. the article relates to disease treatment, not prevention and control
2. the article does not relate to non-communicable/ chronic disease
3. the trial is not completed

In case the authors have had different opinions about the inclusion of some studies, the consensus was achieved in the process of discussion. There were two rounds of negotiations – at "screening for abstract level" and "screening full text according to eligibility criteria level". The number of studies selected for the deep analysis was compromised which resulted in this negotiation and critical appraisal that was conducted. Once the inclusion and exclusion criteria were applied, the selected studies were assessed in detail according to their quality, and the content was analysed and interpreted systematically.

To answer the research question, a systematic review of practice guidelines and policies was conducted. The Cochrane acronym PICO (which stands for population, intervention, comparison, outcomes) was useful to ensure that the decision on all key components was made before starting the review. Once the inclusion and exclusion criteria were defined, the selected studies were assessed in detail according to their quality, and the content was analysed and interpreted systematically according to PRISMA recommendations. A simple data extraction table was created and used to organise the information extracted from each reviewed study. A systematic review of evaluations of medical interventions using evidence-based guidelines for prevention, treatment, and management of chronic diseases, emphasising recommendations and the critical appraisal of eligible guidelines, was made. Most important recommendations for prevention, behavioural therapy (lifestyle changes), psychological management, and therapeutic education were derived. There was a considerable impact on caregivers

on the treatment process and its effectiveness. To tackle these challenges, it is recommended to support health care providers at the primary health care level, encourage the use of community-based health services, as well as increase strategic investment in public health interventions [63].

The primary target group of the study is the growing population of chronic patients and patients at risk of chronic disease.

The second target group is other health care system stakeholders, who are involved in the patient's journey toward better well-being:

1. Professional health care providers: physicians, family and community nurses, community and social workers, etc.
2. Patients' caregivers: formal and informal - family members, neighbours, etc.
3. Health care organisations: hospitals, clinics, and nursing homes that provide infrastructure and other complementary resources to support the work and development of care teams,
4. Policymakers and health care system stakeholders involved in health care: patient associations, representatives of NGOs, representatives of local governments involved in shaping regional health policies, and legal representatives of health care care providers.

Evidence-based practice guidelines and policies for chronic disease have been well developed, but patient outcomes and reach evaluations have not always been positive. The authors are searching the current literature to identify the significant barriers and facilitators that may influence the intervention implementation process.

The authors claim that enabling an understanding of the barriers and facilitators of the proper implementation process has a higher likelihood of success in ensuring effective management and improved well-being for patients.

3.3.2. STAGE 2: WEB-BASED SURVEY

The survey includes structured and unstructured questions and was designed on the highest standard of methodology for qualitative studies [64-68] The responses were collected and stored in a database. The first part of questions aimed to gather general information, then the semi-structured questions aimed to gather information

about respondents' experience with the implementation of non-medical interventions, barriers and facilitators of implementing the effective intervention, the area for improvement, and the final part of questions related to Corona-virus outbreak. The complete questionnaire is attached as Appendix No 1.

For Stage 2, web-based surveys were administered to health care providers to gain an understanding of the barriers, facilitators, and enabling conditions for the success of interventions in different environments and populations. The primary objective of this stage was to explore strategies for empowering chronic patients to increase engagement in non-medical interventions. The survey aimed to gather information on several key topics, including knowledge, attitudes, and practices related to non-medical interventions, the barriers and facilitators of implementation, the conditions for successful intervention, and areas for improvement.

The survey "Effective Strategies for Chronic Diseases Prevention" was designed for health care stakeholders to identify effective strategies and best practices for preventing chronic diseases. The survey was intended to gather insights and perspectives from a range of health care stakeholders, including health care providers, policymakers, patients, and other key decision-makers.

The survey sought to understand the landscape of chronic disease prevention efforts at that time, as well as to identify areas of success and areas for improvement. By gathering input from a broad range of stakeholders, the survey aimed to identify effective strategies for preventing chronic diseases that could be scaled up and implemented on a wider scale.

Through this survey, health care stakeholders had the opportunity to share their experiences and perspectives on chronic disease prevention and management, as well as to provide feedback on the effectiveness of current strategies and initiatives. The insights gathered from the survey were used to inform the development of future policies and programs, as well as to identify areas for further research and investigation. The survey "Effective Strategies for Chronic Diseases Prevention" was an important tool for health care stakeholders to contribute their insights and expertise to the ongoing effort to improve the prevention and management of chronic diseases.

From October 2020 to January 2023, 58 surveys were carried out using a semi-structured format. The protracted duration of survey collection can be attributed to the pandemic period. During the final quarter of 2020, health care workers were preoccupied with other pressing responsibilities and were unable to participate in the scientific survey due to limited bandwidth. At that time, the focus was primarily on the immunization campaign and combating the COVID-19 pandemic. It was only through a renewed request in the last quarter of 2022, following the most severe waves of the pandemic, that the anticipated outcome was achieved, and a greater number of responses were able to be collected.

3.3.3. STAGE 3: FOCUS GROUPS

For Stage 3, focus groups were conducted to evaluate the priorities, needs, expectations, and concerns of various stakeholders, including patients, health care providers, NGOs, careers, and intervention payers. The focus groups aimed to gain insights into the experiences of these stakeholders related to existing local strategies, guidelines, and implementation for the prevention and management of diabetes and hypertension. The interview included open questions and was designed on the highest standard of methodology for qualitative studies [69-73].

The study analyzed data collected from three online focus groups that were conducted on the Zoom platform. These groups provided valuable insights into various areas related to the research. By engaging participants from different backgrounds and organizations, the study aimed to capture a wide range of views and experiences related to health care policy development and implementation.

The online focus groups involved three categories of participants, including observers, moderators, and respondents. These participants were asked questions about certain topics during the focus group discussions, which were held on three separate dates: 10 November 2022, 29 November 2022, and 12 December 2022, and each session lasted between 60 and 90 minutes.

The first group comprised individuals affiliated with Polish governmental bodies linked to the Ministry of Health, including a National Health Fund representative

responsible for funding health care services, a representative of the Medical Research Agency, a representative of the Patient Ombudsman, and two representatives from patient foundations. The discussion was attended by a group of five respondents and was conducted in Polish.

The second group comprised representatives from the European Commission, the Italian Ministry of Health, a General practitioner/Scientist from Ukraine, and a representative from the Local government of the Lower Silesia Region from Poland. The debate was attended by 5 respondents and was conducted in English.

The third group consisted of representatives from the Saxony State Ministry for Science, Culture, and Tourism and Fondazione Regionale per la Ricerca Biomedica, and was attended by three respondents and was conducted in English.

Given the status of the participants in each country, their contributions represent a rich, contextual understanding of prevention health policy perspectives across Europe.

Interviews were facilitated by female researchers: psychologist and social sciences expert based in Poland as moderator and observer respectively. Both interviewers had previous experience in qualitative research.

The discussions were recorded digitally and transcribed verbatim in their original language. The interviewers conducted a thematic analysis of the transcriptions using both inductive and deductive coding. During the inductive coding process, the analysts carefully read and reread the transcripts to identify initial themes. They independently took notes on the issues raised by decision-makers and conducted pattern searches to identify relevant codes. The codes were then compared and collated within and across transcripts. The analysts then developed themes through discussion and independent interpretation reaching consensus. The interview questions also informed deductive coding, which was grouped into themes. Finally, the concepts were synthesized and presented as the interpretation presented here.

Specification of the questions:

Question 1: Barriers and facilitators to the implementation of non-pharmacological interventions – what influences the effectiveness of intervention implementation, and what hinders it?

Question 2: What are the conditions for effective prevention? Does the environment matter, patient population?

Question 3: Are patients' needs known and prioritized?

Question 4: In your opinion, what are the biggest challenges in implementing the interventions in everyday life? What could be improved?

To illuminate study findings, each theme is presented with example quotations. Quotations are attributed to each respondent using a unique participant code:

The codes attributed to the first group: G1P1, G1P2, G1P3, G1P4, G1P5,

The codes attributed to the second group:G2P1, G2P2, G2P3, G2P4, G2P5,

The codes attributed to the third group: G3P1, G3P2, G3P3.

3.3.4. STAGE 4: EPIDEMIOLOGICAL ANALYSIS OF DIABETES/ HYPERTENSION

For Stage 4, an epidemiological analysis was conducted through a retrospective case study of rural and urban GP practices in Poland. The analysis involved an examination of diabetes and hypertension epidemiology, risk factor prevalence, co-morbidities, resource consumption, and disease burden data, which were analyzed separately for rural and urban subgroups. This stage aimed to gain insights into the unique challenges and opportunities associated with diabetes and hypertension management in rural versus urban settings.

A total of 13 833 patient visits were recorded for individuals diagnosed with diabetes, specifically E10 for Type 1 diabetes mellitus and E11 for Type 2 diabetes mellitus, as well as hypertension, identified by I10 for Essential (Primary) Hypertension and I11 for Hypertensive heart disease with (congestive) heart failure.

The data collected covers four years, including 2018, 2019, 2020, and the first quarter of 2021. This extended time frame provides a comprehensive sample for analysis, encompassing a period before, during, and after the COVID-19 pandemic.

By including data from before the pandemic, the study can establish a baseline for comparison with the data collected during the pandemic. This baseline is crucial for understanding the impact of the pandemic on patient visits and outcomes related to chronic diseases.

Furthermore, the inclusion of data from the pandemic period, especially the first quarter of 2021, allows for a more comprehensive analysis of the effects of the pandemic on patient visits and health care delivery. The pandemic has had a significant impact on health care systems and delivery, and this data provides valuable insight into how chronic disease care has been affected. By examining trends and patterns in patient visits over this extended period, the study can provide a more nuanced and comprehensive understanding of the impact of the pandemic on chronic disease care.

The Urban/City Primary Health care Centre under analysis is situated in the fourth-largest city in Poland, with an estimated population of approximately 640,000 residents, which categorizes it as a large city in the country. The health care facility caters to a total of 4000 patients and received a total of 21,700 visits in 2022, including both in-person and remote visits.

The centre is staffed by a dedicated team of health care professionals, including five doctors, two nurses, one midwife, one registration administrator, one janitor / cleaner, and one IT specialist. This personnel works in unison to offer comprehensive primary health care services to the population of the city and its suburbs.

The Centre provides a diverse range of medical services, including general medical consultations, preventive care, health education, diagnostic testing, wound care, and vaccinations. The facility is equipped with modern medical equipment to ensure high-quality care for its patients.

The Rural Primary Health care Centre selected for analysis is situated in a small village located in the southern region of Poland, with an approximate population of 1,200 residents. This centre functions as a medical establishment that provides primary health care services to the local community, serving as the primary point of contact for individuals with health-related concerns. The facility offers a broad range of medical services, including general medical consultations, preventative care, and

health education. During the year 2022, the centre received approximately 11 000 patient visits, which included both in-person and remote consultations.

The medical facility is staffed by a team of health care professionals, comprising doctors, nurses, and medical support staff. The Centre has a total of three doctors, three nurses, one midwife, one registration administrator, and one janitor/cleaner. Additionally, the centre provides a diverse range of medical procedures, such as vaccinations, diagnostic testing, and wound care, using modern medical equipment to ensure the delivery of high-quality health care to patients.

Both centres are supported by the same software for clinics, which allows for conducting medical, dental, and therapeutic visits, accessing patient records and drug lists, and sending e-mail notifications. The software also supports billing and invoicing to the National Health Fund, maintaining a list of admissions and benefits, creating visit templates, and generating statistics.

The ability to analyze data from the same software allowed the effective unification of databases for the conducted, categorising results according to a specific query. I allowed for making analyses in a way that is relevant to the researcher's needs and identifying trends, patterns, or issues that require attention. It was possible to easily compare and analyze patient records to identify common health problems and assess the effectiveness of treatments.

Fully anonymized coded data were obtained according to the following layout date of birth, gender, date of visit diagnosis (according to icd10 codes), concerning diagnosis (according to icd10 codes), examination data, description of physical examination, description of recommendations made, and type of visit (in-person vs. remote).

The recommendations described by the doctors during the visits could be classified and coded into the following categories:

Table 1. Recommendation codes

Recommendation code	Name of recommendation	Recommendation
0	Z0	None
1	Z1	Other: follow-up, a continuation of treatment, drug recommendations, supplementation
2	Z2	Ordered additional results: laboratory, imaging
3	Z3	Ordered advice from another specialist: diabetologist, nutritionist, ophthalmologist, nephrologist, dermatologist, gynaecologist, cardiologist, neurologist, psychiatrist
4	Z4	Dietary recommendations
5	Z5	Weight reduction
6	Z6	Physical exercise
7	Z7	Psychological therapy and contact with mental health clinic suggested
8	Z8	Prohibition of alcohol/tobacco consumption, a recommendation to refer to addiction counselling, support groups
9	Z9	Rehabilitation (including occasional sanatorium)
10	Z10	Lower limb elevation, pressotherapy

3.4. STATISTICAL ANALYSIS

DESCRIPTION OF STATISTICAL METHODS FOR RETROSPECTIVE ANALYSIS

WILCOXON TEST

The dependence of quantitative variables on categories of qualitative variables was tested using the nonparametric Wilcoxon test [74, 75].

The Wilcoxon signed-rank test is a non-parametric statistical hypothesis test was used to compare the locations of two populations using two matched samples. It is a statistical method used to compare the distribution or location of quantitative data across different categories or groups of a qualitative variable. It is a robust alternative to parametric tests when the assumptions of normality and equal variances are not met.

By applying the Wilcoxon test, the researchers were able to assess whether there were significant differences or dependencies between the quantitative variables and the

categories of the qualitative variables under investigation. This nonparametric approach allows for reliable statistical analysis, even when the data do not conform to the assumptions of traditional parametric tests. Values of the calculated significance level p, which were less than 0.05 and are written in bold in the tables.

FISHER'S EXACT TEST

To examine the independence between two qualitative variables, the Fisher's exact test of independence was conducted [76-79].

The Fisher's exact test is a statistical method used when the sample size is small or when expected cell counts in a contingency table are low. It assesses whether there is a significant association between the two qualitative variables under consideration.

In this analysis, a significance level of 0.05 was chosen as the threshold to determine statistical significance. This means that p-values less than 0.05 are considered statistically significant and indicate evidence against the null hypothesis of independence.

The calculated p-values were compared to the significance level. If a p-value was found to be less than 0.05, it was considered statistically significant and is indicated by being written in bold. This indicates that there is sufficient evidence to reject the null hypothesis and conclude that there is a significant association or dependence between the two qualitative variables. On the other hand, if a p-value was equal to or greater than 0.05, it would not be considered statistically significant, and there would be no evidence to suggest a significant association between the variables.

By performing the Fisher's exact test and examining the p-values, we were able to assess the independence of the two qualitative variables and identify any statistically significant associations between them based on the chosen significance level.

DEFINITION OF "AT VISITS"

Age at visits is the age that we record for a patient at a visit, which may also be the age of the same patient at another visit. Thus, the average age at visits is not the same as the average age of patients whose visits are recorded.

Other recorded variables should be understood accordingly. For example, the location of the centre on visits. Here, the number of patients from a given centre whose visits were recorded will not be equal to the number of locations of a given centre on visits that were recorded during all visits, since the same patient may have visited the centre several times (at which we know it was always the same centre). Similarly, the frequency of a given diagnosis on visits will be different from the frequency of that diagnosis in registered patients.

The above distinction is important because the data collected makes it impossible to identify patients unambiguously. Therefore, all calculations refer to visits and not to patients. Nevertheless, below we have attempted to estimate the number of patients in our sample based on the date of birth, gender, and location, and attempted to estimate the average number of patient visits (respectively Tables A, B, and C).

3.5. ETHICS

The study received a positive opinion from the Bioethics Committee at the Medical University of Wroclaw (No. KB - KB-812/2018).

Retrospective data were fully anonymized, without the possibility of decoding, and, under applicable laws, provided by the health centres to the university for scientific analysis.

4. RESULTS

4.1. STAGE 1: EVALUATION OF INTERVENTIONS (H1, H2)

The authors on the base of the quality analysis of the selected texts categorized the studies into the following 14 categories described in Table 1. below. The critical appraisal was conducted and the decision of classifying the 47 studies was made by the authors to highlight the current literature focus and trends in the best practice guidelines and policies.

Table 2. Category of the priority focus in the selected studies [63]

	Category	Description
1	LIFE STYLE	The study highlights the role of lifestyle and modifiable risk factors: i.e. physical activity, dietary recommendations, etc. The study discusses the behaviour change process
2	SOCIAL FACTORS	The study highlights the role of social factors and the whole patient's environment in the process of his recovery
3	ECONOMIC FACTORS	The study highlights the role of economic factors in the effectiveness of health interventions
4	RESOURCES	The study highlights the importance of the resources' availability for the health care system in terms of human and technical resources
5	AWARENESS	The study highlights the role of various kinds of awareness in the process of achieving the best efficacy of the intervention
6	HEALTH LITERACY	The study highlights the significance of health literacy in the process of achieving the best efficacy of the intervention
7	PATIENT ENGAGEMENT	The study highlights the role of patient's and/ or at-risk patient's engagement in the process of prevention and control, study addresses the role of patient's adherence to recommendations
8	HEALTH CARE PROVIDER	The study reflects on the professional health care provider's role in the chronic patient journey toward better well-being
9	CAREGIVER	The study reflects on the non-professional caregiver's role in the chronic patient journey toward better well-being
10	POLICYMAKERS	The study reflects on the role of policymakers in the patient's journey toward better well-being
11	NETWORKING	The study highlights the role of networking interdisciplinary cooperation and communication between all stakeholders
12	SOCIAL CAMPAIGNING	The study highlights the role of social campaigning for chronic disease prevention and control
13	TECHNOLOGY	The study highlights the role of technology development in the health care system efficacy

14	LOCAL CONTEXT	The study highlights the significance of contextualisation, especially in terms of vulnerable populations

Barriers to implementation may arise at multiple levels of health care delivery: micro-, meso-, and macro-level.

1. Micro-level would refer to the individual stakeholders of the health care system: i.e. already diagnosed patient or at-risk patient, the care partner, the health care provider;

2. Meso- level would refer to the organisational level: i.e. hospital, clinic, and nursing home that provide infrastructure and other complementary resources to support the work and development of care teams and micro-systems;

3. Macro-level would refer to the market/policymakers level: i.e. regulatory, financial, and payment regimes and entities that affect the structure and performance of health care organisations.

Table 3. Barriers to and facilitators of intervention implementation concerning the level of intervention delivery [63]

Level of intervention delivery	Barrier		Facilitator	
Micro-level	6	Lack of health literacy in society recognised as a determinant of health [27, 28]	12	Targeted strategy to increase awareness, treatment, and control in individuals [80] health care professionals' awareness of challenges, patients gaining greater awareness [27, 28]
	8	Unclear professional boundaries, low compensation level, insufficient knowledge and capabilities [81]	11	Optimising the prevention, recognition, and care of hypertension requires a paradigm shift to team-based care [80]
	8	Disregarding patient's preferences for different health outcomes [82]	7	Meaningful patient involvement [83] patient self-management, patient-centred approach [20, 24]
	5	Community perception – lack of awareness of diabetes risk factors [84]	6	Patient's Health Information Seeking Behaviours – increase empowerment/focus on control, and satisfaction [85]
	8	Competence, motivation, and workload professionals [86]	1	Reduction of unhealthy behaviours and risk factors such as tobacco use and

				obesity [87, 88]
	1	Unhealthy behaviours and risk factors such as tobacco use and obesity [87, 88]	11	Engaging patients and stakeholders around multiple chronic conditions could improve the relevance of clinical practice guidelines [89] care management [20] interdisciplinary team approach [20]
	8	Not sufficient training for health care providers [20]	1	Physical Activity and Sedentary Behaviour, Activities of daily living, and health outcomes [89]
			9	Support from the caregiver, awareness of the caregiver [90]
Meso- level	8	Insufficient provisions of preventive services within primary health care and inappropriate referrals to ambulatory care [91]	14	Sustainability and scalability of pilot actions [83]
	4	Experiencing uncertainty among staff when implementing new programmes - multi-sectoral partnerships for chronic disease prevention [12]	13	Information technology [20]
	2	Unsupportive organisational and institutional environment [85]	4	Toolbox for the design and implementation of selective prevention initiatives [92]
	4	Unclear description of care pathways, addressing specific groups and the areas of health promotion [93]	5	Identification of a significant disease cluster [94]
	4	Obstacles to inpatient hospital access [95]	11	Applying managed care models [58] Developing and structuring cross-sector relationships [59] Well-established coordination and collaboration, collaborations across the boundaries of organisations [86, 96]
	11	Lack of proper communication and information [86]	11	Increasing staff involvement at the social context level may minimise barriers due to a lack of communication and cooperation [97]
	10	Hospital specialists and clinic GPs do not agree on Clinical Practice Guidelines [95]	11	A vertically integrated service model could optimise care and shift the care from hospital to primary care [98]
	11	Not engaging the community in the process of developing and introducing any new	6	Inter-professional practice and education to address gaps in care [90]

		programmes [99]		
	4	Limited resources including funding and the number of staff [84, 86]	11	Good teamwork: shared space, common vision and goal, clear definitions of roles and leadership [22]
Macro-level	6	System-level leadership to ensure that curricula for health care workers' training contain information on the importance of health literacy in their clinical practice, health system administrators provide signage and educational materials that are at appropriate literacy levels and representative of the languages and cultures of patients [82]	10	Regular exercising and reducing sedentary behaviours through policies to inform national health policies and strengthen surveillance systems that track progress towards national and global targets [100]
	10	Prevention has not collated the tacit knowledge of diverse actors in a structured way - lack of concept mapping [101]	14	The administrative evidence-based practice facilitates the role of public health departments in implementing the most effective programmes and policies [102]
	5	Understanding pathways for scaling-up public health interventions [103]	11	Collective sharing of challenges and opportunities and learning across countries [104]
	5	Most initiatives focus on individual-level capacity and not system-level capacity [23]	11	Co-creation [105]
	4	Fragmentation and misalignment of health care systems [96] Lack of framework to help strengthen systems [21]	12	Population-level evaluation and systematic media follow-up [93]
	4	Popularity and funding availability as opposed to effectiveness [106]	10	Political support, alignment with current health care trends, ongoing technical improvements, and capacity building [107]
	10	Conventional care prioritises maternal and child health, neglecting adult chronic diseases [93]	14	New models should be built on a bottom-up and dynamic approach, based on local needs, resources, and initiatives [92]
	4	Lack of human resources to respond to a growing demand for health care services for adult patients [95]	11	All national and local partners and stakeholders should be involved from the beginning of the planning phase and partnerships should be kept active throughout the process [93]
	4	Lack of necessary equipment to control chronic diseases such as diabetes and	11	Highlighting the importance of administrative evidence-based practice to the public

		hypertension [95]		health leadership level may enhance practice [102, 108]
	4	Shortages of free medication to treat chronic patients [97]	10	Government leadership: government-led, leadership-oriented implementation is the core for the prevention and control of chronic diseases [109]
	10	Lack of functional accessibility and gender bias [95]		
	10	Improper implementation – ending effective programmes prematurely or continuing ineffective ones [110]		

4.2. STAGE 2: WEB-BASED SURVEY (H1, H2, H3,H4)

TARGET GROUP PROFILE

The dataset consists of 50 values representing the ages of respondents. The ages range from 26 to 76, with a range of 50 years. The median age is 50.5, and the distribution of ages appears to be fairly symmetrical, with a few outliers on either end of the range. The most common age appears to be around 45, as there are two values at this age. The dataset is relatively large, providing a good representation of the age range of the respondents.

The survey results indicated that the gender distribution of respondents was 58.6% female and 41.4% male.

The dataset consists of 36 unique nationalities provided by the respondents. The nationalities include Polish, Italian, Hungarian, Spanish, Croatian, Czech, Slovak, Swedish, Turkish, Romanian, Lithuanian, Macedonian, British, Ukrainian, Portuguese, Kazakhstan, Israel, South African, Slovene, Nigerian, Irish, Algeria, British Overseas Citizen, USA, Zimbabwean, French, Australian, Greek, Malawian, Bangladesh, British Australian, Algerian, Indian, and Serbia. The data shows that the respondents come from a diverse range of nationalities, which may suggest that the sample population is also diverse.

The survey collected data on the place of practice for the respondents, and the results showed that 50% of the respondents practised in rural areas, 32.8% practised in urban areas, and 17.2% practised in suburbs. This information is important because

it can provide insight into the availability and accessibility of health care services in different areas.

The respondents represent a diverse group of health care and academic professionals, with a wide range of experience and expertise in their respective fields. Based on the responses provided, the current professions of the respondents include a range of health care professionals such as family physicians, general practitioners, nurse practitioners, psychologists, clinical trial coordinators, and specialists of general practice. The respondents also include a mix of academic professionals such as university professors, lecturers, and co-directors of Master of Science in Medicine programs.

The researchers aimed to gather information about the length of time health care providers have been caring for patients with chronic illnesses. A total of 58 participants were included in the sample. When asked about the duration of their experience in providing health care to chronic patients, responses ranged from 0 to 50 years. The median length of experience was found to be 20 years, indicating that half of the respondents had less than 20 years of experience, while the other half had more. On average, the health care providers had been caring for patients with chronic illnesses for approximately 21.81 years. However, the data had a relatively high degree of variability, with a standard deviation of 14.63 years, suggesting that some participants had significantly more experience than others. Overall, this information provides valuable insight into the level of experience among health care providers in caring for patients with chronic illnesses.

The range of 50 years indicates that the minimum and maximum values differ by a considerable amount. The median of 20 years indicates that 50% of health care workers have been providing care to chronic patients for at least 20 years. The mean of 21.81 is slightly higher than the median, which suggests that the distribution of the data may be slightly positively skewed. The standard deviation of 14.63 indicates that there is a considerable amount of variability in the number of years of experience, with some health care workers having much less experience than others.

NON-MEDICAL INTERVENTIONS

The results of the survey show that respondents have implemented various non-pharmaceutical interventions across several categories. These categories include diet, physical activity, weight management, smoking and alcohol cessation, disease prevention and detection, stress management, mental health, and social support. In the diet category, respondents have provided advice on lifestyle changes, education about food, and diet modifications. For physical activity, respondents have implemented various programs, such as exercise on prescription, supervised exercise therapy, and adapted physical activity. Respondents have also implemented programs for weight reduction and management, smoking and alcohol cessation, prevention and early detection of diseases, stress management, and mental health support. In addition, respondents have provided social support through patient groups, health, and well-being coaches, and connecting individuals with local support groups. The below chart describes in detail the categories of interventions.

Table 4. Categories of interventions

Diet	– Providing advice on lifestyle changes, diet, and lifestyle – Dietary habits education – Education about food – Diet modifications
Physical activity	– Plan of physical activity and lifestyle advice – Exercise/physical activity on prescription – Green gyms – Exercise programmes – Tourist groups – Walking – Exercising – Physical activity run by a physiotherapist – Physical activity (AFA - adapted physical activity) – Nordic walking – Exercise activities – Supervised exercise therapy – Exercise advice – Plan of physical activity – Regular exercising
Weight management:	– Programmes for weight reduction – Prescribing physical activity – Weight control

	– Encouraging weight loss – Losing weight courses – Weight loss programs – Education about elevated blood pressure/cholesterol/blood glucose – Weight management
Smoking and alcohol cessation	– Smoking cessation – Stop smoking advice – Stop alcohol risk use advice – Groups for cessation of smoking – Quit smoking
Disease prevention and detection	– Prevention and early detection of diseases – Prevention and digital – Health protection – Health promotion – Monitoring the health of the population – Scientific research in public health – Approval and implementation of the e-Health Strategy – Development and implementation of integrated information systems in health – Modernization of the public health service, with an emphasis on the regionalization of high-performance hospital services – Promotion of a healthy lifestyle – Protection of the population against health risks – Ensuring coordination at the local level – Therapy education – Podiatry – Device-guided breathing
Stress management	– Stress management – Relaxation therapy – Mindfulness – Psychotherapy (behavioural therapy) – Psychotherapy (ACT, CBT) – Managing emotions needs – Various hobbies – Manual work – Art – Expressing oneself in various things (collective or individual)
Mental health	– Referral to mind mental health support – Encouraging yoga, meditation, and exercise referrals – Alternative medicine - natural products (herbal) and homoeopathy – Connecting with local support groups – Osteopathy – Psychology – Health seeking behaviour – Avoidance of harmful habits – Brief motivational interviewing
Social support	– Social prescribing

	– Social support – Patient groups – Encouragement to talk to family and friends – Group support – Living well coach – Health and well-being coach – Care navigators – Signposting to local services or groups – Connecting with local support groups – Meetings in care homes – Gatherings in the community with discussions and learning – Groups for cessation of smoking – Groups for diets and weight loss – Changing of lifestyle – Exercise every day – Expertise courses – Losing weight courses – Tourist club – Senior meetings – Field nurse – Nurse with special knowledge (specially trained in the management of diabetes, and hypertension) – Domestic violence worker – Alcohol & drugs worker

The survey asked health care providers to rate their level of satisfaction with the offer of non-medical interventions for people with chronic conditions in the region they work in on a scale of 1 (very dissatisfied) to 5 (very satisfied). The results showed that 8.6% of respondents (5 individuals) answered 1 (very dissatisfied), 32.8% (19 individuals) answered 2, 36.2% (21 individuals) answered 3, 17.2% (10 individuals) answered 4, and 5.3% (3 individuals) answered 5 (very satisfied).

The survey asked respondents whether the interventions they implement were evidence-based, and the results showed that 77.6% of respondents answered yes, while 22.4% answered no.

CHALLENGES INVOLVED IN THE IMPLEMENTATION OF NON-MEDICAL INTERVENTIONS

In a survey, health care professionals were solicited to provide details of non-pharmacological interventions, they have implemented in their practice. The responses gathered were diverse and subsequently categorized thematically into the lifestyle and behavioural changes, health promotion and prevention, health care system

improvement, and support and referral. The information derived from this survey offers critical insights into the range of non-pharmacological approaches employed by health care professionals to promote the health and wellness of their patients.

From the responses given, the challenges involved in the implementation of non-medical interventions in health care practice can be classified as follows:

TIME-RELATED BARRIERS

The responses suggest that there are many challenges related to time constraints in health care practice, including a lack of time for patient consultations, too many obligations for family doctors, insufficient time for nurses to attend to patients, limited time for discussion and planning with resources in the community, urgent and unscheduled care demands/workload, and limited time for treating patients due to other shared activities with physicians.

The lack of time is a significant challenge for health care professionals, including family doctors and nurses. They face a heavy workload, urgent and unscheduled care demands, and limited time for patient consultation, discussion, and explanation.

STAFF–RELATED BARRIERS

The responses suggest that there are several challenges in the health care system related to staffing and resources. These include a lack of time and staff who can help in the care process, a shortage of qualified professionals, not enough staff to work with patients, limited availability of staff and time, and a lack of workforce including social nurses and carers. Additionally, limited resources appear to be a common challenge in providing quality health care services.

PATIENT-RELATED FACTORS

These answers refer to patient-related factors that can impact the implementation of behaviour changes and interventions aimed at improving health outcomes. They include challenges related to patient compliance, education level, motivation, and willingness to cooperate. Factors such as insecurity, poverty, and difficulty in adhering to the diet or exercise regimen are also mentioned. Overall, these answers suggest that

patient-related factors can play a significant role in the success of interventions aimed at improving health outcomes.

POLICY AND FINANCIAL FACTORS

The answers under the policy and financial factors include the lack of adequate funding for prevention programs, poor coordination with local authorities, the need for collaboration with social care, and the financial and infrastructural background of the health care system. One of the main issues is the financial and infrastructural background, which can significantly affect the quality of care. Collaboration with social care can also be a challenge, particularly when there is poor coordination with local authorities. Additionally, prevention programs often do not receive adequate funding, which can limit their effectiveness in addressing health issues. These challenges can have a significant impact on the overall quality of care and outcomes for patients.

EDUCATION AND AWARENESS

The answers related to education and awareness indicate that there is a lack of knowledge and information about available interventions, with some respondents noting that prevention programs are not well-promoted in their area. Additionally, some health care staff may only believe in a medical model, and evidence-based advice may not be popular or supported by the country's policy. The challenges related to education and awareness in health care settings can significantly impact the success of interventions. One of the most significant obstacles is limited knowledge and awareness of the available non-medical interventions that could benefit patients. This lack of knowledge can stem from insufficient information and guidelines, which can make it challenging for health care professionals to know which interventions to recommend.

OTHER FACTORS

The additional factors raised related to chronic disease care include support from colleagues and potential backstabbing, poor patient compliance, transportation challenges, myths and beliefs of patients, limited access to resources such as grocery stores and group support, regular check-ups for diabetic patients, availability of facilities, incentives for health care professionals, and time pressure. These factors

can have a significant impact on the quality and effectiveness of chronic disease care and highlight the need for a comprehensive approach to addressing these challenges.

THE BARRIERS AND FACILITATORS ON DIFFERENT LEVELS OF HEALTH CARE DELIVERY

The survey questions have been categorized into various levels and categories to gain a better comprehension of the barriers and facilitators that are present in the management of chronic diseases and at-risk patients.

1. Chronic patient level - the survey explored the barriers and facilitators that chronic patients faced in managing their condition.
2. At-risk patient level - this section of the survey focused on patients who were at risk of developing chronic diseases and examined the barriers and facilitators that impacted their ability to make healthy lifestyle choices and access preventive care.
3. Care partner level - this section of the survey focused on non-professional care providers, such as family members or spouses, who supported and provided care for individuals with dementia and explored the barriers and facilitators that care partners faced in supporting their loved ones.
4. Health care provider level - this section of the survey examined the barriers and facilitators that health care providers face in providing quality care to patients like access to resources, patient education, and support from other health care professionals.
5. Organizational level - this section of the survey explored the barriers and facilitators that exist within health care organizations and examined factors such as organizational culture, communication, and resources that impact the delivery of care.
6. Market/policy level - this section of the survey examined the barriers and facilitators that exist at a market or policy level and included questions about access to care, health policies, and other factors that impact the delivery of care.

By asking specific questions related to each of these groups, the survey aims to identify the barriers and facilitators that exist at different levels and provide insights into how to improve care for chronic and at-risk patients.

CHRONIC DISEASE PATIENT LEVEL

The main barriers at the chronic patient level include lack of time and skills, lack of support, old-fashioned mentality, low motivation, poor compliance, financial barriers, and transportation issues. Other barriers include poor health literacy, lack of resources, poor patient compliance, and limited access to interventions in rural areas. Addressing these barriers may require qualified professionals, patient commitment, better communication, and greater awareness of the importance of healthy lifestyles.

At the chronic patient level, the facilitators include local programs, official guidelines, positive family/work/environment factors, support from health care professionals and apps, peer support, primary care teams, online resources, patient education campaigns, willingness to improve, accessibility, human resources, and public health messaging. Patients are interested in non-medical activities, community support, and information about their condition. Additionally, patients with chronic illnesses have a lot of knowledge about their disease and desire to feel in charge of their condition, as well as have a positive attitude and hope for a good outcome.

AT-RISK PATIENT LEVEL

The barriers at-risk patient level present a range of factors that impede the provision of adequate care to patients who are at risk. Common barriers include the insufficiency of time and personnel, inadequate support, mobility tools, and carers. Additionally, patient-related factors such as lack of motivation, low income, busy work schedules, under-motivation, and low health literacy are significant challenges. The barriers are further compounded by the lack of ongoing training, equipment, and supplies, as well as patient fears and reluctance. Factors such as distance from healthcare facilities, poor awareness of clinical risk, and negative attitudes also add to the difficulties in providing care to at-risk patients.

The facilitators' at-risk patient level involves a proper system to identify patients at risk, official guidelines, supporting families, the relationship with health care providers, fear of getting sick, social media, health-conscious lifestyle, wanting to avoid disease, effective social campaigns, trust in health care professionals, accessibility, adequate education, availability of resources, prioritization, and presence of guidelines. Family support, recognition of signs of deterioration, community nursing visits, and

integrated primary care networks are also facilitators. Effective communication between health care professionals and patients, the use of screening systems, and the use of evidence-based guidelines are essential facilitators to overcome barriers and improve care for patients at risk.

CARE PARTNER LEVEL

At the care partner level, some of the barriers include lack of time, knowledge, and practical information about health and diagnoses, fatigue and burnout, and social and economic burdens. Partners who are elderly, have limited mobility or cognitive abilities, or lack basic medical knowledge may struggle to provide the necessary care and support for their loved ones. Additionally, caring for a partner can be emotionally exhausting and may lead to feelings of isolation and shame, particularly if the partner has a stigmatized condition.

The facilitators for care partners include having access to additional support, such as community organizations and social prescribing, having a good understanding of the patient's condition and emotional involvement in their care, and having infrastructure and societal support in place. Care partners who can access financial and social support, have opportunities for respite, and receive adequate training and instruction may be better equipped to manage the care burden and provide effective support for their loved ones.

HEALTHCARE PROVIDER LEVEL

The summary of barriers and facilitators at the healthcare provider level is a collection of various factors that affect the quality of care that healthcare providers can provide to patients. Some barriers include lack of funds, time constraints, negative personality traits, lack of education, and lack of interest from health policy-makers. On the other hand, facilitators include the availability of additional staff, appropriate education, interesting topics, teamwork, digital tools, and continuous control of diseases. Some other factors that were mentioned include the need for ongoing training, access to relevant resources, the availability of medication and facilities, and the promotion of non-medical interventions. Finally, some challenges identified were poor expertise, lack of time, recruitment difficulties, and the difficulty in evaluating the success of interventions.

ORGANIZATIONAL LEVEL

The barriers to implementing interventions at the organizational level in health care include difficulties in communication between medical and community organizations, lack of expertise and connections with providers, poor management, poor funding, lack of resources and personnel in rural areas, lack of political will and senior management support, bureaucracy, limited funding and opportunities for feedback, and fixation on quantity over quality care. Decision-makers may not prioritize primary care or follow crucial documents from organizations such as the UN, WHO, and OECD. Time pressure, the NHS crisis, and systems designed to measure medical interventions and funding also contribute to these barriers. Collaboration and teamwork are required to overcome these obstacles.

The facilitators at the organizational level for health care include staff, time, and financial support, as well as the ability for social prescribing to reduce attendance and unrealistic expectations from the medical sector. Other facilitators include availability and accessibility for patients, international cooperation and grants, teamwork, willingness to join pilot projects, and support from local policymakers. Non-medical care is cheaper for national health funds and community health workers, as well as medical centres with both medical and non-medical services, which can improve patient satisfaction. Support from top management, involvement of a chronic care directorate, clear guidelines, and under one roof multiple facilities are also important. Local councils and primary care can be supportive of non-medical interventions, and group interventions can be suitable, but support from management and a correct political vision are necessary for economic and personnel investments in the social and health sector.

THE MARKET/POLICY LEVEL

The market/policy level barriers for social prescribing encompass several factors, such as the absence of a long-term vision for prevention, lack of proficiency, financing, insufficient support from the government and social activity providers, self-centeredness, and profit-oriented mentality. Lack of lucid policies, health care commercialization, complexity, and inadequate social and health personnel owing to poor political insight contribute to these barriers. Additionally, the official line

of treatment hinders social prescribing, while tick-box approaches and lack of evidence-based care services further complicate the issue. Government policies also oppose non-pharmaceutical methods, and regulations, funding, and fixed doses remain insufficient. Furthermore, the government prioritizes technological health interventions instead of establishing strong social communities to support unwell people.

Facilitators for social prescribing at the market and policy level include various programs related to occupational medicine, stakeholder promotion of certain activities, the need to reduce expenses, policies supporting the methods, and government engagement. Other facilitators include advocacy groups, education and enlightenment, international cooperation, grants, and national and local lobbying and support groups. Additionally, social assistants and testimonials from chronic patients, along with combinations of drugs and competition from national providers, can act as facilitators. It is suggested that the growing interest in prevention at the national level, as well as profitability, in the long run, may also facilitate social prescribing. Furthermore, an increasing amount of evidence and research on the effectiveness of such interventions, including financial impact, can be a facilitator.

KNOWLEDGE OF THE PATIENT'S NEEDS

Participants were asked if they had knowledge of the patient's needs, barriers, and facilitators required to meet those needs. The survey found that the vast majority of respondents (93.1%) claimed to have familiarity with these aspects of patient care. This result suggests a high level of awareness and engagement among the survey participants with the factors that impact patient care and support, indicating a positive attitude towards understanding the complexities of providing comprehensive and effective care for patients. This level of familiarity could be attributed to the growing recognition of the importance of patient-centred care, as well as the increased attention and resources dedicated to improving health care systems to address patient needs.

In addition to being asked about their familiarity with patient needs, barriers, and facilitators, survey participants were also asked whether the organization they work for knew and prioritized those needs. The results showed that 62.1% of participants responded affirmatively, indicating that their organization was aware of and placed

importance on meeting patient needs. However, 37.9% of respondents answered negatively, suggesting that their organization did not prioritize patient needs.

CAN THE INTERVENTIONS BE TAILORED TO MEET LOCAL NEEDS?

The question of whether interventions can be adapted, tailored, refined, or reinvented to meet local needs was presented to the survey participants. A vast majority of respondents, 98.3%, answered in the affirmative, indicating that they believe interventions can indeed be customized to meet the specific needs of a given population. This suggests that the participants have a positive attitude towards the idea of tailoring interventions to the unique needs of a particular community and that they believe it is possible to do so. The willingness to adapt and refine interventions in response to local needs is an essential component of effective health care delivery, as it helps to ensure that interventions are relevant, appropriate, and effective in addressing the specific health concerns of a given population. Answering Do you think that the interventions can be adapted, tailored, refined, or reinvented to meet local needs – 98.3 % answered yes.

SUGGESTIONS FOR IMPROVING THE EFFECTIVENESS OF INTERVENTIONS

Based on the responses, to make interventions effective, it is important to have a vision for the future, clear funding structures, and guidelines for those involved. Community-oriented primary care, better collaboration between health care providers, and more social and preventative programs are recommended. Adequate staffing and resources, online access to support, and training and retraining of health workers are important. Local input and customization of services, as well as evaluation and monitoring of outcomes, are crucial. A holistic and sustainable approach is needed, with a focus on patient engagement and support.

Below are some responses that were provided by the respondents.

- "Having a clear vision and structure for funding interventions, as well as clear guidelines for who should be involved in them."
- "Working with patients, including involving them in voluntary work and community projects, and promoting the advantages of social prescribing in the media."

- "Creating a space for people to meet and participate in activities like exercise or educational presentations."
- "Supporting guidelines but allowing for local adjustments and attitudes."
- "Implementing community-oriented primary care and improving collaboration between family physicians, community nurses, and social workers."
- "Increasing staffing to allow for more time and better communication."
- "Encouraging a desire to do beautiful things and emphasising the importance of personal skills."
- "Raising awareness, allocating resources, and meeting with the community to better understand their needs."
- "Conducting proper research and evaluation to ensure effectiveness."
- "Focusing on the biggest problem locally and taking a realistic and holistic approach to service provision."
- "Discussing with local stakeholders and ensuring sustainability through cooperation with health care and community organizations."
- "Providing funding for efforts and research into effective implementation."
- "Training personnel at all levels and asking people what they would like most."
- "Enhancing the autonomy of stakeholders in local territories and shaping local services to meet their needs."
- "Providing online access and integrating it with in-person support, as well as identifying chronic disease champions."
- "Making interventions more bespoke to local resources and involving government and local community organizations."
- "Establishing clear protocols, providing effective supervision and support, and ensuring good remuneration for personnel."
- "Starting with an interdisciplinary approach and including non-pharmaceutical treatment methods in policies and nursing curricula."
- "Making sure all required resources are available, proper planning, and having a correct political vision of the problem, greater economic investments, and an adequate organization of social and health services."
- "Decentralising for local availability and improving detail and timeliness in hospital discharge summaries."
- "Providing government aid, bench-marking with centres of excellence, and engaging patients more."

- "Ensuring availability of staff with time to support them and using tools like hand holding apps."
- "Evaluating impact at all levels and conducting economic modelling to ensure effectiveness."
- "Implementing interventions in a system setting."

ADEQUACY OF TRAINING IN NON-MEDICAL INTERVENTIONS IMPLEMENTATION

This study assessed the distribution of respondents' perceived adequacy of training in non-medical intervention implementation. Using a 5-point Likert scale ranging from "very limited" to "excellent," participants were asked to rate their level of training.

The results showed that 6.9% of the respondents felt their training was "very limited" (rated 1), while 20.7% rated their training as 2, indicating some limitations. The majority of the respondents rated their training as average, with 34.5% indicating a score of 3. The next highest rating was 4, with 31% of the respondents feeling they were adequately trained in non-medical intervention implementation. Only 6.9% of the respondents rated their training as excellent (scored 5).

Health care professionals (HCPs) have identified several categories of areas in which they would like to receive additional training. These categories range from specific skills related to patient care to more broad topics related to the health care system as a whole.

- Patient and caregiver training: How to train patients and caregivers, and choosing appropriate staff for interventions.
- Motivation and intervention: Increasing motivation, knowing when to start intervention, tools for patient motivation, and lifestyle changes.
- Pain relief and mental health: Pain relief, mental and psychological support, and counselling skills for addressing diabetes distress.
- Social support: Volunteering, mutual aid, befriending, self-help, social work, and promotion of ideas.
- Communication and medical psychology: Communication, medical psychology in general, and patient monitoring and assessment.

- Physical activity: Exercise prescription, prescribing exercise and weight loss interventions, and lifestyle medicine.
- Holistic approaches: Incorporating evidence-based non-medical interventions, mindfulness-based treatments, and alternate paths.
- Addictions and ICT.
- Social prescribing and evaluation: Social prescribing, effective evaluation, and economic modelling.
- Management and organization: Management of social welfare services, IT skills, conferences, professionally printed matters, and organization.
- No specific area: Some HCPs did not specify a particular area, while others indicated that training would depend on the availability of services in their area.

THE COVID OUTBREAK

The impact of the Covid-19 outbreak on post-diagnostic care for people with chronic diseases has been significant. According to a survey, 35.1% of respondents reported a decrease in the availability of post-diagnostic care and support, while 28.1% found it more difficult to access new post-diagnostic care and support. 14% of respondents reported a shift towards an online focus for post-diagnostic care and support, while 10.5% were unsure of the impact. However, a small percentage of respondents reported that there has been no impact on the availability of post-diagnostic care and support, while some reported that there is no post-diagnostic care and support available anymore.

4.2. STAGE 3: FOCUS GROUPS (H1, H2, H3, H4)

BARRIERS AND FACILITATORS TO THE IMPLEMENTATION OF NON-PHARMACOLOGICAL INTERVENTIONS

INEQUALITIES (H2)

"There are many associations that formed during the implementation of various projects, including during the pilot of Primary Health Care plus, because we saw the differentiation in cities, where, however, the identification of the patient is much less than in the centres of rural areas." (G1P3)

“The difference between rural and urban environments, on the other hand, please note that the economic status of patients often does not allow them to get to their appointments even if that patient goes to a family doctor, it is later an economic problem and not necessarily a desire or lack of desire to seek help.” (G1P1)

“Finances are such a barrier that he (the patient) won't get to the city because he simply can't afford the ticket or here where I live it's in the suburbs there is no public transportation, so always to go to the doctor from my village moments you have to ask a neighbour to drive him by car to the city, so these are problems.” (G1P1)

“It is also the economic status of patients. Sometimes they cannot allow to eat more fish for example, or some fruits and vegetables, because it is more expensive than other kind of food. So that is why they eat not healthy food and have some problems with their health.” (G2P1)

“Another point is cost-effectiveness because it is difficult for clinical efficiency to offer access to testing, to screening, or to detect risk if there is no clear benefit. (...) This is important in terms of understanding the difficulties of health care and evaluating effectiveness in conjunction with the health care system. Not all countries have the same opportunity to adopt or incorporate certain technologies, certain treatments because they have to consider the context of the health care system.” (G2P4)

“(...) In addition, one of the important points regarding the management of the health system is the digital exclusion of some people, such as those who do not have enough skills to work with these modern tools, and those who live in poor regions.” (G2P4)
“Also, the digital exclusion of technology of some regions or some countries, because they have very great difficulty in using friendly technology because they are in poverty, where it is not possible to have this technology.”(G2P5)

“For example, we don't have access to gyms, sports clubs, to the swimming pool because it is closed because of war. So people don't, we don't have electricity a lot of time, so people stay at home and we can go even outside because it is dark; it is dangerous because the car cannot see you as a walker, so people are staying at home and are not physically active. It influences the health of people badly. Another thing is that people are is anxiety and depression and in stress and they eat more and

more sweat and fast food it also influences obesity, diabetes and also stresses influence the high levels of arterial hypertension and blood pressure and glucose levels, and so on. Also right now (war) we do have not enough contact with our patients because of this situation and we need to contact them at a distance and cannot monitor their status well." (G2P1)

LIMITED RESOURCES (H1)

"On the other hand, often developers of prevention programs focus only on using doctors, and it is known that this is a severely limited resource. And, after all, it is not the case that a lecture on, say, breast cancer prevention must be given by a doctor, why not a nurse or midwife." (G1P5)

"One of the barriers that come to mind: we see that the health care is very old fashioned and it has to be modernized a little bit. Or not only a little bit, quite a lot and as you are. I think this is the main problem. So it's the knowledge of the practising medics and health care staff of the possibilities of new technology." (G2P1)

"So I would say that the main barrier is low motivation. It can be divided into. Low motivation on the part of the medical team, and low motivation on the part of the patients and the part of the medical team. We don't have funding for preventive measures, or non-pharmacological interventions, we don't have the time to do it. We don't have enough, maybe trained staff to provide motivational consultations. So not all doctors and not all nurses would want to teach the patient, teach them how to change their lifestyle to a healthier one, and besides, it's difficult, so that's why it's at a low level in my country." (G2P1)

"So I think for the effectiveness of the intervention, the best thing you can do to directly support the patient is to use some kind of mobile device to give direct feedback. But I think to solve the problem is really beyond the scope of the health care system."(G3P1)

GOOD PRACTICES AND PILOT PROGRAMMES (H2)

"I'm very impressed with what the primary health care plus program has done because I'm also on this Whatsup group and these people don't have a day off

at all. Saturday, Sunday they always exchange experiences with each other that's what's valuable is that they activate each other." (G1P1)

"We have some experience, some mechanisms (in implementing prevention programs), just still either lack of time or lack of people. Well, some stimulus is needed. Of course, the financial stimulus is important." (G1P3)

"In various places around the world, there are projects with good practices and systems for implementing prevention, but when the program ends nothing comes out of it further, no simple solutions that would be available to every person, when a demo or pilot ends somewhere, later no one remembers about us (patients)." (G1P2)

"We are just left with the problems of funding servers, domains, and the enormity of patients who are waiting for bracelets (medical devices bought with project funding). No letters of request help, and we are left with several hundred patients who wear our bracelets, we have information here that on more than one occasion we managed to save someone, ahead of this time of saving health." (G1P2)

"Other countries/regions will want to copy this (good pilot program) if it works in practice. So we hope to have some good pilots/projects working. The program is not only to show, but also to find new solutions, innovative solutions, and show effectiveness. But then it has to be followed up by the universal health care system. The health care system in most countries now invests 1 or 2% of the total amount in prevention, that is, in public health campaigns, and the rest 98% is invested in treating sick people, instead of starting work before people get sick, but that's the hard part. I think the political level is starting to realize this and is becoming more open to suggestions. But we also need to get health care decision-makers on board with the system." (G2P3)

THE CONDITIONS FOR EFFECTIVE PREVENTION

ENVIRONMENT (H1, H4)

"So how important is this environment? Environmental conditions are of great importance. Well, I also do not hide the fact that the level of education varies, and

it varies, doesn’t matter if it is a rural or urban area. People if they don't want to know, they just have to experience something in the family to get educated.” (G1P1)

“On the one hand, it should be just such a fragmentation, lack of coordination of pro-health activities, of which there is a very large number, in fact, in Poland from different environments, and different institutions, but they are scattered, a little lack of complementarity here, lack of such a uniform good quality in these programs, because, unfortunately, what follows this fragmentation even among, for example, health policy programs implemented by local governments, you can see a different quality and different levels of refinement when it comes to financing, sources are very scattered and this certainly does not affect the effectiveness of preventive measures.” (G1P5)

“A few highlights of what we think is needed in terms of research include the definition of personalized prevention, which should not be confused with normal public health prevention programs, but as the word says, it is more personalized. It takes into account all available data not only the patient's disease and health status but also takes into account environmental factors, as well as the patient's social status. All this data is important in designing personalized prevention.” (G2P1)

“What is the biggest challenge in implementing interventions in everyday life? I suppose the biggest challenge is that we don't have a really strong state program and funding for that program to implement better health prevention for the people of Ukraine, and as a result, we have cardiovascular disease as the No. 1 mortality rate in Europe, we have about 7-8% diabetes in our population and about 30% obesity.” (G2P1)

“So I suppose after the war we may continue our better prevention, but I suppose we will have a lot of challenges because of the effects of the war, depression and anxiety and the loss of patient monitoring” (G2P1)

“When it goes to education, educating people to eat better, to exercise, but also can provide support for the elderly and others, we're back to social policy, right? So sometimes chronic diseases are a burden, of course, but if you're alone to carry that burden, it's even heavier, while you have a social system, which consists of health care,

of course, but maybe also social policy, housing policy, and so on. The situation is better, so it's the intervention that's more effective." (G3P2)

ORGANIZATIONAL AND LEGAL PROBLEMS (H2)

"I agree that there are organizational and legal problems, but in my opinion, this is a secondary problem, the problem in the ineffective use or development of prevention in Poland lies deep in our culture. Let's see how we use the offer of preventive examinations in Central and Eastern Europe compared to other Western European countries." (G1P4)

"The problem lies in the system which is a bit scattered; let's be honest often uncoordinated activities I want to do something in the region, take some initiative, this is not a criticism, but a lack of coordination at the same time and such a coherent vision of prevention." (G1P4)

"Legislative documents can control the quality of food, the quality of food in schools, workplaces, and so on. We have some legislative documents and standards for food, but sometimes it's not true. They write some ingredients, but it's not quite correct, because they may add something that is not in the ingredients. So we have some problems in this area, and also, for example, we have some government programs and laws, such as don't smoke in public places, but people still smoke and it's passive smoking for other people. How to improve this? It can be government programs, programs, state programs, legislative documents, and promoting healthy lifestyles from television, from state programs and motivating people, uh to be more physically active actively and to eat healthy food and to change their lifestyle to a healthy lifestyle." (G2P1)

"Some sort of a complex system of policies mentioned like the sugar tax (…) even if you tax like Coca-Cola or you know drinks with a lot of sugar, still they're cheaper than healthy and organic food. So what you need is also some kind of economic policies to incentivize the consummation of this, of this kind of producers." (G3P2)

"So when it comes to the challenges in implementing the intervention, I would say that the challenge is the combination of policies from different ministries

or different, responsible political bodies. And obviously, there's also a matter of financial choices." (G3P3)

CULTURAL BACKGROUND (H1)

"Well, this is a significant difference, as it were, we have little trust in the system, and we use these solutions less often, I have such a feeling that even if someone took us in a golden carriage to these examinations, there would be a problem. Ultimately, it is necessary to change the attitude or to undertake, nevertheless, those actions that are being taken, which may now be criticized that are not fully effective, because in fact if in Poland you want to do an examination, you will solve this problem. You will find a patient organization that will help you solve the problem, and you will find a primary care doctor who will help you, it seems that the offer is available, but the problem is often in ourselves. We have the level of primary health care available a wide range of tests offered to patients. I think that we have all these problems defined, while there is still the problem of inactivity on the part of the patients themselves already." (G1P4)

"I have this impression that in Poland we attach too much importance to restorative medicine. I was observing how eagerly entities were to join prevention programs funded by the national health fund. It was that we won a grant well that's great, but after that, there was no such force in the implementation of these projects." (G1P4)

"On the other hand, what we also revolve around here repeatedly, that is, the low enrollment in these programs, the low interest on the part of patients is indeed to a large extent certainly a cultural issue." (G1P5)

"Patients don't want to change their lifestyle. They, would like to continue their traditional consumption of different types of food." (G2P1)

"I think that people don't want to change their lifestyle." (G2P3)

THE ROLE OF MARKETING AND PROMOTION (H4)

"On the other hand, it is also worth noting the purely administrative activities, such as sending Letters of invitation or such marketing activities, such as if we were selling a product, that is, some billboards advertising on television they bring little effectiveness and are I think cost-ineffective it is better when a person is convinced by a person in a direct conversation please note how only effective, how well working are screening programs for newborns of small children. as part of postnatal care or in the hospital or later visits to the paediatrician, this care for the newborn or parents translates into the fact that we have a very large range of use of these tests are, however, quite a lot. Such parents, however, do not let go, they care about the health of their children, well, however, with adults it looks completely different we often neglect our health." (G1P5)

"I would suggest when thinking about advertising moments of certain activities to think from the perspective of advertising aimed at the public patient because then there is a chance that under the law public television broadcasts it for free." (G1P1)

"Maybe we like what we eat, we like what we do, so we don't want to change. And I think that's when the personalized approach can be powerful, because when you identify the risk as a statistic: if you smoke, you might have lung cancer one day. Maybe you need to personalize and say if you smoke, the risk of you getting lung cancer is 90%, 100% will make a difference. I think this is an element that we should take into account in prevention. The example of smoking is a good one. Everyone knows that smoking is harmful. We've known for at least 50 years that it causes lung cancer and also heart disease. And there is no positive benefit except that some people like it and get pleasure from smoking. This is a good example of people not following the recommendations. Even so, we see that the number of smokers is decreasing among the younger generations, partly as a result of the anti-smoking campaign. The same goes for healthy eating and physical activity, and so on." (G2P5)

EDUCATION/ SKILLS IMPROVEMENT (H3)

"Recently in Wroclaw, a very interesting event has taken place: primary health care doctors from all over Poland, among them active, who decided to spend their money and spend 2-3 days to participate in such an educational event, very enthusiastic

about the fact that, that the opportunities related to coordination care are expanding, and they have looked at it from different perspectives; on the one hand as an opportunity for professionals to develop their skills, an opportunity to gain additional funding for their companies, a benefit for patients, so they saw an opportunity for such a proactive attitude that will pay off for them and their patients, and some were more sceptical." (G1P5)

"When there is a shortage of doctors, for people in smaller towns, group talks would be good, for example, with the cooperation of an educator and people with the same conditions, but so far this has not worked. This is a good option to test in the future." (G3P3)

"What are the barriers? I don't know if we should differentiate between pharmacological and non-pharmacological – in my personal view, the barriers and facilitators are similar. And I think that one barrier is simply the lack of understanding of the health care workers, so where we need more education. Also, not only of the future staff, not only of the students in the universities but also the already practising people." (G2P1)

PATIENTS' NEEDS (H1, H4)

"Are patients' needs known and prioritized? Unfortunately, no. Only the primary health care plus program began with a study of patient needs. No one is studying the needs of patients, because then it would be known that there is a problem with accessibility, that there are economic problems with getting to a specialist. We need to make systemic changes, we need to know, and even patient organizations do not even do this, they do not study the needs and expectations of their association members. We have a lot of catching up to do when it comes to patients." (G1P1)

"There is another thing that has been discussed a lot- ethical issues around prevention. On the one hand, you don't want a patient at risk of developing a disease to be discriminated against because of this issue of confidentiality. And I would say that medical safety is very important. And there's also this thing that we need to know when we're talking about prevention, specifically, when it comes to life-threatening diseases, whether the patient wants to know or not. And this is a difficult issue. So that's if we get to something very personal. It also means that, well, dialogue with the medical doctor

is very, very important, and that the doctor must be trained to explain what the risks are." (G2P5)

"I would say there are chronic diseases, there are more known. (…) So in European countries, they have big patient organizations. There are big lobbies, but in a good sense, that can advocate for them at the European Parliament, at our national organizations and I think our national political bodies at the same time. Not all chronic diseases are equally represented in the political arena, so I'm not sure that patients' needs are entirely known, and most of all when it comes to priority, making priorities of their needs, a lot depends on how much is their disease known." (G3P2)

"There is little knowledge of the patient's needs and when it comes to smaller communities, their voices are not equally heard everywhere. I think patients' needs probably are to quite a degree known, but prioritization is a difficult topic.' (G3P3)

AREAS FOR IMPROVEMENT (H3)

"Promoting best practices seems to be a reasonably effective solution." (G1P2)

"An effective way to implement this prevention in the relatively long term just applies it so not occasionally, but apply and with coordinated care." (G1P3)

"It will be important to move away from the bottlenecks of the system, using only doctors for prevention, population-based research but focused on very high-risk groups and there working with the patient to get these screening tests done." (G1P5)

"A large role to play has a doctor, who is closest to the person, not only a doctor, by the way, because here the inclusion of other medical professions nurses, midwives, well, and other professions so psychologists, nutritionists, paramedics all these professions, all these groups have their goals, their competencies to affect education or in terms of, possibly some research." (G1P5)

"I think we need other types of employment other than the medical doctor and nurses and so on. We need digitally literate people. Not everybody has to understand the code and but at least if you have some people in the system who do understand this and can do more motivational consultations, they don't need to be medical doctors because they have enough other things to do. So I think there is an opportunity also for universities to offer some kind of an additional curriculum to have some kind

of specialization as a consultant in this area without being a medical doctor or nurse." (G2P4)

"What would be good would be the activation of proactive measures on the part of the leaders themselves in the medical community." (G1P5)

"Of course, not also questioning the impact on the entire population, especially about those risks to public health common and affecting precisely chronic diseases, such as smoking, being overweight, lack of physical activity, etc., but here a very large role of education simply and this education starting from schools and some kind of such health education, health education in schools from childhood, to shape this for life." (G1P5)

"This is a matter of knowledge and awareness of the personalized medicine approach. In cancer, for example, the knowledge is quite advanced, but in practice reserved for a very limited number of patients. Maybe we should identify specific people at risk and see how we could have a personalized approach to their prevention, instead of just saying it's easier to ban alcohol, ban tobacco - it's a simple approach, but coming really to identifying people at risk, it's much more complicated." (G2P2)

"There is some competition at the bottom, but among the giants, there is also competition for resources or competence, right? Between the ministries of health and the companies, for example; when we went into this primary care project, we wanted to really sort out a little bit and support the work of primary care teams, not necessarily just the doctors themselves, but whole teams, and we knew that good things are happening in different regions, different programs, local initiatives and so on. We wanted to make sure that already in the computer software at the providers, when the patient comes to see the doctor or the person who conducts that first interview with the patient, there is a set or offer for the patient shown, so to speak. Of course, already after the pre-filled questionnaire, it was known what sex he or she was, what age group he or she was in, what previous illnesses he or she had, or what chronic diseases, if any, he or she had. And at the same time, there was a parallel profile database, only it probably didn't quite meet what we had in mind, it didn't collect what was currently going on. Such a solution would be nice. That is, the team knows exactly what it can offer this patient, and it will be much simpler to operate, because of course

some programs are funded by the National Health Service, and they are so already quite common and have been implemented for years, but others can be implemented." (G1P3)

"We talked about the active patient invitation - in small health care facilities, there may only be a doctor and a nurse, and it's difficult to expect them to focus on calling patients, especially if the patient hasn't been seen for a year or two. However, there is a company (I won't mention the name) that specializes in inviting patients for preventive checkups or invites people who have not had contact with the health care system for a long time to visit their primary care physician. They receive compensation for each successful invitation, so it's not like telemarketing, but rather sharing the fee for actively inviting a patient to the health care facility. However, there is a legal issue with accessing PESEL numbers from the active list for an external company, so there may have been a need to consider some solution." (G1P3)

"In addition to clinical treatment, it is very important to increase the effectiveness of non-clinical interventions that can enable chronic patients to become more engaged in the therapy."(G2P1)

"We need more research and we need to convince the payers that we should try to make use of the results that we already have." (G2P2)

"Regarding research, I agree that it is important to follow some pilot studies that involve more populations, especially should involve difficult/sensitive populations. I'm also talking about indigent, vulnerable populations. This is important because biomarkers and different models have been studied mostly in the white population on a large genetically representative population, but then cannot be applied in other genetically different populations." (G2P5)

4.3. STAGE 4: EPIDEMIOLOGICAL RETROSPECTIVE ANALYSIS – CASE REPORT FROM POLAND (H1)

All the table numbers in this section correspond to the table numbers in Appendix 2, which contains all the technical tables with complete data originally generated from data obtained from the centers.

TARGET POPULATION DESCRIPTION

Table 5. Age distribution of patients in the rural and urban centre

centre	n	age					Wilcoxon test p
		mean	stand. dev.	median	min	max	
rural	1472	63.41	14.11	64	7	96	p<0.001
urban	451	60.33	14.74	62	21	92	
total	1923	62.69	14.31	63	7	96	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there was no age difference between rural and urban patients in the study population (p<0.001). Patients from rural areas have a higher average age than patients from the city, the respective means: are 63.41 and 60.33 years (Tab. 5).

Table 6. Gender distribution of patients in the rural and urban centre

centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	816	55.4	656	44.6	0.626
urban	256	56.8	195	43.2	
total	1072	55.7	851	42.3	n=1923

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis that there was no difference in gender distribution between rural and urban patients in the study population (p=0.626). This hypothesis is supported by the case epidemiological report from Poland described in detail in Chapter 4.3. Although the gender distribution of rural and urban patients is similar, patients from rural areas have a higher average age than patients from the city (respective means: 63.41 and 60.33 years) (Tab. 6).

Table 7. Distribution of the number of patient visits in the rural and urban centre

centre	n	number of patient visits					Wilcoxon test p
		mean	stand. dev.	median	min	max	
rural	1472	8.55	6.15	7	1	36	p<0.001
urban	451	2.75	2.62	2	1	25	
total	1923	7.19	6.05	6	1	36	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there was no difference in the number of patient visits between rural and urban patients in the study population (p<0.001). Patients from rural areas have, on average, a higher number of visits than patients from the city, the respective means: 8.55 and 2.75 (Tab. 7).

Table 8. Age distribution on visits to rural and urban centres

centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	12591	67.92	12.74	68	p<0.001
urban	1242	63.09	14.54	65	
total	13833	67.48	12.98	67	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there is no difference in age at rural and urban visits in the study population (p<0.001). Age at rural visits is on average higher than at urban visits, with respective p<0.001: of 67.92 and 63.0 years (Tab. 8).

Table 9. Gender distribution on visits to rural and urban centres

centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	7390	58.7	5201	41.3	0.002
urban	672	54.1	570	45.9	
total	8062	58.3	5771	41.7	13833

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis of independence of gender distribution at visits from the location of the centre in the study population (p=0.002). We observe a higher percentage of women at rural visits than at urban visits, respectively: 58.7% and 54.1% (Tab.9).

Table 10. Distribution of the presence of major diagnoses (E10, E11, I10, I11) on visits to rural and urban centre

centre	E10		E11		I10		I11		Fisher test p
	n	%	n	%	n	%	n	%	
rural	86	0.7	669	5.3	7660	60.8	4176	33.2	p=0.002
urban	78	6.3	270	21.7	850	68.4	44	3.5	
total	164	1.2	939	6.8	8510	61.5	4220	30.5	13833

p - calculated significance level in Fisher's exact test of independence

Distribution of the presence of major diagnoses (E10, E11, I10, I11) on visits to rural and urban centre presents the results that the Fisher's test rejected the hypothesis of independence of the distribution of the presence of diagnoses (E10, E11, I10, I11) at visits from the location of the centre in the study population (p=0.002). We observe a higher prevalence of E10, E11, and I10 diagnoses on urban visits than on rural visits: respectively: 6.3% vs. 0.7%, 21.7% vs. 5.3%, and 68.4% vs. 60.8%. We observe a higher prevalence of I11 diagnoses on rural visits than on urban visits: respectively: 33.2% vs. 3.5% (Tab. 10).

Table 11. Distribution of the type of visits in the rural and urban centre

centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	4742	37.7	7849	62.3	p<0.001
urban	221	17.8	1021	82.2	
total	4963	35.9	8870	64.1	

p - calculated significance level in Fisher's exact test of independence

Distribution of the type of visits in the rural and urban centre presents the results that the Fisher's test rejected the hypothesis of independence of the distribution of the type of visit from the location of the centre in the study population (p<0.001).

We observe a higher percentage of outpatient visits in the urban centre than in the rural centre, respectively: 82.2% versus 62.3%. We observe a higher percentage of remote visits in the rural centre than in the urban centre, respectively: 37.7% vs. 17.8% (Tab. 11).

4.4.1. E10 DIAGNOSIS

POPULATION PROFILE

Table 12. E10 - Age distribution at visits in the rural and urban centre

E10 centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	86	48.51	18.91	55	0.034
urban	78	55.54	17.31	61	
total	164	51.85	18.45	55	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there were no age differences between patients at rural and urban visits in the study population (p=0.034). On average, the age at urban visits is higher than at rural visits, with respective means: of 55.54 and 48.51 years (Tab. 12).

Table 13. E10 - Gender distribution on visits at the rural and urban centre

E10 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	11	12.8	75	87.2	0.004
urban	25	32.1	53	67.9	
total	36	22.0	128	78.0	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis of independence of gender distribution at visits from the location of the centre in the study population (p=0.004). We observe a higher percentage of women at urban visits than at rural visits, respectively: 32.1% and 12.8% (Tab. 13).

VISITS BY TYPE

Table 14. E10 - Distribution of the visits type at the rural and urban centre

E10 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	28	32.6	58	67.4	0.161
urban	17	21.8	61	78.2	
total	45	27.4	119	72.6	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis that the distribution of the type of visits is independent of the location of the centre in the study population (p=0.161). The distribution of the type of visit is similar in both locations (Tab. 14).

Table 15. E10 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1	42	25.8	1+3+5	20	23.3	1	35	44.9
1+3+5	20	12.2	1+4+5+6	16	18.6	1+2	15	19.2
1+4+5+6	16	9.8	4+5+6	15	17.4	1+3	11	14.1
1+2	15	9.1	1	7	8.1	0	5	6.4
4+5+6	15	9.1	0	6	7.0	3	3	3.8
1+3	13	7.9	1+3+4+5	5	5.8	1+2+3	2	2.6
0	11	6.7	1+4+5	5	5.8	1+2+4	2	2.6
1+3+4+5	5	3.0	1+4+6	4	4.7	1+4	2	2.6
1+4+5	5	3.0	1+3	2	2.3	1+2+3+4	1	1.3
1+4	4	2.4	1+4	2	2.3	2+3	1	1.3
1+4+6	4	2.4	1+3+4	1	1.2	4+5	1	1.3
3	3	1.8	1+3+4+5+6	1	1.2			
1+2+3	2	1.2	4+6	1	1.2			
1+2+4	2	1.2	8	1	1.2			

Complete data are available in the original technical tables, attached as Appendix 2.

Table 16. E10 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	131	79.9	Z1	63	73.3	Z1	68	87.2
Z5	63	38.4	Z5	62	72.1	Z2	21	26.9
Z4	56	34.1	Z4	50	58.1	Z3	18	23.1
Z3	47	28.7	Z6	37	43.0	Z4	6	7.7
Z6	37	22.6	Z3	29	33.7	Z0	5	6.4
Z2	21	12.8	Z0	6	7.0	Z5	1	1.3
Z0	11	6.1	Z8	1	1.2			

Complete data are available in the original technical tables, attached as Appendix 2.

Table 17. E10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	5	35.7	Z76.0	3	60	Z76.0	2	22.2
D22	1	7.1	I11	1	20	D22	1	11.1
E11	1	7.1	R10	1	20	E11	1	11.1
I11	1	7.1				L08	1	11.1
L08	1	7.1				L40	1	11.1
L40	1	7.1				N31.0	1	11.1
N31.0	1	7.1				R07	1	11.1
R07	1	7.1				Z03	1	11.1
R10	1	7.1						
Z03	1	7.1						

Complete data are available in the original technical tables, attached as Appendix 2.

Table 18. E10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	5	3.0	Z76.0	3	3.5	Z76.0	2	2.6
D22	1	0.6	I11	1	1.2	D22	1	1.3
E11	1	0.6	R10	1	1.2	E11	1	1.3
I11	1	0.6				L08	1	1.3
L08	1	0.6				L40	1	1.3
L40	1	0.6				N31.0	1	1.3
N31.0	1	0.6				R07	1	1.3
R07	1	0.6				Z03	1	1.3
R10	1	0.6						
Z03	1	0.6						

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.2. E11 DIAGNOSIS

POPULATION PROFILE

Table 19. E11 - Age distribution at visits at the rural and urban centre

E11 centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	669	66.14	10.51	64	0.9
urban	270	64.81	11.47	67	
total	939	65.76	10.80	65	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there were no age differences at rural and urban visits in the study population (p=0.9). The distribution of age at visits in both locations is similar (Tab. 19).

Table 20. E11 - Gender distribution on visits at the rural and urban centre

E11 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	332	49.6	337	50.4	0.221
urban	122	45.2	148	54.8	
total	454	48.3	485	51.7	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis that the distribution of gender at visits is independent of the location of the centre in the study population (p=0.221). The distribution of gender at visits in both locations is similar (Tab. 20).

VISITS BY TYPE

Table 21. E11 - Distribution of the visits type at the rural and urban centre

E11 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	253	37.8	416	62.2	p<0.001
urban	45	16.7	225	83.3	
total	298	31.7	641	68.3	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis that the distribution of the type of visit is not dependent on the location of the centre in the study population (p<0.001). We observe a higher percentage of outpatient visits at the urban centre than at the rural centre, respectively: 83.3% vs. 62.2%. We observe a higher percentage of remote visits at the rural centre than at the urban centre, respectively: 37.8% vs. 16.7% (Tab. 21).

RECOMMENDATIONS ON VISITS WITH E11 DIAGNOSIS

Table 22. E11 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+5+6	200	21.3	1+4+5+6	200	29.9	1	139	51.5
4+5+6	182	19.4	4+5+6	182	27.2	1+2	36	13.3
1	179	19.1	1+3+4+5	118	17.6	1+4	32	11.9
1+3+4+5	118	12.6	1	40	6.0	1+3	15	5.6
1+4	56	6.0	1+4+5	28	4.2	1+2+3	8	3.0
1+2	38	4.0	1+4	24	3.6	3	8	3.0
1+4+5	28	3.0	1+4+6	20	3.0	1+3+4	7	2.6
1+4+6	25	2.7	1+4+5+6+9	14	2.1	1+4+6	5	1.9
1+3	15	1.6	0	8	1.2	1+2+4	4	1.5
1+3+4	14	1.5	1+3+4	7	1.0	2	4	1.5
1+4+5+6+9	14	1.5	3	6	0.9	0	2	0.7
3	14	1.5	1+3+4+5+6	3	0.4	1+2+7	1	0.4
0	10	1.1	1+2	2	0.3	1+2+8	1	0.4

Complete data are available in the original technical tables, attached as Appendix 2.

Table 23. E11 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	719	76.6	Z4	611	91.3	Z1	254	94.1
Z4	662	70.5	Z5	558	83.4	Z2	54	20.0
Z5	558	59.4	Z1	465	69.5	Z4	51	18.9
Z6	441	47.0	Z6	433	64.7	Z3	40	14.8
Z3	179	19.1	Z3	139	20.8	Z6	8	3.0
Z2	62	6.6	Z9	17	2.5	Z8	3	1.1
Z9	20	2.1	Z0	8	1.2	Z9	3	1.1
Z0	10	1.1	Z2	8	1.2	Z0	2	0.7
Z8	4	0.4	Z7	1	0.1	Z7	1	0.4
Z7	2	0.2	Z8	1	0.1			
Z10	1	0.1	Z10	1	0.1			

Complete data are available in the original technical tables, attached as Appendix 2.

CO-MORBID DIAGNOSES

Table 24. E11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	9	15.3	Z76.0	7	20.6	N40	3	12
G54	3	5.1	I11	3	8.8	I10	2	8
I10	3	5.1	G54	2	5.9	I49	2	8
I11	3	5.1	I11+Z76.0	2	5.9	R10	2	8
N40	3	5.1	Z71.2	2	5.9	Z76.0	2	8
I11+Z76.0	2	3.4	E04.1+Z76.0	1	2.9	E03	1	4
I49	2	3.4	E11.7	1	2.9	F01+H53+Z76	1	4
R10	2	3.4	E78.2+F01+G20+G30.8+I11+N31+Z76.0	1	2.9	G54	1	4

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z71.2	2	3.4	G54+Z76.0	1	2.9	H53	1	4

Complete data are available in the original technical tables, attached as Appendix 2.

Table 25. E11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	16	1.7	Z76.0	13	1.9	I10	3	1.1
I11	7	0.7	I11	7	1.0	N40	3	1.1
I10	5	0.5	G54	3	0.4	Z76.0	3	1.1
G54	4	0.4	I10	2	0.3	H53	2	0.7
H53	3	0.3	M25.5	2	0.3	I49	2	0.7
N40	3	0.3	Z71.2	2	0.3	R10	2	0.7
F01	2	0.2	E04.1	1	0.1	Z76	2	0.7
I49	2	0.2	E11.7	1	0.1	E03	1	0.4
M25.5	2	0.2	E78.2	1	0.1	F01	1	0.4
R10	2	0.2	F01	1	0.1	G54	1	0.4
Z71.2	2	0.2	G20	1	0.1	H90	1	0.4
Z76	2	0.2	G30.8	1	0.1	I48	1	0.4

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.3. I10 DIAGNOSIS

POPULATION PROFILE

Table 26. I10 - Age distribution at visits at the rural and urban centre

I10 centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	7660	63.44	11.58	64	0.83
urban	850	62.76	14.87	65	
total	8510	63.37	12.00	64	

p - calculated significance level in Wilcoxon test

The Wilcoxon test did not reject the hypothesis that there were no age differences at rural and urban visits in the study population (p=0.83). The distribution of age at visits in both locations is similar (Tab. 26).

Table 27. I10 - Gender distribution on visits at the rural and urban centre

I10 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	4321	56.4	3339	43.6	0.145
urban	502	59.1	348	40.9	
total	4823	56.7	3687	43.3	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis that the distribution of gender at visits is independent of the location of the centre in the study population (p=0.145). The distribution of gender at visits in both locations is similar (Tab. 27).

VISITS BY TYPE

Table 28. I10 - Distribution of the visits type at the rural and urban centre

I10 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	2930	38.3	4730	61.7	p<0.001
urban	150	17.6	700	82.4	
total	3080	36.2	5430	63.8	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis that the distribution of the type of advice at visits is independent of the location of the centre in the study population (p<0.001). We observe a higher percentage of outpatient visits at the urban centre than at the rural centre, respectively: 82.4% versus 61.7%. We observe a higher percentage of remote visits at the rural centre than at the urban centre, respectively: 38.3% vs. 17.6% (Tab. 28).

Table 29. I10 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+5+6	4742	55.7	1+4+5+6	4742	61.9	1	645	75.9
1+3+4+5	914	10.7	1+3+4+5	914	11.9	1+2	89	10.6
1	760	8.9	1+3+4	640	8.4	1+3	34	4.0
1+3+4	641	7.5	1+4	336	4.4	1+2+3	23	2.7
1+4	342	4.0	1+4+5+6+9	282	3.7	0	10	1.2
1+4+5+6+9	282	3.3	1+4+6	150	2.0	2	9	1.1
1+4+6	152	1.8	1	115	1.5	3	9	1.1
1+2+4+5+6	102	1.2	1+2+4+5+6	102	1.3	1+4	6	0.7
1+2	93	1.1	1+3+4+5+6	50	0.7	1+9	6	0.7

Complete data are available in the original technical tables, attached as Appendix 2.

Table 30. I10 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	8416	98.9	Z1	7597	99.2	Z1	819	96.4
Z4	7486	88.0	Z4	7474	97.6	Z2	125	14.7
Z5	6309	74.1	Z5	6307	82.3	Z3	72	8.5
Z6	5474	64.3	Z6	5468	71.4	Z4	12	1.4
Z3	1835	21.6	Z3	1763	23.0	Z0	10	1.2
Z9	386	4.5	Z9	376	4.9	Z9	10	1.2
Z2	294	3.5	Z2	169	2.2	Z6	6	0.7
Z10	53	0.6	Z10	52	0.7	Z7	3	0.4
Z8	36	0.4	Z8	35	0.5	Z5	2	0.2
Z7	32	0.4	Z7	29	0.4	Z8	1	0.1
Z0	30	0.4	Z0	20	0.3	Z10	1	0.1

Complete data are available in the original technical tables, attached as Appendix 2.

Table 31. I10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	19	10.1	Z76.0	16	12.2	H53	3	5.3
Z03	12	6.4	Z03	9	6.9	M70	3	5.3
J06	8	4.3	J06	7	5.3	R05	3	5.3
Z71.2	5	2.7	Z71.2	5	3.8	Z03	3	5.3
M70	4	2.1	Z24.6	4	3.1	Z76.0	3	5.3
R05	4	2.1	G54	3	2.3	E78	2	3.5
Z24.6	4	2.1	Z71.0	3	2.3	J00	2	3.5

Complete data are available in the original technical tables, attached as Appendix 2.

Table 32. I10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	23	0.3	Z76.0	20	0.3	H53	4	0.5
Z03	13	0.2	Z03	10	0.1	M70	4	0.5
J06	8	0.1	J06	7	0.1	R05	3	0.4
H53	6	0.1	Z71.2	5	0.1	Z03	3	0.4
M70	6	0.1	G54	4	0.1	Z76.0	3	0.4
E78	5	0.1	Z03.8	4	0.1	E11	2	0.2
G54	5	0.1	Z24.6	4	0.1	E78	2	0.2
R05	5	0.1	E78	3		J00	2	0.2
Z71.2	5	0.1	Z71.0	3		M17	2	0.2

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.4. I11 DIAGNOSIS

POPULATION PROFILE

Table 33. I11 - Age distribution at visits at the rural and urban centre

I11 centre	n	age			Wilcoxon test p
		mean	mean	mean	
rural	4176	76.82	9.71	78	0.01
urban	44	72.34	12.87	75	
total	4220	76.77	9.76	78	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there were no age differences at rural and urban visits in the study population (p=0.01). Age at rural visits is on average higher than at urban visits, the respective averages: 76.82 and 72.34 years (Tab. 33).

Table 34. I11 - Gender distribution on visits at the rural and urban centre

I11 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	2726	65.3	1450	34.7	0.08
urban	23	52.3	21	47.7	
total	2749	65.1	1471	34.9	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis that the distribution of gender at visits is independent of the location of the centre in the study population (p=0.08). The distribution of gender at visits in both locations is similar (Tab. 34).

VISITS BY TYPE

Table 35. I11 - Distribution of the visits type at the rural and urban centre

I11 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	1531	36.7	2645	63.3	0.027
urban	9	20.5	35	79.5	
total	1540	36.5	2680	63.5	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis that the distribution of the type of visits is independent of the location of the centre in the study population (p=0.027). We observe a higher percentage of outpatient visits at the urban centre than at the rural centre, respectively: 79.5% versus 63.3%. We observe a higher percentage of remote visits at the rural centre than at the urban centre, respectively: 36.7% vs. 20.5% (Tab. 35).

RECOMMENDATIONS ON VISITS WITH I11 DIAGNOSIS

Table 36. I11 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+5+6	1918	45.5	1+4+5+6	1918	45.9	1	25	56.8
1+3+4	1001	23.7	1+3+4	1001	24.0	1+2	8	18.2
1+3+4+5	568	13.5	1+3+4+5	568	13.6	2	3	6.8
1+4+5+6+9	173	4.1	1+4+5+6+9	173	4.1	1+2+3	2	4.5
1	130	3.1	1	105	2.5	1+4+6	2	4.5
1+4+6	87	2.1	1+4+6	85	2.0	3	2	4.5
1+4	67	1.6	1+4	66	1.6	1+3	1	2.3
1+4+5	66	1.6	1+4+5	66	1.6	1+4	1	2.3

Complete data are available in the original technical tables, attached as Appendix 2.

Table 37. I11 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	4155	98.5	Z1	4116	98.6	Z1	39	88.6
Z4	4015	95.1	Z4	4012	96.1	Z2	13	29.5
Z5	2811	66.6	Z5	2811	67.3	Z3	5	11.4
Z6	2253	53.4	Z6	2251	53.9	Z4	3	6.8
Z3	1659	39.3	Z3	1654	39.6	Z6	2	4.5
Z9	245	5.8	Z9	245	5.9			
Z2	53	1.3	Z2	40	1.0			
Z0	17	0.4	Z0	17	0.4			
Z10	15	0.4	Z10	15	0.4			
Z7	12	0.3	Z7	12	0.3			
Z8	2		Z8	2				

Complete data are available in the original technical tables, attached as Appendix 2.

CO-MORBID DIAGNOSES AT VISITS WITH I11 DIAGNOSIS

Table 38. I11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	25	24.5	Z76.0	25	25	E66	1	50
Z03	10	9.8	Z03	10	10	M54.4	1	50
I10	6	5.9	I10	6	6			
E11	5	4.9	E11	5	5			
E10+Z76.0	2	2.0	E10+Z76.0	2	2			
E11+Z76.0	2	2.0	E11+Z76.0	2	2			
H61.2	2	2.0	H61.2	2	2			
J06	2	2.0	J06	2	2			
R10	2	2.0	R10	2	2			
R73+Z76.0	2	2.0	R73+Z76.0	2	2			
Z02	2	2.0	Z02	2	2			

Complete data are available in the original technical tables, attached as Appendix 2.

Table 39. I11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	45	1.1	Z76.0	45	1.1	E66	1	2.3
Z03	10	0.2	Z03	10	0.2	M54.4	1	2.3
E11	8	0.2	E11	8	0.2			
I10	6	0.1	I10	6	0.1			
N40	6	0.1	N40	6	0.1			
R73	4	0.1	R73	4	0.1			
M47	3	0.1	M47	3	0.1			

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.5. IMPACT OF COVID-19 PERIOD ON CHRONIC DISEASE TREATMENT

The study involved the retrospective analysis of data collected during the pre-Covid (until 29.02.2020) and Covid (from 01.03.2020) periods, to investigate the potential impact of the pandemic on the observed results. For analytical purposes, it was assumed that the pre-COVID period encompassed all data collected before the aforementioned date, whereas the COVID period comprised data collected from 01.03.2020 onwards. The results of this investigation are expected to shed light on the possible influence of the COVID-19 pandemic on the variables under study, thereby contributing to a deeper understanding of the pandemic's broader effects on society.

Table 40. Age distribution at visits during Covid periods

period	n	age			Wilcoxon test
		mean	st. dev.	median	p
pre-Covid	5220	66.16	12.82	66	p<0.001
Covid	8613	68.28	13.03	68	
total	13833	67.48	12.98	67	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis that there was no difference in age at visits during the two Covid periods in the study population (p<0.001). Age at Covid

visits is on average higher than at pre-Covid visits, with respective means of 68.28 and 66.16 years (Tab. 40). Note: This difference may be due to a simple shift in the timing of the periods relative to each other, but the influence of the pandemic cannot be ruled out.

Table 41. Gender distribution on visits during Covid periods

period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	3017	57.8	2203	42.2	0.374
Covid	5045	58.6	3568	41.4	
total	8062	58.3	5771	41.7	13833

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis of independence of gender distribution at visits from the Covid period in the study population (p=0.374). We observe a similar percentage of women (men) at pre-Covid and Covid visits, respectively: 57.8%(42.2%) and 58.6% (41.4%) (Tab. 41).

Table 42. Distribution of the presence of the main diagnoses (E10, E11, I10, I11) at visits during the Covid periods

period	E10		E11		I10		I11		Fisher test p
	n	%	n	%	n	%	n	%	
pre-Covid	90	1.7	432	8.3	2648	50.7	2050	39.3	p<0.001
Covid	74	0.9	507	5.9	5862	68.1	2170	25.2	
total	164	1.2	939	6.8	8510	61.5	4220	30.5	13833

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis of independence of the distribution of the presence of diagnoses (E10, E11, I10, I11) at visits from the Covid period in the study population (p<0.001). We observe a higher prevalence of E10, E11, and I11 diagnoses at pre-Covid visits: respectively: 1.7% vs. 0.9%, 8.3% vs. 5.9%, and 39.3% vs. 25.2%. We observe a higher incidence of I10 diagnoses at Covid visits, respectively: 68.1% vs. 50.7% (Tab.42).

Table 43. Distribution of the type of visit in Covid periods

period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	5220	100.0	p<0.001
Covid	4963	57.6	3650	42.4	
total	4963	35.9	8870	64.1	

p - calculated significance level in Fisher's exact test of independence

Distribution of the type of visit in Covid periods presents the results that the Fisher's test rejected the hypothesis of independence of the distribution of the type of advice at visits from the Covid period in the study population (p<0.001). We observe a higher percentage of outpatient visits in the pre-Covid period, respectively: 100% vs. 42.4%. We observe a higher percentage of remote visits in the Covid period, respectively: 57.6% vs. 0% (Tab. 43).

4.4.5.1. VISITS WITH E10 DIAGNOSIS: ANALYSIS OF PRE-COVID VS. COVID PERIODS

Table 44. cE10 - Age distribution at visits during Covid periods

E10 period	n	age			Wilcoxon test p
		mean	stand. dev.	median	
pre-Covid	90	54.06	15.40	55.0	0.27
Covid	74	49.18	21.39	52.5	
total	164	51.85	18.45	55	

p - calculated significance level in Wilcoxon test

The Wilcoxon test did not reject the hypothesis that there were no age differences between patients at rural and urban visits in the study population (p=0.27). The age at the visits during the Covid and pre-Covid periods is similar (Tab.44).

Table 45. cE10 - Gender distribution at visits during Covid periods

E10 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	29	32.2	61	67.8	p<0.001
Covid	7	9.5	67	90.5	
total	36	22.0	128	78.0	

p - calculated significance level in Fisher's exact test of independence

There is a higher percentage of women at pre-Covid visits compared to Covid visits, with respective percentages of 32.2% and 9.5%. Conversely, there is a higher percentage of women at Covid visits compared to pre-Covid visits, with respective percentages of 90.5% and 67.8% (Tab.45).

Table 46. cE10 - Distribution of the type of visits during the Covid periods

E10 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	90	100.0	0
Covid	45	60.8	29	39.2	
total	45	27.4	119	72.6	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis of independence of the distribution of the type visits from the Covid period in the study population (p<0.001). We observe a higher percentage of outpatient visits at pre-Covid visits, respectively: 100% vs. 39.2% (Tab. 46).

Table 47. cE10 - Distribution of recommendation configurations and in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1	42	25.6	1	22	24.4	1	20	27.0
1+3+5	20	12.2	1+3+5	20	22.2	4+5+6	14	18.9
1+4+5+6	16	9.8	1+2	11	12.2	1+4+5+6	12	16.2
1+2	15	9.1	1+3	7	7.8	0	7	9.5
4+5+6	15	9.1	1+4+5	5	5.6	1+3	6	8.1
1+3	13	7.9	0	4	4.4	1+2	4	5.4
0	11	6.7	1+3+4+5	4	4.4	1+4+6	3	4.1
1+3+4+5	5	3.0	1+4+5+6	4	4.4	1+2+4	2	2.7
1+4+5	5	3.0	1+4	3	3.3	1+2+3	1	1.4
1+4	4	2.4	3	3	3.3	1+3+4+5	1	1.4
1+4+6	4	2.4	1+2+3	1	1.1	1+4	1	1.4
3	3	1.8	1+2+3+4	1	1.1	4+5	1	1.4
1+2+3	2	1.2	1+3+4	1	1.1	4+6	1	1.4
1+2+4	2	1.2	1+3+4+5+6	1	1.1	8	1	1.4

Complete data are available in the original technical tables, attached as Appendix 2.

Table 48. cE10 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	131	79.9	Z1	81	90.0	Z1	50	67.6
Z5	63	38.4	Z3	39	43.3	Z4	35	47.3
Z4	56	34.1	Z5	35	38.9	Z6	30	40.5
Z3	47	28.7	Z4	21	23.3	Z5	28	37.8
Z6	37	22.6	Z2	14	15.6	Z3	8	10.8
Z2	21	12.8	Z6	7	7.8	Z0	7	9.5
Z0	11	6.1	Z0	4	4.4	Z2	7	9.5
Z8	1	0.6				Z8	1	1.4

Complete data are available in the original technical tables, attached as Appendix 2.

Table 49. cE10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	5	35.7	Z76.0	5	45.5	D22	1	33.3
D22	1	7.1	I11	1	9.1	E11	1	33.3
E11	1	7.1	L08	1	9.1	L40	1	33.3
I11	1	7.1	N31.0	1	9.1			
L08	1	7.1	R07	1	9.1			
L40	1	7.1	R10	1	9.1			
N31.0	1	7.1	Z03	1	9.1			
R07	1	7.1						
R10	1	7.1						
Z03	1	7.1						

Complete data are available in the original technical tables, attached as Appendix 2.

Table 50. cE10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	5	3.0	Z76.0	5	5.6	D22	1	1.4
D22	1	0.6	I11	1	1.1	E11	1	1.4
E11	1	0.6	L08	1	1.1	L40	1	1.4
I11	1	0.6	N31.0	1	1.1			
L08	1	0.6	R07	1	1.1			
L40	1	0.6	R10	1	1.1			
N31.0	1	0.6	Z03	1	1.1			
R07	1	0.6						
R10	1	0.6						
Z03	1	0.6						

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.5.2. VISITS WITH E11 DIAGNOSIS: ANALYSIS OF PRE-COVID VS. COVID PERIODS

Table 51. cE11 - Age distribution at visits during Covid periods

E11 period	n	age			Wilcoxon test p
		mean	stand. dev.	median	
pre-Covid	432	65.86	10.99	66	0.43
Covid	507	65.66	10.65	65	
total	939	65.76	10.80	65	

p - calculated significance level in Wilcoxon test

The Wilcoxon test did not reject the hypothesis that there were no age differences between patients at rural and urban visits in the study population (p=0.43). The age at the visits during the Covid and pre-Covid periods is similar (Tab. 51).

Table 52. cE11 - Gender distribution at visits during Covid periods

E11 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	218	50.5	214	49.5	0.239
Covid	236	46.5	271	53.5	
total	454	48.3	485	51.7	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis of independence of the gender distribution on visits from Covid periods of the population (p=0.239). The gender distribution at the visits in both Covid periods is similar (Tab. 52).

Table 53. cE11 - The gender distribution at the visits in both Covid periods is similar

E11 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	432	100.0	p<0.001
Covid	298	58.8	209	41.2	
total	298	31.7	641	68.3	

p - calculated significance level in Fisher's exact test of independence

The results that the Fisher's test rejected the hypothesis of independence of the distribution of the type visits from the Covid period in the study population (p<0.001). We observe a higher percentage of outpatient visits during the pre-Covid period than during the Covid period, respectively: 100.0% vs. 41.2%. We observe a higher percentage of outpatient visits at pre-Covid visits, respectively 58.8% vs. 0% (Tab. 53).

Table 54. cE11 - Distribution of recommendation configurations in total and distribution of recommendation configurations in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5+6	200	21.3	1	135	31.2	1+4+5+6	193	38.1
4+5+6	182	19.4	1+3+4+5	89	20.6	4+5+6	117	23.1
1	179	19.1	4+5+6	65	15.0	1	44	8.7
1+3+4+5	118	12.6	1+4+5	27	6.2	1+4	32	6.3
1+4	56	6.0	1+4	24	5.6	1+3+4+5	29	5.7
1+2	38	4.0	1+2	19	4.4	1+4+6	20	3.9
1+4+5	28	3.0	1+3	14	3.2	1+2	19	3.7
1+4+6	25	2.7	1+2+3	8	1.9	1+4+5+6+9	14	2.8
1+3	15	1.6	1+3+4	8	1.9	3	7	1.4
1+3+4	14	1.5	0	7	1.6	1+3+4	6	1.2
1+4+5+6+9	14	1.5	1+4+5+6	7	1.6	0	3	0.6
3	14	1.5	3	7	1.6	1+3+4+5+6	3	0.6
0	10	1.1	1+4+6	5	1.2	1+2+4	2	0.4

Complete data are available in the original technical tables, attached as Appendix 2.

Table 55. cE11 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	719	76.6	Z1	346	80.1	Z4	431	85.0
Z4	662	70.5	Z4	231	53.5	Z1	373	73.6
Z5	558	59.4	Z5	190	44.0	Z5	368	72.6
Z6	441	47.0	Z3	128	29.6	Z6	359	70.8
Z3	179	19.1	Z6	82	19.0	Z3	51	10.1
Z2	62	6.6	Z2	35	8.1	Z2	27	5.3
Z9	20	2.1	Z0	7	1.6	Z9	18	3.6
Z0	10	1.1	Z8	3	0.7	Z0	3	0.6
Z8	4	0.4	Z7	2	0.5	Z8	1	0.2
Z7	2	0.2	Z9	2	0.5	Z10	1	0.2
Z10	1	0.1						

Complete data are available in the original technical tables, attached as Appendix 2.

Table 56. cE11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	9	15.3	Z76.0	8	18.2	G54	3	20.0
G54	3	5.1	I11	3	6.8	Z71.2	2	13.3
I10	3	5.1	N40	3	6.8	H61.2	1	6.7
I11	3	5.1	I10	2	4.5	I10	1	6.7
N40	3	5.1	I11+Z76.0	2	4.5	I10+U09	1	6.7
I11+Z76.0	2	3.4	E03	1	2.3	I11.0	1	6.7
I49	2	3.4	E04.1+Z76.0	1	2.3	I49	1	6.7
R10	2	3.4	E11.7	1	2.3	M25.5	1	6.7
Z71.2	2	3.4	E78.2+F01+G20+ G30.8+I11+N31+ Z76.0	1	2.3	M25.5+ S01.2	1	6.7

Complete data are available in the original technical tables, attached as Appendix 2.

Table 57. cE11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	16	1.7	Z76.0	15	3.5	G54	3	0.6
I11	7	0.7	I11	7	1.6	I10	2	0.4
I10	5	0.5	H53	3	0.7	M25.5	2	0.4
G54	4	0.4	I10	3	0.7	Z71.2	2	0.4
H53	3	0.3	N40	3	0.7	H61.2	1	0.2
N40	3	0.3	F01	2	0.5	I11.0	1	0.2
F01	2	0.2	Z76	2	0.5	I49	1	0.2
I49	2	0.2	E03	1	0.2	M54.3	1	0.2
M25.5	2	0.2	E04.1	1	0.2	R10	1	0.2
R10	2	0.2	E11.7	1	0.2	S01.2	1	0.2
Z71.2	2	0.2	E78.2	1	0.2	U09	1	0.2
Z76	2	0.2	G20	1	0.2	Z76.0	1	0.2

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.5.3. VISITS WITH I10 DIAGNOSIS: ANALYSIS OF PRE-COVID VS. COVID PERIODS

Table 58. cI10 - Age distribution at visits during Covid periods

I10 period	n	age			Wilcoxon test stand. dev.
		mean	stand. dev.	mean	
pre-Covid	2648	60.68	11.66	61	p<0.001
Covid	5862	64.59	11.88	65	
total	8510	63.37	12.00	64	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis of no age differences at Covid visits in the study population (p<0.001). The mean age at Covid visits is higher than at pre-Covid visits, respectively: 64.59 and 60.68 years (Tab. 58).

Table 59. cI10 - Gender distribution at visits during Covid periods

I10 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	1498	56.6	1150	43.4	0.906
Covid	3325	56.7	2537	43.3	
total	4823	56.7	3687	43.3	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test did not reject the hypothesis that the distribution of gender at visits is independent of the Covid periods in the study population (p=0.906). The distribution of gender at visits in both Covid periods is similar (Tab. 59).

Table 60. cI10 - Distribution of the type of visits during the Covid periods

I10 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	2648	100.0	p<0.001
Covid	3080	52.5	2782	47.5	
total	3080	36.2	5430	63.8	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis of independence of the distribution of the type visits from the Covid period in the study population (p<0.001). We observe a higher percentage of outpatient visits during the pre-Covid period than during the Covid period, respectively: 100% vs. 47.5%. We observe a higher percentage of remote visits during the Covid period than during the pre-Covid period, respectively: 52.5% vs. 0% (Tab. 60).

Table 61. cI10 - Distribution of recommendation configurations in total and distribution of recommendation configurations in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5+6	4742	55.7	1+4+5+6	976	36.9	1+4+5+6	3766	64.2
1+3+4+5	914	10.7	1	515	19.4	1+3+4+5	500	8.5
1	760	8.9	1+3+4+5	414	15.6	1+4	285	4.9
1+3+4	641	7.5	1+3+4	382	14.4	1+4+5+6+9	277	4.7
1+4	342	4.0	1+2	65	2.5	1+3+4	260	4.4
1+4+5+6+9	282	3.3	1+4+6	62	2.3	1	245	4.2
1+4+6	152	1.8	1+4	57	2.2	1+2+4+5+6	97	1.7
1+2+4+5+6	102	1.2	1+3	32	1.2	1+4+6	90	1.5
1+2	93	1.1	0	15	0.6	1+3+4+5+6	44	0.8

Complete data are available in the original technical tables, attached as Appendix 2.

Table 62. cI10 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	8416	98.9	Z1	2598	98.1	Z1	5818	99.2
Z4	7486	88.0	Z4	1962	74.1	Z4	5524	94.2
Z5	6309	74.1	Z5	1446	54.6	Z5	4863	83.0
Z6	5474	64.3	Z6	1079	40.7	Z6	4395	75.0
Z3	1835	21.6	Z3	889	33.6	Z3	946	16.1
Z9	386	4.5	Z2	104	3.9	Z9	367	6.3
Z2	294	3.5	Z9	19	0.7	Z2	190	3.2
Z10	53	0.6	Z0	15	0.6	Z10	44	0.8
Z8	36	0.4	Z8	13	0.5	Z7	25	0.4
Z7	32	0.4	Z10	9	0.3	Z8	23	0.4
Z0	30	0.4	Z7	7	0.3	Z0	15	0.3

Complete data are available in the original technical tables, attached as Appendix 2.

Table 63. cI10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	19	10.1	Z76.0	15	12.8	Z71.2	5	7.0
Z03	12	6.4	Z03	8	6.8	Z03	4	5.6
J06	8	4.3	J06	6	5.1	Z76.0	4	5.6
Z71.2	5	2.7	M70	4	3.4	E11	3	4.2
M70	4	2.1	G54	3	2.6	Z24.6	3	4.2
R05	4	2.1	H53	3	2.6	Z71.0	3	4.2
Z24.6	4	2.1	J00	3	2.6	J06	2	2.8
E11	3	1.6	L60	3	2.6	M54	2	2.8
G54	3	1.6	E78	2	1.7	R05	2	2.8
H53	3	1.6	K40	2	1.7	R06.0	2	2.8
J00	3	1.6	M17	2	1.7	Z71	2	2.8
L60	3	1.6	M47	2	1.7	A46	1	1.4
M54	3	1.6	R05	2	1.7	B07	1	1.4
Z71.0	3	1.6	R42	2	1.7	D64.9	1	1.4
B07	2	1.1	R73	2	1.7	E11.8	1	1.4
E78	2	1.1	B07	1	0.9	E66	1	1.4
K40	2	1.1	B86	1	0.9	E78+E79	1	1.4
K80	2	1.1	D02.2	1	0.9	E78+M54.2	1	1.4
L02	2	1.1	D12	1	0.9	F03	1	1.4
L30	2	1.1	D45	1	0.9	H10	1	1.4
M17	2	1.1	D69.6	1	0.9	H11.3	1	1.4
M47	2	1.1	E03	1	0.9	H53.8+H61.2	1	1.4
M54.4	2	1.1	E11+G54+M70	1	0.9	H53+H90.8	1	1.4
N30	2	1.1	E74.8+M17	1	0.9	H53+M54.6 +Z03	1	1.4
R06.0	2	1.1	E78+M25.5+ M70+Z03.8	1	0.9	I11.0	1	1.4
R10	2	1.1	F10.2+H25	1	0.9	I11.9	1	1.4
R42	2	1.1	F32.2	1	0.9	I70.9	1	1.4
R73	2	1.1	F45	1	0.9	J01	1	1.4
Z71	2	1.1	G54+M17	1	0.9	K07	1	1.4

Complete data are available in the original technical tables, attached as Appendix 2.

Table 64. cI10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	23	0.3	Z76.0	19	0.7	Z03	5	0.1
Z03	13	0.2	Z03	8	0.3	Z71.2	5	0.1
J06	8	0.1	J06	6	0.2	Z76.0	4	0.1
H53	6	0.1	M70	6	0.2	E11	3	0.1
M70	6	0.1	G54	5	0.2	Z24.6	3	0.1
E78	5	0.1	H53	4	0.2	Z71.0	3	0.1
G54	5	0.1	J00	4	0.2	E78	2	
R05	5	0.1	M17	4	0.2	H53	2	
Z71.2	5	0.1	Z03.8	4	0.2	J06	2	

Complete data are available in the original technical tables, attached as Appendix 2.

4.4.5.4. VISITS WITH I11 DIAGNOSIS: ANALYSIS OF PRE-COVID VS. COVID PERIODS

Table 65. cI11 - Age distribution at visits during Covid periods

I11 period	n	age			Wilcoxon test p
		mean	stand. dev.	mean	
pre-Covid	2050	73.84	10.13	74	p<0.001
Covid	2170	79.54	8.51	81	
total	4220	76.77	9.76	78	

p - calculated significance level in Wilcoxon test

The Wilcoxon test rejected the hypothesis of no age differences at Covid visits in the study population (p<0.001). The mean age at Covid visits is higher than at pre-Covid visits, respectively 79.54 and 73.84 years (Tab. 65).

Table 66. cI11 - Gender distribution at visits during Covid periods

I11 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	1272	62.0	778	38.0	p<0.001
Covid	1477	68.1	693	31.9	
total	2749	65.1	1471	34.9	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypotheses of independence of the gender distribution on visits from Covid periods in the study population (p<0.001). We observe a higher percentage of women at visits during the Covid period than during the pre-Covid period, respectively: 68.1% and 62.0% (Tab. 66).

Table 67. cI11 - Distribution of the type of visits during the Covid periods

I11 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0	2050	100	p<0.001
Covid	1540	71	630	29	
total	1540	36.5	2680	63.5	

p - calculated significance level in Fisher's exact test of independence

The Fisher's test rejected the hypothesis of independence of the distribution of the type visits from the Covid period in the study population (p<0.001). We observe a higher percentage of outpatient visits during the pre-Covid period than during the Covid period, respectively: 100% vs. 29%. We observe a higher percentage of remote visits during the Covid period than during the pre-Covid period, respectively: 71% vs 0% (Tab. 67).

Table 68. cI11 - Distribution of recommendation configurations in total and distribution of recommendation configurations in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5+6	1918	45.5	1+3+4	944	46.0	1+4+5+6	1693	78.0
1+3+4	1001	23.7	1+3+4+5	530	25.9	1+4+5+6+9	169	7.8
1+3+4+5	568	13.5	1+4+5+6	225	11.0	1+4+6	58	2.7
1+4+5+6+9	173	4.1	1	110	5.4	1+3+4	57	2.6
1	130	3.1	1+4+5	62	3.0	1+3+4+5	38	1.8
1+4+6	87	2.1	1+4	46	2.2	1+2+4+5+6	24	1.1
1+4	67	1.6	1+4+6	29	1.4	1+4	21	1.0
1+4+5	66	1.6	1+3+4+9	21	1.0	1	20	0.9

Complete data are available in the original technical tables, attached as Appendix 2.

Table 69. cI11 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommen-dation	n	%	recommen-dation	n	%	recommen-dation	n	%
Z1	4155	98.5	Z1	2016	98.3	Z1	2139	98.6
Z4	4015	95.1	Z4	1896	92.5	Z4	2119	97.6
Z5	2811	66.6	Z3	1525	74.4	Z6	1986	91.5
Z6	2253	53.4	Z5	838	40.9	Z5	1973	90.9
Z3	1659	39.3	Z6	267	13.0	Z9	195	9.0
Z9	245	5.8	Z9	50	2.4	Z3	134	6.2
Z2	53	1.3	Z2	20	1.0	Z2	33	1.5
Z0	17	0.4	Z0	7	0.3	Z0	10	0.5
Z10	15	0.4	Z10	7	0.3	Z7	10	0.5
Z7	12	0.3	Z7	2	0.1	Z10	8	0.4
Z8	2		Z8	2	0.1			

Complete data are available in the original technical tables, attached as Appendix 2.

Table 70. cI11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	25	24.5	Z76.0	23	24.7	I10	5	55.6
Z03	10	9.8	Z03	10	10.8	Z76.0	2	22.2
I10	6	5.9	E11	5	5.4	S61.0	1	11.1
E11	5	4.9	E10+Z76.0	2	2.2	Z71.2	1	11.1
E10+Z76.0	2	2.0	E11+Z76.0	2	2.2			
E11+Z76.0	2	2.0	H61.2	2	2.2			
H61.2	2	2.0	J06	2	2.2			
J06	2	2.0	R10	2	2.2			
R10	2	2.0	R73+Z76.0	2	2.2			
R73+Z76.0	2	2.0	Z02	2	2.2			
Z02	2	2.0	B02	1	1.1			

Complete data are available in the original technical tables, attached as Appendix 2.

Table 71. cI11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	45	1.1	Z76.0	43	2.1	I10	5	0.2
Z03	10	0.2	Z03	10	0.5	Z76.0	2	0.1
E11	8	0.2	E11	8	0.4	S61.0	1	
I10	6	0.1	N40	6	0.3	Z71.2	1	
N40	6	0.1	R73	4	0.2			
R73	4	0.1	M47	3	0.1			
M47	3	0.1	E10	2	0.1			

Complete data are available in the original technical tables, attached as Appendix 2.

5. DISCUSSION

The prevention and management of chronic diseases have become critical public health concerns. In recent years, various interventions have been developed to promote behaviour change and prevent chronic diseases. However, the effectiveness of these interventions has been debated, leading to the development of several hypotheses defined in Chapter 2.2.

To explore the validity of the research hypotheses, qualitative research to provide rich, in-depth insights into the experiences and perspectives of patients, health care practitioners, and other stakeholders were conducted. The research aimed to identify the gaps and challenges in the current approaches to chronic disease prevention and management, and to explore potential effective strategies.

The findings of the qualitative study demonstrated that the four hypotheses are widely supported.

SIMPLE ADVICE OR PATIENT EDUCATION ALONE IS INSUFFICIENT FOR ACHIEVING AND SUSTAINING GOOD SELF-MANAGEMENT OR HEALTH BEHAVIOUR CHANGE (H1)

Current health policies focus on chronic conditions, which can be managed but not cured, through medication and therapy, as well as preventable by modifying lifestyle factors. Given the growing burden of chronic diseases worldwide, it is crucial to evaluate the effectiveness of existing policies and practices. However, there is limited evidence on the barriers and facilitators that affect the implementation of practice guidelines in everyday medical practice.

Many interventions found to be effective in health services research studies fail to translate into meaningful patient care outcomes across multiple contexts. Health services research aims to identify interventions and strategies that can improve the quality, effectiveness, and efficiency of health care services. However, despite the significant efforts made in health services research, many interventions that are effective in research studies fail to translate into meaningful patient care outcomes across multiple contexts.

The surveys and focus group interviews have revealed that the health care system is facing a major obstacle due to the lack of continuous and uninterrupted execution
of the initiatives that were introduced under the pilot programs funded by the health care financing entity. If appropriate funding and well-coordinated allocation of resources are provided, successful practices could be continued. However, at present, there are no comprehensive and effective systemic solutions to maintain the innovative approaches generated by the pilot programs in a practical and sustainable way.

Research evidence does not automatically diffuse into clinical practice but requires active translation that starts with clinicians' awareness of the science and ends with patient adherence to the recommended care. Some researchers have criticised the "cookbook" approach that guidelines may promote [111]. In such opinions, evidence-based medicine may undervalue the tacit knowledge of health care providers which comes from their experience and relates to the context in which they work. Any guidelines, in addition to being based on clinical evidence, need to be flexible, adaptable, socially and culturally acceptable, and economically attainable for better health-related outcomes in patients. Undoubtedly, an evidence-based approach to prevention can significantly minimise chronic disease burden. There is a strong need for evidence derived from complex intervention evaluation methodologies in diverse health and social care contexts [112].

Guidelines, in addition to being based on clinical evidence, need to be broad-based, flexible, adaptable, socially and culturally acceptable, and economically attainable for better health-related outcomes in patients. As exemplified by the National Institute for Clinical Excellence guidelines, patients' participation should be incorporated to enhance adherence to these recommendations. Indeed, the active involvement of all stakeholders in the design of guidelines is likely to improve implementation and effectiveness [26].

In the existing literature, there is a considerable record of what are the best practices and consequences of lack of adherence to the recommendation. Current health policy within focuses on chronic conditions, defined as conditions that cannot be cured but can be managed through medication and/or other therapy or further complications prevented by modifiable lifestyle factor changes. As chronic diseases are associated

with the increasing burden of disease globally, it is crucial to reflect on the efficacy of the existing policies and practices. There is very little evidence of barriers and facilitators of implementing particular practice guidelines into everyday practice. The gaps that the research fills by conducting this systematic review is a qualitative analysis of the barriers and facilitators that affect the translation of best recommendations into everyday medical practice.

Prevention and treatment of hypertension and diabetes is a global challenge in public health. Engaging patients and caregivers is a key factor for effective interventions. Undertaking actions on each level of the intervention delivery – either micro-, meso-, or macro –improves treatment schemes; however, it is worth mentioning that too fast or too complicated innovations may be the roadblock to improvement. Preventing chronic diseases requires complex interventions, involving multi-component and multi-level efforts that are tailored to the context in which they are delivered [113].

Also regular monitoring and evaluation, with defined and shared outcomes and indicators, are important drivers for further programme implementation using both quantitative and qualitative methods [114].

WELL-DEVELOPED GUIDELINES FOR PRIMARY CARE MANAGEMENT ARE OFTEN NOT EFFECTIVELY IMPLEMENTED, ESPECIALLY IN VULNERABLE POPULATIONS, WHICH MAY RESULT IN WORSE HEALTH OUTCOMES FOR CHRONIC DISEASES (H2)

The prevention and management of chronic conditions are critical in health care globally. Evidence-based recommendations for the screening and management of chronic conditions have been developed, but the patient outcome and reach evaluations have not always been positive. This is frequently due to a lack of proper translation of guidelines, as well as patients' non-compliance with advice and adherence to recommendations. General practice is also overwhelmed with clinical guidelines, and implementing all of them may result in significant polypharmacy, despite their utility [115, 116]. Effective health care management strategies should engage not only the health professionals but also the patient himself and his local environment in decision-making and guarantee the employment of guidelines in any organisational context.

General practice is overwhelmed with clinical guidelines and implementing all of them may result in significant polypharmacy, despite their individual utility [11, 12].

The data gathered enables us to consider which issues need to be addressed to assist in prevention programme implementation management. In particular, the need to raise awareness of prevention throughout the medical profession through improved training and research was noticed. Health care professionals including the primary health care team, require guidelines for best clinical practice, an overview of insights from new interventions, and practical guidance on how to assess and manage prevention.

Also, there is a need to reconsider the current system of 'opportunistic' health care professional training prevention to ensure that all new health care practitioners develop a full understanding of the experiences of prevention.

It is noteworthy to mention that the significant shift in health care delivery observed between the pre-Covid and Covid periods can be considered a crucial environmental factor influencing primary health care delivery, which is described in detail in tables in Chapter 4.4.5. In the pre-Covid period, all visits were made in person, indicating a reliance on traditional methods of health care delivery. However, during the Covid period, there was a significant increase in remote visits, indicating a shift toward telemedicine as a mode of health care delivery. This pattern holds in both rural and urban areas.

The Covid-19 outbreak had a significant impact on post-diagnosis care for people with chronic diseases. The majority of respondents in the online survey reported reduced availability of post-diagnosis care and support and difficulty accessing new care and support. As a result, some health care providers have begun to focus on post-diagnosis care and support via the Internet. The pandemic has highlighted the importance of environmental aspects, such as access to health care services, and the need for adaptation and innovation in health care delivery.

This shift can be attributed to the Covid pandemic, which has led to social distancing measures and restrictions on physical contact, making in-person visits riskier for both health care providers and patients. The results also show that there is a higher percentage of women at pre-Covid visits compared to Covid visits, with respective

percentages of 32.2% and 9.5%. Conversely, there is a higher percentage of women at Covid visits compared to pre-Covid visits, with respective percentages of 90.5% and 67.8%. These findings suggest that the Covid period may have had a differential impact on women's health care-seeking behaviour compared to men. However, further research is needed to explore the underlying reasons for these gender differences.

The feedback from the focus groups' discussion presented in the results Chapter suggests that there are significant inequalities in access to health care and prevention measures, particularly in rural areas. The economic status of patients is mentioned as a barrier to accessing health care, as patients often cannot afford transportation or healthy food options. Additionally, lack of transportation and digital exclusion are identified as further barriers to accessing health care, particularly in rural areas where these resources may be limited.

The cost-effectiveness of health care interventions is also highlighted, with considerations for context-specific factors being important in evaluating the effectiveness of health care interventions. This suggests that health care interventions must be tailored to the specific needs and resources of the population being served.

The impact of war and conflict is also emphasized, with participants reporting that physical activity, diet, and mental health are all adversely affected in such situations. In particular, the lack of access to gyms, sports clubs, and healthy food options, combined with increased stress and anxiety, can contribute to the development of chronic diseases such as obesity, diabetes, and hypertension. The challenges of monitoring patients' health status during war and conflict are also highlighted, with remote monitoring being the only feasible option in some cases.

There are multiple barriers to accessing health care and prevention measures, particularly in rural areas and in situations of conflict (like the war in Ukraine). Addressing these barriers will require tailored interventions that consider the specific needs and resources of the populations being served.

The hypothesis about the vulnerable population can be also supported by the case epidemiological report from Poland described in detail in Chapter 4.3. Although the gender distribution of rural and urban patients is similar, patients from rural areas have a higher average age than patients from the city (respective means: 63.41 and

60.33 years). This difference could be due to several factors, such as differences in lifestyle, access to health care, or socioeconomic status. One possible reason for this difference could be that rural areas tend to have an older population overall. This could be because younger people are more likely to move to urban areas in search of better job opportunities or a higher standard of living. As a result, the rural population may be more heavily skewed towards older individuals, which could explain the higher average age of patients from rural areas. Another possible explanation is that access to health care may be more limited in rural areas, which could lead to a delay in diagnosis or treatment for certain conditions. This could result in patients from rural areas being older on average when they receive a diagnosis, compared to their urban counterparts who may have had earlier access to health care. Regardless of the reasons behind the age difference, health care providers should be aware of this trend and adjust their approach to care accordingly. For example, older patients may require more specialized care or more frequent check-ups, and health care providers may need to consider the unique challenges faced by rural patients when developing treatment plans. On the other side patients from rural areas have, on average, a higher number of visits than patients from the city, the respective means: 8.55 and 2.75. The reason for that may be that older patients tend to have more complex medical needs, requiring more frequent visits to health care facilities. It's also worth noting that the difference the number of visits between rural and urban patients could be influenced by cultural and socioeconomic factors. For example, patients from rural areas may have different beliefs and attitudes towards health care, which could lead to differences in health care utilization patterns. It would be worth do develop in future research.

The results of the retrospective analysis indicate that there is a significant relationship between the presence of diagnoses (E10, E11, I10, I11) at visits and the location of the medical centre in the study population. Specifically, there is a higher prevalence of E10, E11, and I10 diagnoses among patients who visited urban medical centres compared to those who visited rural centres. The prevalence of E10, E11, and I10 diagnoses at urban visits were 6.3%, 21.7%, and 68.4% respectively, whereas the prevalence of these diagnoses at rural visits were 0.7%, 5.3%, and 60.8% respectively. On the other hand, there is a higher prevalence of I11 diagnoses among patients who visited rural medical centres compared to those who visited urban centres. The prevalence of I11 diagnoses at rural visits was 33.2%, while at urban visits it was only

3.5%. Urban areas typically have higher population densities and greater diversity than rural areas, which may lead to differences in the prevalence of certain medical conditions. For example, urban areas may have a higher prevalence of lifestyle-related conditions like diabetes and hypertension due to factors like unhealthy diets, sedentary lifestyles, and stress.

The focus group discussed also broadly organizational and legal problems related to preventive measures in Poland. Participants mentioned that the problem lies in the scattered and uncoordinated systems, lack of a coherent vision of prevention, and cultural factors.

PROVIDING HEALTH CARE PRACTITIONERS WITH TRAINING IN DESIGNING CONTEXT-SPECIFIC, MULTI-COMPONENT INTERVENTIONS COULD IMPROVE PATIENT OUTCOMES IN ACHIEVING AND MAINTAINING LIFESTYLE CHANGES (H3)

There are well-established associations between behaviour and chronic diseases, which justify government efforts to reduce behavioural risk factors. However, the question of how population behaviour patterns might be shifted most effectively remains one of the greatest research and policy uncertainties [117]. What is important in the implementation of priority interventions to make them effective is one of the main research questions of the last decades.

To effectively prevent and manage chronic diseases, health care providers must be equipped with the knowledge and skills they need to deliver evidence-based care that is tailored to the needs of their patients. However, translating clinical guidelines into real-world practice can be challenging, particularly in resource-limited settings or among non-standard populations.

One promising strategy for addressing this challenge is to develop training programs that help health care providers to understand how to contextualize and adapt guidelines to their local population. This approach recognizes that clinical guidelines are not "one size fits all" and that best practices may need to be adapted to meet the unique needs and circumstances of different populations.

The development of such training programs is both novel and essential for the scaling up of best practices. By equipping health care providers with the knowledge and skills they need to contextualize and adapt guidelines, these programs can help to ensure that patients receive high-quality, patient-centred care that is tailored to their needs and preferences. This, in turn, can lead to better health outcomes, improved patient satisfaction, and increased provider engagement and satisfaction.

By empowering health care providers with the tools they need to contextualize and adapt guidelines, these training programs can help to promote a culture of continuous quality improvement and innovation in health care delivery. As health care providers gain confidence in their ability to adapt guidelines to their population, they may be more willing to experiment with new approaches and adopt best practices to meet emerging challenges or changing patient needs.

The theoretical model of adaptive implementation [118-120] is a framework for designing and implementing health interventions that can be adapted and modified over time to fit the needs of different contexts and populations. This model is based on the idea that successful implementation of health interventions requires continuous learning and adaptation to local contexts and changing circumstances.

The model includes four key components:

1. Intervention design: This involves developing a clear understanding of the problem to be addressed, defining the intervention components, and specifying how the intervention will be delivered.
2. Implementation monitoring: This involves collecting and analysing data on the implementation process to identify any challenges or areas for improvement.
3. Continuous feedback and adaptation: This involves using the data collected through implementation monitoring to modify and refine the intervention over time, in response to changing needs and circumstances.
4. Sustainability planning: This involves developing a plan for ensuring the intervention can be sustained over the long term, including identifying funding sources and strategies for scaling up the intervention.

The theoretical model of adaptive implementation recognizes the importance of context and the need for flexibility in the implementation process. By building

mechanisms for ongoing learning and adaptation, the model seeks to increase the likelihood of successful implementation and sustained impact of health interventions. The model has been applied in various health contexts, including mental health, chronic disease management, and health systems strengthening, and has shown promise in improving the effectiveness and sustainability of health interventions [121].

Dröes' model of implementation refers to the theoretical model of adaptive implementation by emphasising the need for flexibility and adaptation in implementing evidence-based interventions in real-world settings. The model recognizes that implementation is a complex and dynamic process that requires ongoing assessment and adjustment to fit the needs of the target population, the health care system, and the broader social and cultural context. Meiland et al. [119, 120] note that implementation is not a one-time event, but a continuous process of adaptation and improvement. They propose a cyclical process of implementation that includes four phases: pre-implementation, implementation, evaluation and feedback, and adaptation and improvement. This process allows for ongoing assessment and adjustment of the intervention to optimize its fit with the target population and the health care system.

The theoretical model of adaptive implementation provides a framework for understanding the importance of ongoing assessment and adaptation in implementation, which is consistent with Dröes' model. By emphasising the need for flexibility and adaptation, both models recognize that implementation is a complex process that requires ongoing attention and adjustment to ensure that evidence-based interventions achieve meaningful patient care outcomes across multiple contexts.

The theoretical model of adaptive implementation [119, 120] describes external factors (e.g. characteristics of the intervention, operational preconditions, personal, and financial resources)that can influence the implementation of an intervention during various phases (preparation, execution, and continuation). It differentiates between influencing factors on different levels in each of these phases: micro (user/primary process), meso (inter-organizational/social context), and macro level (health care system, legislation, policy). The theoretical model of adaptive implementation emphasizes the external factors that can influence the implementation of intervention during different phases of the process. The model distinguishes between influencing factors at different levels (micro, meso, and macro) and takes into account various

aspects of the intervention, including its characteristics, operational preconditions, and personal and financial resources [119, 120].

It is necessary to identify the barriers and facilitators of the implementation process to increase its effectiveness. Barriers to implementation may arise at multiple levels of health care delivery: micro, meso, and macro level. Micro-level would refer to the patient level (already diagnosed patient and also an at-risk patient), the care partner level, and the health care provider level. Meso- level would refer to the organisational level, while macro-level to the market/policy level.

To promote better health-related outcomes for patients, guidelines should not only be based on clinical evidence, but also be broad-based, flexible, adaptable, socially and culturally acceptable, and economically attainable. This requirement is exemplified by the National Institute for Clinical Excellence guidelines, which have incorporated patients' participation to enhance adherence to recommendations. The active involvement of all stakeholders in the design of guidelines is likely to improve their implementation and effectiveness [26].

The data suggests that there is a range of opinions among health care providers regarding the offer of non-medical interventions for people with chronic conditions in the region, they work in. While some respondents expressed a high level of satisfaction (answering 4 or 5 on the scale), others expressed lower levels of satisfaction (answering 1, 2, or 3).

The relatively high percentage of respondents who answered 3 (36.2%) suggests that while some health care providers may not be completely satisfied with the offer of non-medical interventions, they are not necessarily dissatisfied either. This could suggest that there is room for improvement in the provision of non-medical interventions, but that there are also some positive aspects of the current situation.

The relatively low percentage of respondents who answered 5 (5.3%) suggests that there is room for improvement in the provision of non-medical interventions and that some health care providers may feel that there is a significant gap between the current state of non-medical interventions and their ideal vision of what should be offered.

Overall, the data on health care providers' satisfaction with the offer of non-medical interventions for people with chronic conditions provides valuable insight into the experiences and perceptions of health care providers. By using this information to inform health care policy and planning, health care organizations and policymakers can work to improve the provision of non-medical interventions and better meet the needs of people with chronic conditions.

These results suggest that health care providers have a mixed perception of their level of training regarding their skills in implementing non-medical interventions. While some respondents expressed high levels of confidence (answering 4 or 5 on the scale), others expressed lower levels of confidence (answering 1, 2, or 3).

The relatively high percentage of respondents who answered 3 (34.5%) suggests that while health care providers may not feel completely confident in their skills in implementing non-medical interventions, they do not necessarily feel that their skills are very limited either. This could indicate that there is a need for additional training or resources to support health care providers in implementing non-medical interventions.

The relatively low percentage of respondents who answered 5 (6.9%) suggests that there is room for improvement in the level of training and support provided to health care providers regarding their skills in implementing non-medical interventions. This could include providing additional training opportunities, resources, and support to health care providers to improve their confidence and ability to implement non-medical interventions.

Overall, the data on health care providers' perceived level of training regarding their skills in implementing non-medical interventions provides valuable insight into the experiences and needs of health care providers. By using this information to inform health care policy and planning, health care organizations and policymakers can work to improve the level of training and support provided to health care providers and better equip them to implement non-medical interventions in the care of people with chronic conditions.

The focus group members highlighted the issue of limited resources in health care, including the reliance on doctors as a limited resource, the need for

modernization and training in new technologies, and low motivation among health care staff and patients. Funding, time constraints, and the lack of trained staff are identified as barriers to providing preventive measures and non-pharmacological interventions. The use of mobile devices to provide direct feedback is suggested as an effective intervention, but the scope of the health care system is deemed insufficient to fully address the problem.

INDIVIDUALIZED SUPPORT FOR PATIENTS IN ACHIEVING AND MAINTAINING LIFESTYLE CHANGES COULD RESULT IN IMPROVED PREVENTION OUTCOMES (H4)

Undoubtedly, an evidence-based approach to prevention can significantly minimise chronic disease burden. There is a strong need for evidence derived from complex intervention evaluation methodologies in diverse health and social care contexts [124].

The article by Wensing et al. [123] emphasized the importance of integrated care and the need for effective implementation strategies to improve the quality of care. To achieve this, the authors suggest that a proactive health care team, including health care professionals such as nurses, physicians, physical therapists, consulting dieticians, and psychologists, is required to work in collaboration with patients and their caregivers.

The focus group discussion suggests that individualized support for patients in achieving and maintaining lifestyle changes could potentially result in improved prevention outcomes. However, cultural factors make it difficult to implement such support effectively. There is a general lack of trust in the health care system and low patient enrollment in prevention programs. Additionally, there is a cultural attachment to restorative medicine over preventative measures, and patients may be resistant to change their traditional lifestyles and diets. These cultural attitudes and beliefs may need to be addressed and overcome to effectively implement individualized support for patients in making lifestyle changes for prevention.

Billings et al. [124] propose suggestions and recommendations for enhancing the evaluation of integrated care, with a particular emphasis on its intricate and ongoing

nature. To improve the assessment of integrated care, the authors suggest adopting implementation research methods and conducting case studies, in addition to proposing ways of refining data collection methods for vulnerable populations and conducting cost-benefit analyses. Overall, the article provides valuable insights for advancing the evaluation of integrated care.

Moreover, the authors propose that a functional information exchange network is essential for facilitating communication and coordination between different health care providers, patients, and caregivers. This exchange network helps to ensure that relevant and up-to-date information is shared between the health care team and patients, enabling them to make informed decisions about their care. This, in turn, improves the quality of care, enhances patient satisfaction, and potentially leads to better health outcomes.

The authors suggest that the proactive health care team and the functional information exchange network are critical components of the successful implementation of integrated care. Health care systems that prioritize these factors are more likely to provide high-quality, patient-centred care.

Glazier et al. [111] conducted a comprehensive systematic review of interventions that aimed to improve diabetes care in socially disadvantaged populations and found that interventions targeting organizational structures beyond traditional diabetes education programs were more effective. This suggests that a more comprehensive approach to addressing the social determinants of health, such as organizational changes to promote health equity, may be needed to improve diabetes care outcomes in these populations.

The findings from the study highlight the need for interventions that are tailored to specific populations and the importance of addressing social determinants of health to improve diabetes care outcomes in socially disadvantaged populations. The study underscores the need for health care providers and policymakers to recognize the importance of addressing the social determinants of health, such as poverty, education, housing, and access to care, to improve the health outcomes of socially disadvantaged populations.

The results of this research provide a framework to strengthen chronic disease prevention, especially in terms of evidence-based and practice-based recommendations for health systems. Most literature sources postulate that collaboration among professionals and their organisations increases the capacity of the health system and the involvement of patients and policymakers in the process of developing guidelines may affect the implementation. The number of reviews also underlines the importance of technology in the process of intervention implementation. This review is also in line with the existing literature, which highlights the role of increasing awareness of healthy lifestyle recommendations, especially among populations where the health literacy level is not sufficient.

Also, the importance of the environment in effective prevention was emphasized in the quotes given by the focus groups member. There is a need for a coordinated approach to health policies and programs from different institutions to ensure uniform quality and refinement. Personalized prevention programs that take into account environmental and social factors are also seen as a necessary approach. Lack of funding and strong state programs is a major challenge in implementing effective prevention programs in some countries. War, depression, anxiety, and loss of patient monitoring can also pose challenges to better prevention efforts. It is highlighted that social policies such as support for the elderly and housing policies can contribute to better prevention outcomes.

Public health interventions are implemented to improve the health outcomes of individuals and populations. When a specific intervention is effective in a particular sample, it is important to scale up the intervention to reach a larger population. However, there is often a lack of understanding about the mechanisms or pathways through which these interventions are scaled up. This lack of understanding can hinder the effective implementation of these interventions on a wider scale.

Multi-sectoral partnerships (MSPs) are frequently cited as a means by which governments can improve population health while leveraging the resources and expertise of private and non-profit sectors [125]. The social, psychological, and economic situations of regions or countries should be put into consideration while making a deeper analysis of health care systems. Reducing the burden of chronic diseases is a global challenge requiring diverse collaborations and the diffusion and

adoption of effective interventions in multiple settings. The past decade has seen a range of innovative community-driven and clinically driven primary and secondary prevention strategies designed to prevent and reduce the burden of chronic conditions worldwide [111].

STUDY LIMITATIONS

In the study, several limitations were identified across different research methods, including database searches, semi-structured qualitative surveys, focus groups, and retrospective data analysis. Understanding these limitations is important to accurately interpret the results and draw meaningful conclusions.

Database searches: The scope of the search was adjusted to the potential of two databases, which may have limited the number of available sources. Additionally, only open-access published articles were included, which may have omitted eligible studies.

Semi-structured qualitative surveys: These surveys have a limited sample size, which may limit the generalizability of the findings. The semi-structured nature of the survey can make it more susceptible to response bias, and the survey length can be time-consuming and hinder the collection of data from a large number of participants. In the context of the COVID-19 pandemic, the survey length was particularly challenging for health care professionals.

Focus groups: A potential limitation of focus groups is the tendency of moderators to generalize or categorize individual feedback, which can obscure unique perspectives.

Retrospective data analysis has some limitations that the researcher was aware of. The quality of the retrospective data depends on the accuracy and completeness of the original records. If the records were incomplete, incorrect, or not collected in a standardized manner, this can affect the quality of the data and limit the conclusions that can be drawn from it. Retrospective studies are usually observational, which means that they can only establish associations between variables and cannot prove causality.

This is because other factors that were not measured or controlled for could be responsible for the observed associations. Also, the data collected in retrospective studies may not be relevant to the current context or population. For example, if the study was conducted at a different time or in a different country, the results may not be generalizable to the current population or context. Retrospective studies are limited by the available data, which may not include all relevant variables or may not allow for the examination of certain hypotheses.

Interpretation bias: This is a potential limitation for all qualitative research methods, where the researcher's own biases or preconceptions can influence the interpretation of data, leading to inaccurate conclusions.

PRACTICAL RECOMMENDATIONS

The results of this research offer a structure to enhance the prevention of chronic diseases, specifically regarding evidence-based and practice-based directives for health systems. The majority of literature sources speculate that collaboration among professionals and their organizations enhances the capacity of the health system, and involving patients and policymakers in the guideline development process may impact implementation. Furthermore, the substantial number of reviews emphasizes the importance of technology in executing interventions. This study is consistent with the current literature, which underscores the significance of promoting awareness of healthy lifestyle recommendations, particularly among individuals with insufficient health literacy.

In addition to medical treatments, it is crucial to enhance the efficacy of non-medical interventions that can enable individuals with chronic conditions to become more engaged in their treatment. The systematic review aimed to identify optimal guidelines and policies for non-medical interventions and to explore the factors that hinder or facilitate their integration into routine clinical practice.

Also in addition to the existing literature, the researchers endeavored to obtain a more comprehensive understanding of the facilitators and barriers that empower patients in their process of behaviour change. Health behaviour transformation is not

exclusively a personal matter but rather is embedded in a network of psychological, social, and environmental factors that encompass the patient's complete context. It is untenable to consider behaviour change as a purely personal process, but rather as a systemic process in which professionals collaborate with the individual to address both internal and external factors and their interdependencies. As these factors may act as influential barriers or facilitators, contextual, relational, and social factors will be integrated into the intervention delivery.

Also, despite having some experience and mechanisms in implementing prevention programs, lack of time, people, and financial stimulus remain challenges. In various parts of the world, good practices and systems for implementing prevention exist, but no simple solutions are available to every person when a demo or pilot ends. Funding issues for medical devices, servers, and domains are also a concern. For prevention efforts to be successful, it needs to be followed up by the universal health care system. The focus group members also highlighted that most health care systems invest only 1 or 2% of the total amount in prevention, whereas the rest is invested in treating sick people. The political level is starting to realize the importance of prevention, but getting health care decision-makers on board with the system remains a challenge.

Based on the valuable insights provided by experts in focus group discussions, practical advice for implementing health promotion activities can be broken down into several key points. Experts emphasize the importance of tailoring health messages and interventions to individuals' needs and preferences, meaning that personalized approaches are essential. For example, using personalized risk assessments can help demonstrate specific risks an individual faces from a certain behaviour, which can make the health message more relevant and motivating to them. Direct communication channels are vital in promoting health behaviours. Experts suggest utilizing screening programs, postnatal care, and visits to primary care providers as examples of direct communication channels that allow for personalized conversations and advice. These channels are often more effective than mass media campaigns. Cultural sensitivity is a crucial aspect to consider when developing health promotion campaigns. Cultural differences can impact health behaviours and attitudes toward health promotion activities, and understanding cultural beliefs, values, and attitudes toward health is crucial to tailoring culturally appropriate messages. While mass media campaigns

such as billboards and television advertising can be effective, they can also be cost-ineffective. Therefore, resources should be focused on direct communication channels and personalized approaches, which can be more efficient in promoting behaviour change. Patient organizations can provide valuable insights and support for health promotion activities, especially for individuals from underserved populations. These organizations have a deep understanding of the needs and preferences of their members and can be instrumental in promoting health behaviours.

Based on the analysis of focus group discussions about patients' needs, the following practical recommendation can be made for health promotion activities. It is essential to prioritize understanding the needs and expectations of patients. To achieve this, there must be a systemic change in how patient needs are studied and prioritized. Patient organizations can play a crucial role in this by advocating for their members' needs and expectations. Medical professionals should also be trained to engage in dialogue with patients and explain the risks associated with different health behaviours. Additionally, it is important to recognize that patients from smaller communities may face unique challenges in accessing health care and having their voices heard. Thus, prioritization of patient needs is critical and should be informed by a deep understanding of the unique challenges faced by different patient groups.

FURTHER PERSPECTIVES

Multimorbidity management in general practice can be reinforced by knowledge of the clinical implications of the presence of comprehensive disease patterns among elderly patients, and those between 55 and 69 years. Guideline developers should be aware of the complexity of multimorbidity. As a consequence of this complexity, it is even more important to focus on what matters to a patient with multimorbidity in general practice [38]. Conducting research on the needs and expectations of patients with chronic diseases, and taking steps to meet them, is crucial for improving the efficiency of therapy management. By doing so, health care providers can ensure that patients receive the appropriate care, support, and resources they need to manage their condition effectively, ultimately leading to better health outcomes.

Future clinical trials may be helpful to determine the interventional utility of composite lifestyle metrics like the HOLS (optimal lifestyle score that includes body mass index (BMI) plus four behavioural factors: smoking, alcohol use, fruit/vegetable consumption, and physical activity), as well as the degree to which maintaining a healthy lifestyle over the long term helps adults avoid, or at least delay, metabolic syndrome complications [125]. By evaluating the effectiveness of this score in clinical trials, researchers can determine the degree to which maintaining a healthy lifestyle over the long term helps adults avoid or delay complications associated with metabolic syndrome. This information can be invaluable in providing health care professionals with evidence-based tools and strategies to help patients make healthier lifestyle choices and manage their metabolic syndrome effectively. Ultimately, such trials could help improve the quality of life for individuals with metabolic syndrome and reduce the burden of chronic disease on the health care system

Further research is needed to determine the effectiveness of implementing innovations and conducting health technology assessments. These innovative approaches can have either positive or negative impacts on the health care system, including the patient care experience, quality of care, and cost of care (known as "exnovations"). [126] It is also important to conduct more advanced research to prevent the development of multiple chronic illnesses, maintain fiscal responsibility in avoiding high health care costs, and promote partnerships between different sectors and the use of evidence-based practices. By doing so, health care providers can ensure that patients receive the highest quality of care possible while minimizing the risk of adverse outcomes and unnecessary health care expenditures. Therefore, it is recommended that a comprehensive analysis be undertaken to identify the procedures for scaling up public health interventions. This analysis could involve examining the different methods used to expand the interventions and the factors that influence their successful implementation. It is important to understand the challenges that can arise when trying to scale up an intervention, such as resource constraints or lack of support from health care system stakeholders. It is also crucial to identify facilitators of successful scaling up, such as effective communication and collaboration among health care system stakeholders. By analysing the scaling-up process in-depth, researchers and public health professionals can gain a better understanding of the most effective methods for expanding interventions and overcoming the challenges that arise

during this process. This knowledge can ultimately improve the health outcomes of a larger population and contribute to more effective and efficient public health interventions.

It is important to work in close collaboration with policymakers and health care service payers to ensure that the intervention is designed with their input and that it meets their needs and expectations. By involving these stakeholders in the process, it is more likely that the intervention will be accepted and implemented more effectively.

Monitoring the efficacy of the implementation of the intervention is also crucial. This involves continuously assessing the impact of the intervention on patient outcomes and identifying any barriers or facilitators that may be affecting the implementation process [127]. By doing so, it is possible to make adjustments to the intervention in real-time, optimising its effectiveness and efficiency.

The above is supported by the recommendations given by the focus group members. There is a need to promote best practices that are effective in preventing chronic diseases, which can be achieved through coordinated care and regular application of prevention measures. Also, it is important to include other medical professionals such as nurses, midwives, psychologists, nutritionists, and paramedics to play a large role in prevention and there is a need for digitally literate people who can provide motivational consultations and support to patients.

Also, education is key to prevention, and health education should start from schools and childhood to shape healthy habits for life. A personalized medicine approach should be adopted instead of a one-size-fits-all approach to identify specific people at risk and have a personalized approach to prevention. Supporting the work of primary care teams, not just doctors, is necessary to ensure that patients receive the best possible care. Active patient invitations can be effective in encouraging patients to come for preventive checkups. However, legal issues need to be considered when accessing PESEL numbers from an external company.

Non-clinical interventions can be effective in helping chronic patients become more engaged in therapy and improve their health outcomes. Finally, more research

is needed to identify effective prevention strategies, especially in difficult or sensitive populations. It is crucial to make use of the results we already have and convince payers to support these efforts.

The development of training programs that enable health care providers to contextualize and adapt guidelines to their population is a key strategy for achieving population-wide improvement in chronic disease prevention and management.

To enhance the effectiveness of behavior change interventions in healthcare, several strategies can be implemented. Firstly, education and training should be provided to healthcare professionals and stakeholders, equipping them with the necessary knowledge and skills for patient-centered care, behavior change strategies, and effective intervention implementation. This training enables professionals to engage patients effectively, understand their needs, and provide appropriate support for self-management.

Patient involvement is crucial in the design and evaluation of public health programs and policies. Collaborating with patient advocacy groups and community organizations ensures that interventions are tailored to the specific needs, preferences, and cultural contexts of the target population. Patient input provides valuable insights that enhance the relevance and effectiveness of interventions, fostering a patient-centered approach.

Access to resources and technology is another essential aspect of behavior change support. Healthcare providers and patients should have access to educational materials, digital health platforms, mobile applications, wearable devices, and other relevant resources. These tools empower patients to monitor their health, set goals, and track their progress, enabling active engagement in behavior change.

Regular follow-up and feedback mechanisms should be established to monitor intervention effectiveness and make necessary adjustments. This can be achieved through periodic assessments, patient surveys, focus groups, or qualitative interviews, gathering feedback from both patients and healthcare providers. Continuous evaluation ensures interventions remain responsive to evolving patient needs, supporting ongoing improvement.

By implementing these strategies, healthcare systems can enhance the implementation of behavior change interventions, promote patient-centered care, and improve health outcomes. Education and training, patient involvement, access to resources and technology, and follow-up and feedback mechanisms contribute to a comprehensive and effective approach to behavior change support in healthcare settings.

6. CONCLUSIONS

There is no “one size fits all” solution for implementing effective prevention strategies for chronic diseases, particularly in non-standard situations that produce health inequities. The results of this qualitative research provide valuable insights into the challenges and gaps in chronic disease prevention and management.

Health behaviour change is not just a personal issue, rather it is grounded in a system of psychological, social, and environmental factors, the full context of the patient. It is a system process, where professionals, together with the patients, address internal and external factors and their interactions. The way forward is to produce tools, guidelines, and materials for training methods and skills that will enable health care practitioners to design their multi-component interventions that will be person and context-based. Health services research needs to adopt a more comprehensive and context-sensitive approach. This includes conducting research that reflects the diversity and complexity of real-world contexts, involving health care system stakeholders in the design and implementation of interventions, and developing and testing effective implementation strategies. Long-term monitoring and evaluation are essential to gauge the effectiveness and sustainability of behavior change interventions. Recognizing that behavior change is a dynamic process, ongoing monitoring and evaluation will provide valuable insights into the outcomes and progress of interventions. (O1)

It is essential to focus on patient empowerment when implementing public health interventions and involve patients in the design and evaluation of public health programs and policies to ensure that they are tailored to their needs and preferences. This can be achieved by providing professionals and other stakeholders of the process with the knowledge, skills, and tools they need to manage effective intervention implementation. Effective guidelines must be supported by adequate training for health care providers, access to necessary resources and technology, and regular follow-up and feedback mechanisms to monitor their effectiveness. To enhance behavior change interventions in healthcare, key strategies should include: providing comprehensive education and training for healthcare professionals and stakeholders on patient-centered care and effective intervention implementation; involving patients in the design and evaluation of programs and policies to tailor interventions to their needs (co-designing);

ensuring access to resources and technology for behavior change support; and establishing follow-up and feedback mechanisms for ongoing monitoring, personalized assessment and improvement. These strategies promote patient-centeredness, effectiveness, and improved health outcomes. By addressing these challenges, health care providers can ensure that patients receive the best possible care and support for self-management, resulting in improved health outcomes and better quality of life. (O2)

The prevention and management of chronic diseases is a complex challenge that requires a multifaceted approach. One key aspect of this approach is to tailor public health programs and policies to the needs of non-standard populations. These populations may face unique social, cultural, or economic barriers to accessing health care, which can contribute to health disparities and poorer health outcomes. It is necessary to identify the barriers to and facilitators of the implementation process to increase its effectiveness. The global target is to identify high-impact interventions and identify barriers to their implementation and opportunities for acceleration. Health equity is a critical consideration in health behavior change. Acknowledging and addressing health disparities and inequities is necessary to ensure that interventions are effective for individuals from diverse backgrounds. It is important to reduce disparities by taking into account the specific needs and contexts of marginalized populations, thus promoting equal access to and benefits from behavior change interventions. (O3)

Healthcare professionals, researchers, policymakers, and community stakeholders should join forces, bringing their diverse expertise and perspectives to the table. Key action would be fostering collaboration and partnerships among healthcare providers, public health agencies, community organizations, and other stakeholders. The success of any intervention is dependent on how well it fits within the existing health care system and how it aligns with the needs and values of different stakeholders. By working together, sharing expertise and resources, and leveraging community networks, interventions can be more comprehensive, sustainable, and impactful. Stakeholders can ensure that programs and policies are designed with a deep understanding of the local context and that they are sustainable, cost-effective, and capable of achieving meaningful improvements in health outcomes. Interdisciplinary collaboration is key in addressing the complexity of health behavior change. (O4)

The research-to-practice gap is a significant challenge in health services research. Addressing this challenge requires a more comprehensive and context-sensitive approach that takes into account the complexity of health care systems and the diverse needs and values of different stakeholders. By doing so, health services research can translate into meaningful patient care outcomes and improve the quality, effectiveness, and efficiency of health care services.

7. LITERATURE

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8. SUMMARY IN ENGLISH

BACKGROUND

Health policies are focused on chronic conditions, which are conditions that cannot be cured but can be managed through medication and/or other therapies to prevent further complications by modifying lifestyle factors. This study defines non-clinical aspects of the patient journey and their role in the treatment process. Supporting patients in achieving and maintaining lifestyle changes on an individualized basis could improve prevention results. The research integrates outcomes from global and national guidelines, and publications, and addresses the gap between research and outcome implementation and effectiveness in primary health care patients within primary prevention of chronic diseases.

STUDY OBJECTIVES

The main objective of the study was to identify strategies within the framework of personalized prevention that intensify the effectiveness of chronic disease management in primary care patients.

The specific objectives were to identify opportunities to introduce competencies in primary care for using person-centred and contextual behaviour change as a way to actively engage and empower patients in their care and prevention, increasing patient capacity and understanding their needs; to evaluate the awareness of professionals and other health system stakeholders of the processes underlying the change and maintenance of healthy lifestyle habits as prevention of chronic diseases; to identify barriers and facilitators to implementing non-medical interventions; to appraise dialogue with health care system stakeholders.

METHODOLOGY

To provide rich, in-depth insights into the experiences and perspectives of patients, health care practitioners, and other stakeholders, a qualitative research study was conducted. The research aimed to identify the gaps and challenges in the current approaches to chronic disease prevention and management, and to explore potential solutions. The study comprised four complementary stages, which included a systematic review of medical intervention evaluations, a web-based survey

to understand the barriers and facilitators to intervention success, focus group discussions with health care system stakeholders, and epidemiological analysis of diabetes and hypertension data, which were further broken down into rural and urban subgroups.

RESULTS

Simply advising patients or providing them with education about their health is often not enough to achieve and sustain good self-management or health behaviour change. This is particularly true for vulnerable populations, including those living in rural areas. While well-developed guidelines for primary care management exist, they are often not effectively implemented. As a result, patients may experience worse health outcomes when it comes to chronic diseases.

To improve patient outcomes, it's important to provide health care practitioners with training in designing context-specific, multi-component interventions. By tailoring interventions to each patient's unique situation, health care practitioners can better support patients in achieving and maintaining lifestyle changes that will improve their overall health. Providing individualized support for patients can lead to improved prevention outcomes and help patients successfully manage their chronic conditions.

CONCLUSIONS

There is no single solution for preventing chronic diseases and addressing health inequities. Health care professionals to provide effective support to patients should adopt a comprehensive approach to designing interventions, taking into account each patient's unique situation and context, and utilize evidence-based tools such as guidelines and research findings. Patient empowerment and involvement in the design and evaluation of public health programs and policies are essential for tailored care and support for self-management. To address health disparities, it is necessary to identify barriers and facilitators to implementation and identify high-impact interventions. Stakeholder collaboration is crucial for the success of any intervention, as health care systems involve a range of stakeholders with different priorities, goals, and resources. A more comprehensive and context-sensitive approach can bridge the research-to-practice gap and improve the quality, effectiveness, and efficiency of health care services.

9. SUMMARY IN POLISH

STRESZCZENIE

Polityki zdrowotne koncentrują się na chorobach przewlekłych, czyli takich, które nie są możliwe do całkowitego wyleczenie, lecz umożliwiają kontrolowanie objawów dzięki farmakoterapii, terapii inwazyjnej lub modyfikacji stylu życia, w celu uniknięcia dalszych powikłań. Niniejsze badanie określa niemedyczne aspekty opieki nad pacjentami ich znaczeniu dla procesu leczenia. Wsparcie pacjentów w osiąganiu i utrzymywaniu zmian stylu życia może poprawić skuteczność prewencji chorób przewlekłych. Badanie integruje wyniki pochodzące z krajowych i międzynarodowych wytycznych i publikacji, a także adresuje luki między badaniami naukowymi a rzeczywistą implementacją i skutecznością interwencji w opiece podstawowej, w ramach pierwotnej prewencji chorób przewlekłych.

CELE

Głównym celem badania było określenie strategii w ramach personalizacji prewencji, które nasilają efektywność zarządzania chorobą przewlekłą u pacjentów opieki podstawowej.

Cele szczegółowe pracy to określenie możliwości wprowadzenia w podstawowej opiece zdrowotnej kompetencji w zakresie stosowania skoncentrowanej na pacjencie zmiany zachowań jako sposobu aktywnego angażowania pacjentów w proces leczenia i podejmowania działań profilaktycznych; ocena świadomości specjalistów i innych interesariuszy systemu ochrony zdrowia w zakresie procesów leżących u podstaw zmiany i utrzymania nawyków zdrowego stylu życia jako profilaktyki chorób przewlekłych; identyfikacja barier i ułatwień we wdrażaniu interwencji niemedycznych; ocena dialogu z interesariuszami systemu opieki zdrowotnej.

METODY

Badanie składało się z czterech wzajemnie uzupełniających się etapów analizowanych jakościowo. W pierwszym etapie dokonano przeglądu ocen interwencji medycznych, następnie przeprowadzono ankietę internetową i dyskusje w grupach

fokusowych z interesariuszami systemu ochrony zdrowia. Ostatnim etapem była analiza epidemiologiczna danych dotyczących pacjentów z cukrzycą i nadciśnieniem.

WYNIKI

Zwykła edukacja i porady udzielane pacjentom w zakresie ich zdrowia często nie są wystarczające, aby osiągnąć i utrzymać zmianę zachowań prozdrowotnych. Dotyczy to szczególnie populacji wrażliwych, w tym osób mieszkających na obszarach wiejskich. Chociaż istnieją dobrze opracowane wytyczne w zakresie zarządzania podstawową opieką zdrowotną, często nie są one skutecznie wdrażane. W konsekwencji może prowadzić to do pogorszenia wyników zdrowotnych pacjentów z chorobami przewlekłymi.

Aby osiągnąć poprawę wyników zdrowotnych pacjentów, istotne jest dostarczenie lekarzom odpowiedniego szkolenia z zakresu projektowania wieloskładnikowych interwencji dostosowanych do konkretnych kontekstów. Dopasowanie interwencji do indywidualnych potrzeb każdego pacjenta pozwala pracownikom opieki zdrowotnej na skuteczniejsze wsparcie pacjentów w osiąganiu i utrzymywaniu zmian stylu życia, co prowadzi do poprawy ogólnego stanu zdrowia. Indywidualne podejście do pacjentów może przyczynić się do poprawy wyników profilaktyki i zwiększyć skuteczność radzenia sobie z chorobami przewlekłymi.

WNIOSKI

W zapobieganiu chorobom przewlekłym i rozwiązywaniu problemów związanych z nierównościami zdrowotnymi nie ma uniwersalnego rozwiązania. Aby zapewnić skuteczne wsparcie pacjentom, pracownicy opieki zdrowotnej muszą podejść do projektowania interwencji kompleksowo i z uwzględnieniem indywidualnej sytuacji pacjenta oraz kontekstu, a także wykorzystać narzędzia, takie jak wytyczne i wyniki badań naukowych. Zaangażowanie pacjentów w projektowanie i ocenę programów i polityk zdrowia publicznego, a także uwzględnienie ich indywidualnych potrzeb i preferencji, jest kluczowe dla zapewnienia opieki zdrowotnej dostosowanej do pacjenta oraz wsparcia dla samodzielnej kontroli nad swoim zdrowiem. Aby zniwelować nierówności zdrowotne, niezbędne jest dokładne zidentyfikowanie barier i ułatwień, które wpływają na realizację działań i wdrożenie skutecznych interwencji. Aby osiągnąć sukces w każdej interwencji związanej z opieką zdrowotną, kluczowe

znaczenie ma współpraca z zainteresowanymi stronami, biorąca pod uwagę, że systemy opieki zdrowotnej składają się z wielu podmiotów o różnych celach, priorytetach i zasobach. Dostosowanie podejścia do indywidualnego kontekstu może pomóc w redukcji rozbieżności między badaniami naukowymi a praktyką oraz zwiększyć jakość, skuteczność i efektywność świadczonych usług zdrowotnych.

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APPENDIX 1. WEB-BASED SURVEY

I am a PhD candidate researching effective strategies for chronic disease prevention.
This survey is dedicated to the health care providers who play a significant role in the chronic patient pathway to effective coping with the disease.
The overall goal of this study is to answer the question of how we could empower the chronic patient to increase his/her engagement in non-medical interventions.

I would like to understand your experiences with implementing non-medical interventions and learn from your experiences. This survey aims to collect information about:

- Your knowledge, attitudes, and practices in non-medical interventions/social prescribing.
- Barriers and facilitators of non-medical interventions implementation - what influences implementation effectiveness?
- Conditions for successful intervention in different environments and populations.
- The area for improvement within the intervention implementation process.

I am interested in your views and your experiences, so please complete the questions accordingly. Please answer all of the questions.

The following questions are aimed to gather general information

---

1. What is your age? .....

2. What is your gender?

❑male ❑female ❑other

3. What is your nationality? .....

4. What is your current profession? .....

5. How many years have you been providing health care to chronic patients? .....

6. Where do you practice?

❑rural area ❑urban area ❑suburbs

The following questions are aimed to gather information about your experience with the implementation of non-medical interventions

1. Given your professional experiences, on a scale of 1 (very dissatisfied) to 5 (very satisfied), how satisfied are you with the offer of non-medical interventions for people with chronic conditions in the region you work in?

very dissatisfied very satisfied

1	2	3	4	5

2. What non-medical interventions have you been implementing? Please list them below briefly.

.....

.....

3. Are the interventions you implement evidence-based?

❑ Yes ❑ No

They are based mainly on (please mark the most relevant for you sources):

❑ literature
❑ guidelines
❑ anecdotal stories from colleagues
❑ information from a competitor
❑ patient experiences
❑ results from a local pilot
❑ other sources? (please specify)

.....

.....

4. Do you perceive difficulties in implementation? i.e. reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement

.....

.....

Barriers and facilitators of implementing the effective intervention

1. What are the biggest challenges of implementing the interventions in your daily work

.....

.....

2. What are the barriers and facilitators? Please think about the chronic patient level, at-risk patient level, care partner level, health care provider level, organizational level, and market/ policy level.

	Barriers	Facilitators
Chronic patient level (regards the diagnosed patients' perspective)		
At-risk patient level (regards patients whose chronic disease is not yet diagnosed but risk factors are noticed)		
Care partner level (regards non-professional care providers - usually a family member - who supports or provides the main care for the person with a chronic disease)		
Health care provider level (regards professional care providers)		
Organizational level (e.g., hospital, clinic, nursing home) that provides infrastructure and other complementary resources to support the work and development of care teams and microsystems)		
Market/ policy level (includes regulatory, financial, and payment regimes and entities that influence the structure and performance of health care organizations)		

3. Are you familiar with patient needs, barriers, and facilitators to meet those needs?

❑ Yes ❑ No

4. Are those needs known and prioritized by the organization you work for?

❑ Yes ❑ No

The area for improvement

1. Do you think that the interventions can be adapted, tailored, refined, or reinvented to meet local needs?

❑Yes ❑No

Please specify what could be helpful.

.....
.....

2. On a scale of 1 (very limited) to 5 (excellent), to what extent do you think you are adequately trained regarding your skills in implementing non-medical interventions?

very limited excellent

1	2	3	4	5

1. In what areas do you wish to receive additional training regarding your skills in implementing non-medical interventions?

.....
.....
.....
.....

How has the Coronavirus outbreak impacted the post-diagnostic care for people with chronic diseases?

❑ It has not impacted the chronic diseases post-diagnostic care
❑ There has been a decrease in the availability of post-diagnostic care and support
❑ There is no post-diagnostic care and support available anymore
❑ It is (more) difficult to access new post-diagnostic care and support Post diagnostic care and support have shifted to an online focus
❑ I do not know
❑ Other Answers

THANK YOU FOR YOUR IMPORTANT INPUT

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Table 5. Age distribution of patients in the rural and urban centre

centre	n	age					Wilcoxon test p
		mean	stand. dev.	median	min	max	
rural	1472	63.41	14.11	64	7	96	p<0.001
urban	451	60.33	14.74	62	21	92	
total	1923	62.69	14.31	63	7	96	

p - calculated significance level in Wilcoxon test

Table 6. Gender distribution of patients in the rural and urban centre

centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	816	55.4	656	44.6	0.626
urban	256	56.8	195	43.2	
total	1072	55.7	851	42.3	n=1923

p - calculated significance level in Fisher's exact test of independence

Table 7. Distribution of the number of patient visits in the rural and urban centre

centre	n	number of patient visits					Wilcoxon test p
		mean	stand. dev.	median	min	max	
rural	1472	8.55	6.15	7	1	36	p<0.001
urban	451	2.75	2.62	2	1	25	
total	1923	7.19	6.05	6	1	36	

p - calculated significance level in Wilcoxon test

Table 8. Age distribution on visits to rural and urban centres

centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	12591	67.92	12.74	68	p<0.001
urban	1242	63.09	14.54	65	
total	13833	67.48	12.98	67	

p - calculated significance level in Wilcoxon test

Table 9. Gender distribution on visits to rural and urban centres

centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	7390	58.7	5201	41.3	0.002
urban	672	54.1	570	45.9	
total	8062	58.3	5771	41.7	13833

p - calculated significance level in Fisher's exact test of independence

Table 10. Distribution of the presence of major diagnoses (E10, E11, I10, I11) on visits to rural and urban centre

centre	E10		E11		I10		I11		Fisher test p
	n	%	n	%	n	%	n	%	
rural	86	0.7	669	5.3	7660	60.8	4176	33.2	p=0.002
urban	78	6.3	270	21.7	850	68.4	44	3.5	
total	164	1.2	939	6.8	8510	61.5	4220	30.5	13833

p - calculated significance level in Fisher's exact test of independence

Table 11. Distribution of the type of visits in the rural and urban centre

centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	4742	37.7	7849	62.3	p<0.001
urban	221	17.8	1021	82.2	
total	4963	35.9	8870	64.1	

p - calculated significance level in Fisher's exact test of independence

Table 12. E10 - Age distribution at visits in the rural and urban centre

E10 centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	86	48.51	18.91	55	0.034
urban	78	55.54	17.31	61	
total	164	51.85	18.45	55	

p - calculated significance level in Wilcoxon test

Table 13. E10 - Gender distribution on visits at the rural and urban centre

E10 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	11	12.8	75	87.2	0.004
urban	25	32.1	53	67.9	
total	36	22.0	128	78.0	

p - calculated significance level in Fisher's exact test of independence

Table 14. E10 - Distribution of the visits type at the rural and urban centre

E10 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	28	32.6	58	67.4	0.161
urban	17	21.8	61	78.2	
total	45	27.4	119	72.6	

p - calculated significance level in Fisher's exact test of independence

Table 15. E10 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1	42	25.8	1+3+5	20	23.3	1	35	44.9
1+3+5	20	12.2	1+4+5+6	16	18.6	1+2	15	19.2
1+4+5+6	16	9.8	4+5+6	15	17.4	1+3	11	14.1
1+2	15	9.1	1	7	8.1	0	5	6.4
4+5+6	15	9.1	0	6	7.0	3	3	3.8
1+3	13	7.9	1+3+4+5	5	5.8	1+2+3	2	2.6
0	11	6.7	1+4+5	5	5.8	1+2+4	2	2.6
1+3+4+5	5	3.0	1+4+6	4	4.7	1+4	2	2.6
1+4+5	5	3.0	1+3	2	2.3	1+2+3+4	1	1.3
1+4	4	2.4	1+4	2	2.3	2+3	1	1.3
1+4+6	4	2.4	1+3+4	1	1.2	4+5	1	1.3
3	3	1.8	1+3+4+5+6	1	1.2			
1+2+3	2	1.2	4+6	1	1.2			
1+2+4	2	1.2	8	1	1.2			
1+2+3+4	1	0.6						
1+3+4	1	0.6						
1+3+4+5+6	1	0.6						

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
2+3	1	0.6						
4+5	1	0.6						
4+6	1	0.6						
8	1	0.6						

Table 16. E10 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	131	79.9	Z1	63	73.3	Z1	68	87.2
Z5	63	38.4	Z5	62	72.1	Z2	21	26.9
Z4	56	34.1	Z4	50	58.1	Z3	18	23.1
Z3	47	28.7	Z6	37	43.0	Z4	6	7.7
Z6	37	22.6	Z3	29	33.7	Z0	5	6.4
Z2	21	12.8	Z0	6	7.0	Z5	1	1.3
Z0	11	6.1	Z8	1	1.2			
Z8	1	0.6						

Table 17. E10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	5	35.7	Z76.0	3	60	Z76.0	2	22.2
D22	1	7.1	I11	1	20	D22	1	11.1
E11	1	7.1	R10	1	20	E11	1	11.1
I11	1	7.1				L08	1	11.1
L08	1	7.1				L40	1	11.1
L40	1	7.1				N31.0	1	11.1
N31.0	1	7.1				R07	1	11.1
R07	1	7.1				Z03	1	11.1
R10	1	7.1						
Z03	1	7.1						

Table 18. E10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	5	3.0	Z76.0	3	3.5	Z76.0	2	2.6
D22	1	0.6	I11	1	1.2	D22	1	1.3
E11	1	0.6	R10	1	1.2	E11	1	1.3
I11	1	0.6				L08	1	1.3
L08	1	0.6				L40	1	1.3
L40	1	0.6				N31.0	1	1.3
N31.0	1	0.6				R07	1	1.3
R07	1	0.6				Z03	1	1.3
R10	1	0.6						
Z03	1	0.6						

Table 19. E11 - Age distribution at visits at the rural and urban centre

E11 centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	669	66.14	10.51	64	0.9
urban	270	64.81	11.47	67	
total	939	65.76	10.80	65	

p - calculated significance level in Wilcoxon test

Table 20. E11 - Gender distribution on visits at the rural and urban centre

E11 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	332	49.6	337	50.4	0.221
urban	122	45.2	148	54.8	
total	454	48.3	485	51.7	

p - calculated significance level in Fisher's exact test of independence

Table 21. E11 - Distribution of the visits type at the rural and urban centre

E11 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	253	37.8	416	62.2	p<0.001
urban	45	16.7	225	83.3	
total	298	31.7	641	68.3	

p - calculated significance level in Fisher's exact test of independence

Table 22. E11 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+5+6	200	21.3	1+4+5+6	200	29.9	1	139	51.5
4+5+6	182	19.4	4+5+6	182	27.2	1+2	36	13.3
1	179	19.1	1+3+4+5	118	17.6	1+4	32	11.9
1+3+4+5	118	12.6	1	40	6.0	1+3	15	5.6
1+4	56	6.0	1+4+5	28	4.2	1+2+3	8	3.0
1+2	38	4.0	1+4	24	3.6	3	8	3.0
1+4+5	28	3.0	1+4+6	20	3.0	1+3+4	7	2.6
1+4+6	25	2.7	1+4+5+6+9	14	2.1	1+4+6	5	1.9
1+3	15	1.6	0	8	1.2	1+2+4	4	1.5
1+3+4	14	1.5	1+3+4	7	1.0	2	4	1.5
1+4+5+6+9	14	1.5	3	6	0.9	0	2	0.7
3	14	1.5	1+3+4+5+6	3	0.4	1+2+7	1	0.4
0	10	1.1	1+2	2	0.3	1+2+8	1	0.4
1+2+3	8	0.9	1+2+4+5+6	2	0.3	1+3+4+6	1	0.4
1+2+4	4	0.4	1+3+4+5+6+9	2	0.3	1+3+4+8	1	0.4
2	4	0.4	1+2+3+4+5+6	1	0.1	1+6	1	0.4
1+3+4+5+6	3	0.3	1+2+4+6	1	0.1	1+6+9	1	0.4
1+2+4+5+6	2	0.2	1+3+4+5+9	1	0.1	1+8	1	0.4
1+3+4+5+6+9	2	0.2	1+4+5+6+10	1	0.1	1+9	1	0.4
4	2	0.2	1+5+6	1	0.1	4	1	0.4
1+2+3+4+5+6	1	0.1	2+4+5+6	1	0.1	9	1	0.4
1+2+4+6	1	0.1	2+4+6	1	0.1			
1+2+7	1	0.1	3+4+5+6	1	0.1			
1+2+8	1	0.1	4	1	0.1			
1+3+4+5+9	1	0.1	4+5+6+7	1	0.1			
1+3+4+6	1	0.1	4+5+6+8	1	0.1			

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+3+4+8	1	0.1	4+6	1	0.1			
1+4+5+6+10	1	0.1	5	1	0.1			
1+5+6	1	0.1						
1+6	1	0.1						
1+6+9	1	0.1						
1+8	1	0.1						
1+9	1	0.1						
2+4+5+6	1	0.1						
2+4+6	1	0.1						
3+4+5+6	1	0.1						
4+5+6+7	1	0.1						
4+5+6+8	1	0.1						
4+6	1	0.1						
5	1	0.1						
9	1	0.1						

Table 23. E11 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	719	76.6	Z4	611	91.3	Z1	254	94.1
Z4	662	70.5	Z5	558	83.4	Z2	54	20.0
Z5	558	59.4	Z1	465	69.5	Z4	51	18.9
Z6	441	47.0	Z6	433	64.7	Z3	40	14.8
Z3	179	19.1	Z3	139	20.8	Z6	8	3.0
Z2	62	6.6	Z9	17	2.5	Z8	3	1.1
Z9	20	2.1	Z0	8	1.2	Z9	3	1.1
Z0	10	1.1	Z2	8	1.2	Z0	2	0.7
Z8	4	0.4	Z7	1	0.1	Z7	1	0.4
Z7	2	0.2	Z8	1	0.1			
Z10	1	0.1	Z10	1	0.1			

Table 24. E11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	9	15.3	Z76.0	7	20.6	N40	3	12
G54	3	5.1	I11	3	8.8	I10	2	8
I10	3	5.1	G54	2	5.9	I49	2	8
I11	3	5.1	I11+Z76.0	2	5.9	R10	2	8
N40	3	5.1	Z71.2	2	5.9	Z76.0	2	8
I11+Z76.0	2	3.4	E04.1+Z76.0	1	2.9	E03	1	4
I49	2	3.4	E11.7	1	2.9	F01+H53+Z76	1	4
R10	2	3.4	E78.2+F01+G20+G30.8+I11+N31+Z76.0	1	2.9	G54	1	4
Z71.2	2	3.4	G54+Z76.0	1	2.9	H53	1	4
E03	1	1.7	H53+Z76.0	1	2.9	H90	1	4
E04.1+Z76.0	1	1.7	H61.2	1	2.9	I10+M47+Z76	1	4
E11.7	1	1.7	I10	1	2.9	I48	1	4
E78.2+F01+G20+G30.8+I11+N31+Z76.0	1	1.7	I10+U09	1	2.9	I83.0	1	4
F01+H53+Z76	1	1.7	I11.0	1	2.9	J00	1	4
G54+Z76.0	1	1.7	I11+I25	1	2.9	L24	1	4
H53	1	1.7	J01	1	2.9	M17	1	4
H53+Z76.0	1	1.7	J06	1	2.9	M54	1	4
H61.2	1	1.7	M25.5	1	2.9	M70	1	4
H90	1	1.7	M25.5+S01.2	1	2.9	Z23+Z76.0	1	4
I10+M47+Z76	1	1.7	M54.3	1	2.9			
I10+U09	1	1.7	R73.0	1	2.9			
I11.0	1	1.7	S83.4	1	2.9			
I11+I25	1	1.7	Z03.8	1	2.9			
I48	1	1.7						
I83.0	1	1.7						
J00	1	1.7						
J01	1	1.7						
J06	1	1.7						
L24	1	1.7						
M17	1	1.7						
M25.5	1	1.7						
M25.5+S01.2	1	1.7						
M54	1	1.7						

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
M54.3	1	1.7						
M70	1	1.7						
R73.0	1	1.7						
S83.4	1	1.7						
Z03.8	1	1.7						
Z23+Z76.0	1	1.7						

Table 25. E11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	16	1.7	Z76.0	13	1.9	I10	3	1.1
I11	7	0.7	I11	7	1.0	N40	3	1.1
I10	5	0.5	G54	3	0.4	Z76.0	3	1.1
G54	4	0.4	I10	2	0.3	H53	2	0.7
H53	3	0.3	M25.5	2	0.3	I49	2	0.7
N40	3	0.3	Z71.2	2	0.3	R10	2	0.7
F01	2	0.2	E04.1	1	0.1	Z76	2	0.7
I49	2	0.2	E11.7	1	0.1	E03	1	0.4
M25.5	2	0.2	E78.2	1	0.1	F01	1	0.4
R10	2	0.2	F01	1	0.1	G54	1	0.4
Z71.2	2	0.2	G20	1	0.1	H90	1	0.4
Z76	2	0.2	G30.8	1	0.1	I48	1	0.4
E03	1	0.1	H53	1	0.1	I83.0	1	0.4
E04.1	1	0.1	H61.2	1	0.1	J00	1	0.4
E11.7	1	0.1	I11.0	1	0.1	L24	1	0.4
E78.2	1	0.1	I25	1	0.1	M17	1	0.4
G20	1	0.1	J01	1	0.1	M47	1	0.4
G30.8	1	0.1	J06	1	0.1	M54	1	0.4
H61.2	1	0.1	M54.3	1	0.1	M70	1	0.4
H90	1	0.1	N31	1	0.1	Z23	1	0.4
I11.0	1	0.1	R73.0	1	0.1			
I25	1	0.1	S01.2	1	0.1			
I48	1	0.1	S83.4	1	0.1			
I83.0	1	0.1	U09	1	0.1			
J00	1	0.1	Z03.8	1	0.1			
J01	1	0.1						
J06	1	0.1						

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
L24	1	0.1						
M17	1	0.1						
M47	1	0.1						
M54	1	0.1						
M54.3	1	0.1						
M70	1	0.1						
N31	1	0.1						
R73.0	1	0.1						
S01.2	1	0.1						
S83.4	1	0.1						
U09	1	0.1						
Z03.8	1	0.1						
Z23	1	0.1						

Table 26. I10 - Age distribution at visits at the rural and urban centre

I10 centre	n	age			Wilcoxon test p
		mean	stand. dev.	median	
rural	7660	63.44	11.58	64	0.83
urban	850	62.76	14.87	65	
total	8510	63.37	12.00	64	

p - calculated significance level in Wilcoxon test

Table 27. I10 - Gender distribution on visits at the rural and urban centre

I10 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	4321	56.4	3339	43.6	0.145
urban	502	59.1	348	40.9	
total	4823	56.7	3687	43.3	

p - calculated significance level in Fisher's exact test of independence

Table 28. I10 - Distribution of the visits type at the rural and urban centre

I10 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	2930	38.3	4730	61.7	p<0.001
urban	150	17.6	700	82.4	
total	3080	36.2	5430	63.8	

p - calculated significance level in Fisher's exact test of independence

Table 29. I10 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+5+6	4742	55.7	1+4+5+6	4742	61.9	1	645	75.9
1+3+4+5	914	10.7	1+3+4+5	914	11.9	1+2	89	10.6
1	760	8.9	1+3+4	640	8.4	1+3	34	4.0
1+3+4	641	7.5	1+4	336	4.4	1+2+3	23	2.7
1+4	342	4.0	1+4+5+6+9	282	3.7	0	10	1.2
1+4+5+6+9	282	3.3	1+4+6	150	2.0	2	9	1.1
1+4+6	152	1.8	1	115	1.5	3	9	1.1
1+2+4+5+6	102	1.2	1+2+4+5+6	102	1.3	1+4	6	0.7
1+2	93	1.1	1+3+4+5+6	50	0.7	1+9	6	0.7
1+3+4+5+6	50	0.6	1+3+4+5+9	42	0.5	1+6	3	0.4
1+3+4+5+9	42	0.5	1+4+5+6+10	32	0.4	1+4+6	2	0.2
1+3	41	0.5	1+4+5+6+8	23	0.3	2+3	2	0.2
1+4+5+6+10	32	0.4	0	20	0.3	1+10	1	0.1
0	30	0.4	1+4+5+6+7	20	0.3	1+2+4	1	0.1
3	26	0.3	1+2+3+4+5+6	19	0.2	1+2+9	1	0.1
1+2+3	24	0.3	3	17	0.2	1+3+4	1	0.1
1+4+5+6+8	23	0.3	1+3+4+9	16	0.2	1+3+4+6	1	0.1
1+4+5+6+7	20	0.2	1+4+5	13	0.2	1+3+5	1	0.1
1+2+3+4+5+6	19	0.2	1+3+4+5+10	12	0.2	1+3+9	1	0.1
1+3+4+9	16	0.2	1+2+3+4+5	11	0.1	1+4+5	1	0.1
2	15	0.2	1+2+4+5+6+9	10	0.1	1+7	1	0.1
1+4+5	14	0.2	9	9	0.1	1+7+8	1	0.1
1+3+4+5+10	12	0.1	1+3	7	0.1	1+7+9	1	0.1
1+2+3+4+5	11	0.1	1+3+4+5+6+9	7	0.1	9	1	0.1
1+2+4+5+6+9	10	0.1	1+3+4+6	6	0.1			
9	10	0.1	2	6	0.1			

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+3+4+5+6+9	7	0.1	4+5+6	5	0.1			
1+3+4+6	7	0.1	1+2	4	0.1			
1+9	6	0.1	1+4+6+8	3				
4+5+6	5	0.1	1+5	3				
1+4+6+8	3		1+2+3+4	2				
1+5	3		1+2+3+4+5+9	2				
1+6	3		1+2+4+5+6+7	2				
1+2+3+4	2		1+3+4+5+6+8	2				
1+2+3+4+5+9	2		1+3+4+5+8	2				
1+2+4+5+6+7	2		1+3+4+8	2				
1+3+4+5+6+8	2		1+4+7	2				
1+3+4+5+8	2		1+4+9	2				
1+3+4+8	2		2+4+5+6	2				
1+3+5	2		1+2+3	1				
1+4+7	2		1+2+3 +4+9	1				
1+4+9	2		1+2+4+5	1				
2+3	2		1+2+4+5 +6+10	1				
2+4+5+6	2		1+2+4+5+6+8	1				
1+10	1		1+2+4+6	1				
1+2+3+4+9	1		1+2+4+6+7	1				
1+2+4	1		1+3+4+10	1				
1+2+4+5	1		1+3+4+5+6+10	1				
1+2+4+5+6+10	1		1+3+4+5+9+10	1				
1+2+4+5+6+8	1		1+3+4+6+8	1				
1+2+4+6	1		1+3+4+7	1				
1+2+4+6+7	1		1+3+4+7+8	1				
1+2+9	1		1+3+5	1				
1+3+4+10	1		1+4+10	1				
1+3+4+5+6+10	1		1+4+5+10	1				
1+3+4+5+9+10	1		1+4+5+6+7+9	1				
1+3+4+6+8	1		1+4+5+6+9+10	1				
1+3+4+7	1		1+4+6+7	1				
1+3+4+7+8	1		1+4+6+9	1				
1+3+9	1		1+6+9	1				
1+4+10	1		10	1				
1+4+5+10	1		2+3+5	1				
1+4+5+6+7+9	1		2+4	1				
1+4+5+6+9+10	1		3+4	1				
1+4+6+7	1							

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+6+9	1							
1+6+9	1							
1+7	1							
1+7+8	1							
1+7+9	1							
10	1							
2+3+5	1							
2+4	1							
3+4	1							

Table 30. I10 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	8416	98.9	Z1	7597	99.2	Z1	819	96.4
Z4	7486	88.0	Z4	7474	97.6	Z2	125	14.7
Z5	6309	74.1	Z5	6307	82.3	Z3	72	8.5
Z6	5474	64.3	Z6	5468	71.4	Z4	12	1.4
Z3	1835	21.6	Z3	1763	23.0	Z0	10	1.2
Z9	386	4.5	Z9	376	4.9	Z9	10	1.2
Z2	294	3.5	Z2	169	2.2	Z6	6	0.7
Z10	53	0.6	Z10	52	0.7	Z7	3	0.4
Z8	36	0.4	Z8	35	0.5	Z5	2	0.2
Z7	32	0.4	Z7	29	0.4	Z8	1	0.1
Z0	30	0.4	Z0	20	0.3	Z10	1	0.1

Table 31. I10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	19	10.1	Z76.0	16	12.2	H53	3	5.3
Z03	12	6.4	Z03	9	6.9	M70	3	5.3
J06	8	4.3	J06	7	5.3	R05	3	5.3
Z71.2	5	2.7	Z71.2	5	3.8	Z03	3	5.3
M70	4	2.1	Z24.6	4	3.1	Z76.0	3	5.3
R05	4	2.1	G54	3	2.3	E78	2	3.5

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z24.6	4	2.1	Z71.0	3	2.3	J00	2	3.5
E11	3	1.6	E11	2	1.5	M17	2	3.5
G54	3	1.6	K40	2	1.5	M47	2	3.5
H53	3	1.6	L02	2	1.5	M54	2	3.5
J00	3	1.6	L30	2	1.5	R42	2	3.5
L60	3	1.6	L60	2	1.5	B07	1	1.8
M54	3	1.6	M54.4	2	1.5	D02.2	1	1.8
Z71.0	3	1.6	R73	2	1.5	D45	1	1.8
B07	2	1.1	Z71	2	1.5	E03	1	1.8
E78	2	1.1	A46	1	0.8	E11	1	1.8
K40	2	1.1	B07	1	0.8	E11+G54+M70	1	1.8
K80	2	1.1	B86	1	0.8	F45	1	1.8
L02	2	1.1	D12	1	0.8	H06	1	1.8
L30	2	1.1	D64.9	1	0.8	H25+H91.9	1	1.8
M17	2	1.1	D69.6	1	0.8	H52	1	1.8
M47	2	1.1	E11.8	1	0.8	H53+H90.2	1	1.8
M54.4	2	1.1	E66	1	0.8	H61.1	1	1.8
N30	2	1.1	E74.8+M17	1	0.8	I70.2	1	1.8
R06.0	2	1.1	E78+E79	1	0.8	I83	1	1.8
R10	2	1.1	E78+M25.5+M70+Z03.8	1	0.8	J06	1	1.8
R42	2	1.1	E78+M54.2	1	0.8	J18	1	1.8
R73	2	1.1	F03	1	0.8	J31	1	1.8
Z71	2	1.1	F10.2+H25	1	0.8	K21.0	1	1.8
A46	1	0.5	F32.2	1	0.8	K80	1	1.8
B86	1	0.5	G54+M17	1	0.8	L08	1	1.8
D02.2	1	0.5	G56.0+Z03.8+Z76.0	1	0.8	L40	1	1.8
D12	1	0.5	H10	1	0.8	L60	1	1.8
D45	1	0.5	H11.3	1	0.8	M65.3	1	1.8
D64.9	1	0.5	H53.8+H61.2	1	0.8	N18	1	1.8
D69.6	1	0.5	H53+H90.8	1	0.8	N30	1	1.8
E03	1	0.5	H53+M54.6+Z03	1	0.8	N39.3	1	1.8
E11.8	1	0.5	H60	1	0.8	R06.0	1	1.8
E11+G54+M70	1	0.5	H61.2	1	0.8	R10	1	1.8
E66	1	0.5	I11	1	0.8	S40	1	1.8
E74.8+M17	1	0.5	I11.0	1	0.8	Z00.1	1	1.8

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
E78+E79	1	0.5	I11.9	1	0.8			
E78+M25.5+M70+Z03.8	1	0.5	I11+Z76.0	1	0.8			
E78+M54.2	1	0.5	I70.9	1	0.8			
F03	1	0.5	J00	1	0.8			
F10.2+H25	1	0.5	J00+M54.2	1	0.8			
F32.2	1	0.5	J01	1	0.8			
F45	1	0.5	J03	1	0.8			
G54+M17	1	0.5	J22+Z76.0	1	0.8			
G56.0+Z03.8+Z76.0	1	0.5	K07	1	0.8			
H06	1	0.5	K30	1	0.8			
H10	1	0.5	K62	1	0.8			
H11.3	1	0.5	K80	1	0.8			
H25+H91.9	1	0.5	L29	1	0.8			
H52	1	0.5	L50	1	0.8			
H53.8+H61.2	1	0.5	M23	1	0.8			
H53+H90.2	1	0.5	M53.1	1	0.8			
H53+H90.8	1	0.5	M54	1	0.8			
H53+M54.6+Z03	1	0.5	M70	1	0.8			
H60	1	0.5	M77	1	0.8			
H61.1	1	0.5	N20	1	0.8			
H61.2	1	0.5	N20.0	1	0.8			
I11	1	0.5	N30	1	0.8			
I11.0	1	0.5	N45	1	0.8			
I11.9	1	0.5	R05	1	0.8			
I11+Z76.0	1	0.5	R05+Z03.8	1	0.8			
I70.2	1	0.5	R06.0	1	0.8			
I70.9	1	0.5	R07.3	1	0.8			
I83	1	0.5	R10	1	0.8			
J00+M54.2	1	0.5	R22.2	1	0.8			
J01	1	0.5	R23.8	1	0.8			
J03	1	0.5	R53	1	0.8			
J18	1	0.5	R55	1	0.8			
J22+Z76.0	1	0.5	R73.9	1	0.8			
J31	1	0.5	S42.2+Z76.0	1	0.8			
K07	1	0.5	S50.0	1	0.8			

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
K21.0	1	0.5	S61	1	0.8			
K30	1	0.5	T00	1	0.8			
K62	1	0.5	T93.2	1	0.8			
L08	1	0.5	U07.1	1	0.8			
L29	1	0.5	Z03.8	1	0.8			
L40	1	0.5	Z23.5	1	0.8			
L50	1	0.5	Z96.1	1	0.8			
M23	1	0.5						
M53.1	1	0.5						
M65.3	1	0.5						
M77	1	0.5						
N18	1	0.5						
N20	1	0.5						
N20.0	1	0.5						
N39.3	1	0.5						
N45	1	0.5						
R05+Z03.8	1	0.5						
R07.3	1	0.5						
R22.2	1	0.5						
R23.8	1	0.5						
R53	1	0.5						
R55	1	0.5						
R73.9	1	0.5						
S40	1	0.5						
S42.2+Z76.0	1	0.5						
S50.0	1	0.5						
S61	1	0.5						
T00	1	0.5						
T93.2	1	0.5						
U07.1	1	0.5						
Z00.1	1	0.5						
Z03.8	1	0.5						
Z23.5	1	0.5						
Z96.1	1	0.5						

Table 32. I10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	23	0.3	Z76.0	20	0.3	H53	4	0.5
Z03	13	0.2	Z03	10	0.1	M70	4	0.5
J06	8	0.1	J06	7	0.1	R05	3	0.4
H53	6	0.1	Z71.2	5	0.1	Z03	3	0.4
M70	6	0.1	G54	4	0.1	Z76.0	3	0.4
E78	5	0.1	Z03.8	4	0.1	E11	2	0.2
G54	5	0.1	Z24.6	4	0.1	E78	2	0.2
R05	5	0.1	E78	3		J00	2	0.2
Z71.2	5	0.1	Z71.0	3		M17	2	0.2
E11	4		E11	2		M47	2	0.2
J00	4		H53	2		M54	2	0.2
M17	4		H61.2	2		R42	2	0.2
Z03.8	4		I11	2		B07	1	0.1
Z24.6	4		J00	2		D02.2	1	0.1
L60	3		K40	2		D45	1	0.1
M54	3		L02	2		E03	1	0.1
Z71.0	3		L30	2		F45	1	0.1
B07	2		L60	2		G54	1	0.1
H25	2		M17	2		H06	1	0.1
H61.2	2		M54.2	2		H25	1	0.1
I11	2		M54.4	2		H52	1	0.1
K40	2		M70	2		H61.1	1	0.1
K80	2		R05	2		H90.2	1	0.1
L02	2		R73	2		H91.9	1	0.1
L30	2		Z71	2		I70.2	1	0.1
M47	2		A46	1		I83	1	0.1
M54.2	2		B07	1		J06	1	0.1
M54.4	2		B86	1		J18	1	0.1
N30	2		D12	1		J31	1	0.1
R06.0	2		D64.9	1		K21.0	1	0.1
R10	2		D69.6	1		K80	1	0.1
R42	2		E11.8	1		L08	1	0.1
R73	2		E66	1		L40	1	0.1
Z71	2		E74.8	1		L60	1	0.1
A46	1		E79	1		M65.3	1	0.1
B86	1		F03	1		N18	1	0.1

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
D02.2	1		F10.2	1		N30	1	0.1
D12	1		F32.2	1		N39.3	1	0.1
D45	1		G56.0	1		R06.0	1	0.1
D64.9	1		H10	1		R10	1	0.1
D69.6	1		H11.3	1		S40	1	0.1
E03	1		H25	1		Z00.1	1	0.1
E11.8	1		H53.8	1				
E66	1		H60	1				
E74.8	1		H90.8	1				
E79	1		I11.0	1				
F03	1		I11.9	1				
F10.2	1		I70.9	1				
F32.2	1		J01	1				
F45	1		J03	1				
G56.0	1		J22	1				
H06	1		K07	1				
H10	1		K30	1				
H11.3	1		K62	1				
H52	1		K80	1				
H53.8	1		L29	1				
H60	1		L50	1				
H61.1	1		M23	1				
H90.2	1		M25.5	1				
H90.8	1		M53.1	1				
H91.9	1		M54	1				
I11.0	1		M54.6	1				
I11.9	1		M77	1				
I70.2	1		N20	1				
I70.9	1		N20.0	1				
I83	1		N30	1				
J01	1		N45	1				
J03	1		R06.0	1				
J18	1		R07.3	1				
J22	1		R10	1				
J31	1		R22.2	1				
K07	1		R23.8	1				
K21.0	1		R53	1				
K30	1		R55	1				
K62	1		R73.9	1				

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
L08	1		S42.2	1				
L29	1		S50.0	1				
L40	1		S61	1				
L50	1		T00	1				
M23	1		T93.2	1				
M25.5	1		U07.1	1				
M53.1	1		Z23.5	1				
M54.6	1		Z96.1	1				
M65.3	1							
M77	1							
N18	1							
N20	1							
N20.0	1							
N39.3	1							
N45	1							
R07.3	1							
R22.2	1							
R23.8	1							
R53	1							
R55	1							
R73.9	1							
S40	1							
S42.2	1							
S50.0	1							
S61	1							
T00	1							
T93.2	1							
U07.1	1							
Z00.1	1							
Z23.5	1							
Z96.1	1							

Table 33. I11 - Age distribution at visits at the rural and urban centre

I11 centre	n	age			Wilcoxon test p
		mean	mean	mean	
rural	4176	76.82	9.71	78	0.01
urban	44	72.34	12.87	75	
total	4220	76.77	9.76	78	

p - calculated significance level in Wilcoxon test

Table 34. I11 - Gender distribution on visits at the rural and urban centre

I11 centre	gender				Fisher test p
	female		male		
	n	%	n	%	
rural	2726	65.3	1450	34.7	0.08
urban	23	52.3	21	47.7	
total	2749	65.1	1471	34.9	

p - calculated significance level in Fisher's exact test of independence

Table 35. I11 - Distribution of the visits type at the rural and urban centre

I11 centre	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
rural	1531	36.7	2645	63.3	0.027
urban	9	20.5	35	79.5	
total	1540	36.5	2680	63.5	

p - calculated significance level in Fisher's exact test of independence

Table 36. I11 - Distribution of recommendation configurations in total and distribution of recommendation configurations at centres by frequency of occurrence

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+4+5+6	1918	45.5	1+4+5+6	1918	45.9	1	25	56.8
1+3+4	1001	23.7	1+3+4	1001	24.0	1+2	8	18.2
1+3+4+5	568	13.5	1+3+4+5	568	13.6	2	3	6.8
1+4+5+6+9	173	4.1	1+4+5+6+9	173	4.1	1+2+3	2	4.5
1	130	3.1	1	105	2.5	1+4+6	2	4.5
1+4+6	87	2.1	1+4+6	85	2.0	3	2	4.5
1+4	67	1.6	1+4	66	1.6	1+3	1	2.3
1+4+5	66	1.6	1+4+5	66	1.6	1+4	1	2.3

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
1+3+4+9	28	0.7	1+3+4+9	28	0.7			
1+2+4+5+6	25	0.6	1+2+4+5+6	25	0.6			
0	17	0.4	0	17	0.4			
1+3+4+5+6	17	0.4	1+3+4+5+6	17	0.4			
9	16	0.4	9	16	0.4			
3	11	0.3	1+4+5+6+7	9	0.2			
1+2	10	0.2	3	9	0.2			
1+4+5+6+7	9	0.2	1+3+4+5+9	8	0.2			
1+3+4+5+9	8	0.2	1+4+5+6+10	7	0.2			
1+4+5+6+10	7	0.2	1+3+4+5+6+9	4	0.1			
2	7	0.2	1+9	4	0.1			
1+3+4+5+6+9	4	0.1	2	4	0.1			
1+9	4	0.1	4+5+6	4	0.1			
4+5+6	4	0.1	1+3+4+10	3	0.1			
1+2+3	3	0.1	1+4+5+9	3	0.1			
1+3	3	0.1	1+4+6+9	3	0.1			
1+3+4+10	3	0.1	4	3	0.1			
1+4+5+9	3	0.1	1+2	2				
1+4+6+9	3	0.1	1+2+3+4+5	2				
4	3	0.1	1+3	2				
1+2+3+4+5	2		1+3+4+6	2				
1+3+4+6	2		1+3+4+7	2				
1+3+4+7	2		1+4+9	2				
1+4+9	2		1+2+3	1				
1+2+3+4+5+6	1		1+2+3+4+5+6	1				
1+2+4	1		1+2+4	1				
1+2+4+5	1		1+2+4+5	1				
1+2+4+5+6+9	1		1+2+4+5+6+9	1				
1+3+4+5+10	1		1+3+4+5+10	1				
1+3+4+8	1		1+3+4+8	1				
1+3+4+9+10	1		1+3+4+9+10	1				
1+3+5	1		1+3+5	1				
1+4+10	1		1+4+10	1				
1+4+5+6+8	1		1+4+5+6+8	1				
10	1		10	1				
2+3	1		2+3	1				
2+3+4	1		2+3+4	1				
4+10	1		4+10	1				
4+5+6+9	1		4+5+6+9	1				

recommendation configurations	total		recommendation configurations	rural		recommendation configurations	urban	
	n	%		n	%		n	%
4+9	1		4+9	1				
7	1		7	1				

Table 37. I11 - Distribution of individual recommendations in total and distribution of individual recommendations at centres by frequency of occurrence

recommendation	total		recommendation	rural		recommendation	urban	
	n	%		n	%		n	%
Z1	4155	98.5	Z1	4116	98.6	Z1	39	88.6
Z4	4015	95.1	Z4	4012	96.1	Z2	13	29.5
Z5	2811	66.6	Z5	2811	67.3	Z3	5	11.4
Z6	2253	53.4	Z6	2251	53.9	Z4	3	6.8
Z3	1659	39.3	Z3	1654	39.6	Z6	2	4.5
Z9	245	5.8	Z9	245	5.9			
Z2	53	1.3	Z2	40	1.0			
Z0	17	0.4	Z0	17	0.4			
Z10	15	0.4	Z10	15	0.4			
Z7	12	0.3	Z7	12	0.3			
Z8	2		Z8	2				

Table 38. I11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses at centres by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	25	24.5	Z76.0	25	25	E66	1	50
Z03	10	9.8	Z03	10	10	M54.4	1	50
I10	6	5.9	I10	6	6			
E11	5	4.9	E11	5	5			
E10+Z76.0	2	2.0	E10+Z76.0	2	2			
E11+Z76.0	2	2.0	E11+Z76.0	2	2			
H61.2	2	2.0	H61.2	2	2			
J06	2	2.0	J06	2	2			
R10	2	2.0	R10	2	2			
R73+Z76.0	2	2.0	R73+Z76.0	2	2			
Z02	2	2.0	Z02	2	2			
B02	1	1.0	B02	1	1			
E03+F06.3+	1	1.0	E03+F06.3+	1	1			

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0			Z76.0					
E11.8	1	1.0	E11.8	1	1			
E11+H40+Z76.0	1	1.0	E11+H40+Z76.0	1	1			
E66	1	1.0	E66+E78.0+R73	1	1			
E66+E78.0+R73	1	1.0	E78+Z76.0	1	1			
E78+Z76.0	1	1.0	E79	1	1			
E79	1	1.0	F32	1	1			
F32	1	1.0	G40.2+N40+Z76.0	1	1			
G40.2+N40+Z76.0	1	1.0	H10+J00	1	1			
H10+J00	1	1.0	H11.3	1	1			
H11.3	1	1.0	I25.0	1	1			
I25.0	1	1.0	I25.2+I48+Z76.0	1	1			
I25.2+I48+Z76.0	1	1.0	I48	1	1			
I48	1	1.0	I49	1	1			
I49	1	1.0	I49+R73+Z76.0	1	1			
I49+R73+Z76.0	1	1.0	I69.3	1	1			
I69.3	1	1.0	I83+Z76.0	1	1			
I83+Z76.0	1	1.0	J02+J22+Z76.0	1	1			
J02+J22+Z76.0	1	1.0	J44.9+Z03.8	1	1			
J44.9+Z03.8	1	1.0	J98.9+M47+N40+Z76.0	1	1			
J98.9+M47+N40+Z76.0	1	1.0	L03+M47	1	1			
L03+M47	1	1.0	M10+N40+Z76.0	1	1			
M10+N40+Z76.0	1	1.0	M13	1	1			
M13	1	1.0	M15	1	1			
M15	1	1.0	M41+M47+M79.2+Z76.0	1	1			
M41+M47+M79.2+Z76.0	1	1.0	M54.2	1	1			
M54.2	1	1.0	N31.8+N40+R42+R51+Z76.0	1	1			
M54.4	1	1.0	N40	1	1			
N31.8+N40+R42+R51+Z76.0	1	1.0	N40+R22+Z76.0	1	1			
N40	1	1.0	N45	1	1			

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	rural		configurations of co-morbid diagnoses	urban	
	n	%		n	%		n	%
N40+R22+Z76.0	1	1.0	R05	1	1			
N45	1	1.0	R22.2	1	1			
R05	1	1.0	R73.0	1	1			
R22.2	1	1.0	R93.4	1	1			
R73.0	1	1.0	S46	1	1			
R93.4	1	1.0	S61.0	1	1			
S46	1	1.0	S66	1	1			
S61.0	1	1.0	Z23+Z76.0	1	1			
S66	1	1.0	Z71.2	1	1			
Z23+Z76.0	1	1.0						
Z71.2	1	1.0						

Table 39. I11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis at centres by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
Z76.0	45	1.1	Z76.0	45	1.1	E66	1	2.3
Z03	10	0.2	Z03	10	0.2	M54.4	1	2.3
E11	8	0.2	E11	8	0.2			
I10	6	0.1	I10	6	0.1			
N40	6	0.1	N40	6	0.1			
R73	4	0.1	R73	4	0.1			
M47	3	0.1	M47	3	0.1			
E10	2		E10	2				
E66	2		H61.2	2				
H61.2	2		I48	2				
I48	2		I49	2				
I49	2		J06	2				
J06	2		R10	2				
R10	2		Z02	2				
Z02	2		B02	1				
B02	1		E03	1				
E03	1		E11.8	1				
E11.8	1		E66	1				
E78	1		E78	1				
E78.0	1		E78.0	1				
E79	1		E79	1				

co-morbid diagnoses	total		co-morbid diagnoses	rural		co-morbid diagnoses	urban	
	n	%		n	%		n	%
F06.3	1		F06.3	1				
F32	1		F32	1				
G40.2	1		G40.2	1				
H10	1		H10	1				
H11.3	1		H11.3	1				
H40	1		H40	1				
I25.0	1		I25.0	1				
I25.2	1		I25.2	1				
I69.3	1		I69.3	1				
I83	1		I83	1				
J00	1		J00	1				
J02	1		J02	1				
J22	1		J22	1				
J44.9	1		J44.9	1				
J98.9	1		J98.9	1				
L03	1		L03	1				
M10	1		M10	1				
M13	1		M13	1				
M15	1		M15	1				
M41	1		M41	1				
M54.2	1		M54.2	1				
M54.4	1		M79.2	1				
M79.2	1		N31.8	1				
N31.8	1		N45	1				
N45	1		R05	1				
R05	1		R22	1				
R22	1		R22.2	1				
R22.2	1		R42	1				
R42	1		R51	1				
R51	1		R73.0	1				
R73.0	1		R93.4	1				
R93.4	1		S46	1				
S46	1		S61.0	1				
S61.0	1		S66	1				
S66	1		Z03.8	1				
Z03.8	1		Z23	1				
Z23	1		Z71.2	1				
Z71.2	1							

Table 40. Age distribution at visits during Covid periods

period	n	age			Wilcoxon test p
		mean	st. dev.	median	
pre-Covid	5220	66.16	12.82	66	p<0.001
Covid	8613	68.28	13.03	68	
total	13833	67.48	12.98	67	

p - calculated significance level in Wilcoxon test

Table 41. Gender distribution on visits during Covid periods

period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	3017	57.8	2203	42.2	0.374
Covid	5045	58.6	3568	41.4	
total	8062	58.3	5771	41.7	13833

p - calculated significance level in Fisher's exact test of independence

Table 42. Distribution of the presence of the main diagnoses (E10, E11, I10, I11) at visits during the Covid periods

period	E10		E11		I10		I11		Fisher test p
	n	%	n	%	n	%	n	%	
pre-Covid	90	1.7	432	8.3	2648	50.7	2050	39.3	p<0.001
Covid	74	0.9	507	5.9	5862	68.1	2170	25.2	
total	164	1.2	939	6.8	8510	61.5	4220	30.5	13833

p - calculated significance level in Fisher's exact test of independence

Table 43. Distribution of the type of visit in Covid periods

period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	5220	100.0	p<0.001
Covid	4963	57.6	3650	42.4	
total	4963	35.9	8870	64.1	

p - calculated significance level in Fisher's exact test of independence

Table 44. cE10 - Age distribution at visits during Covid periods

E10 period	n	age			Wilcoxon test p
		mean	stand. dev.	median	
pre-Covid	90	54.06	15.40	55.0	0.27
Covid	74	49.18	21.39	52.5	
total	164	51.85	18.45	55	

p - calculated significance level in Wilcoxon test

Table 45. cE10 - Gender distribution at visits during Covid periods

E10 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	29	32.2	61	67.8	p<0.001
Covid	7	9.5	67	90.5	
total	36	22.0	128	78.0	

p - calculated significance level in Fisher's exact test of independence

Table 46. cE10 - Distribution of the type of visits during the Covid periods

E10 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	90	100.0	0
Covid	45	60.8	29	39.2	
total	45	27.4	119	72.6	

p - calculated significance level in Fisher's exact test of independence

Table 47. cE10 - Distribution of recommendation configurations and in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1	42	25.6	1	22	24.4	1	20	27.0
1+3+5	20	12.2	1+3+5	20	22.2	4+5+6	14	18.9
1+4+5+6	16	9.8	1+2	11	12.2	1+4+5+6	12	16.2
1+2	15	9.1	1+3	7	7.8	0	7	9.5
4+5+6	15	9.1	1+4+5	5	5.6	1+3	6	8.1
1+3	13	7.9	0	4	4.4	1+2	4	5.4
0	11	6.7	1+3+4+5	4	4.4	1+4+6	3	4.1
1+3+4+5	5	3.0	1+4+5+6	4	4.4	1+2+4	2	2.7

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5	5	3.0	1+4	3	3.3	1+2+3	1	1.4
1+4	4	2.4	3	3	3.3	1+3+4+5	1	1.4
1+4+6	4	2.4	1+2+3	1	1.1	1+4	1	1.4
3	3	1.8	1+2+3+4	1	1.1	4+5	1	1.4
1+2+3	2	1.2	1+3+4	1	1.1	4+6	1	1.4
1+2+4	2	1.2	1+3+4+5+6	1	1.1	8	1	1.4
1+2+3+4	1	0.6	1+4+6	1	1.1			
1+3+4	1	0.6	2+3	1	1.1			
1+3+4+5+6	1	0.6	4+5+6	1	1.1			
2+3	1	0.6						
4+5	1	0.6						
4+6	1	0.6						
8	1	0.6						

Table 48. cE10 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	131	79.9	Z1	81	90.0	Z1	50	67.6
Z5	63	38.4	Z3	39	43.3	Z4	35	47.3
Z4	56	34.1	Z5	35	38.9	Z6	30	40.5
Z3	47	28.7	Z4	21	23.3	Z5	28	37.8
Z6	37	22.6	Z2	14	15.6	Z3	8	10.8
Z2	21	12.8	Z6	7	7.8	Z0	7	9.5
Z0	11	6.1	Z0	4	4.4	Z2	7	9.5
Z8	1	0.6				Z8	1	1.4

Table 49. cE10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	5	35.7	Z76.0	5	45.5	D22	1	33.3
D22	1	7.1	I11	1	9.1	E11	1	33.3
E11	1	7.1	L08	1	9.1	L40	1	33.3
I11	1	7.1	N31.0	1	9.1			
L08	1	7.1	R07	1	9.1			

L40	1	7.1	R10	1	9.1
N31.0	1	7.1	Z03	1	9.1
R07	1	7.1			
R10	1	7.1			
Z03	1	7.1			

Table 50. cE10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	5	3.0	Z76.0	5	5.6	D22	1	1.4
D22	1	0.6	I11	1	1.1	E11	1	1.4
E11	1	0.6	L08	1	1.1	L40	1	1.4
I11	1	0.6	N31.0	1	1.1			
L08	1	0.6	R07	1	1.1			
L40	1	0.6	R10	1	1.1			
N31.0	1	0.6	Z03	1	1.1			
R07	1	0.6						
R10	1	0.6						
Z03	1	0.6						

Table 51. cE11 - Age distribution at visits during Covid periods

E11 period	n	age			Wilcoxon test p
		mean	stand. dev.	median	
pre-Covid	432	65.86	10.99	66	0.43
Covid	507	65.66	10.65	65	
total	939	65.76	10.80	65	

p - calculated significance level in Wilcoxon test

Table 52. cE11 - Gender distribution at visits during Covid periods

E11 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	218	50.5	214	49.5	0.239
Covid	236	46.5	271	53.5	
total	454	48.3	485	51.7	

p - calculated significance level in Fisher's exact test of independence

Table 53. cE11 - The gender distribution at the visits in both Covid periods is similar

E11 period	Visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	432	100.0	p<0.001
Covid	298	58.8	209	41.2	
total	298	31.7	641	68.3	

p - calculated significance level in Fisher's exact test of independence

Table 54. cE11 - Distribution of recommendation configurations in total and distribution of recommendation configurations in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5+6	200	21.3	1	135	31.2	1+4+5+6	193	38.1
4+5+6	182	19.4	1+3+4+5	89	20.6	4+5+6	117	23.1
1	179	19.1	4+5+6	65	15.0	1	44	8.7
1+3+4+5	118	12.6	1+4+5	27	6.2	1+4	32	6.3
1+4	56	6.0	1+4	24	5.6	1+3+4+5	29	5.7
1+2	38	4.0	1+2	19	4.4	1+4+6	20	3.9
1+4+5	28	3.0	1+3	14	3.2	1+2	19	3.7
1+4+6	25	2.7	1+2+3	8	1.9	1+4+5+6+9	14	2.8
1+3	15	1.6	1+3+4	8	1.9	3	7	1.4
1+3+4	14	1.5	0	7	1.6	1+3+4	6	1.2
1+4+5+6+9	14	1.5	1+4+5+6	7	1.6	0	3	0.6
3	14	1.5	3	7	1.6	1+3+4+5+6	3	0.6
0	10	1.1	1+4+6	5	1.2	1+2+4	2	0.4
1+2+3	8	0.9	2	4	0.9	1+2+4+5+6	2	0.4
1+2+4	4	0.4	1+2+4	2	0.5	1+3+4+5+6+9	2	0.4
2	4	0.4	1+2+7	1	0.2	1+2+3+4+5+6	1	0.2
1+3+4+5+6	3	0.3	1+2+8	1	0.2	1+2+4+6	1	0.2
1+2+4+5+6	2	0.2	1+3+4+6	1	0.2	1+3	1	0.2
1+3+4+5+6+9	2	0.2	1+3+4+8	1	0.2	1+3+4+5+9	1	0.2
4	2	0.2	1+5+6	1	0.2	1+4+5	1	0.2
1+2+3+4+5+6	1	0.1	1+6	1	0.2	1+4+5+6+10	1	0.2
1+2+4+6	1	0.1	1+6+9	1	0.2	1+9	1	0.2
1+2+7	1	0.1	1+8	1	0.2	2+4+5+6	1	0.2
1+2+8	1	0.1	4	1	0.2	2+4+6	1	0.2
1+3+4+5+9	1	0.1	4+5+6+7	1	0.2	3+4+5+6	1	0.2
1+3+4+6	1	0.1	9	1	0.2	4	1	0.2

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+3+4+8	1	0.1				4+5+6+8	1	0.2
1+4+5+6+10	1	0.1				4+6	1	0.2
1+5+6	1	0.1				5	1	0.2
1+6	1	0.1						
1+6+9	1	0.1						
1+8	1	0.1						
1+9	1	0.1						
2+4+5+6	1	0.1						
2+4+6	1	0.1						
3+4+5+6	1	0.1						
4+5+6+7	1	0.1						
4+5+6+8	1	0.1						
4+6	1	0.1						
5	1	0.1						
9	1	0.1						

Table 55. cE11 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	719	76.6	Z1	346	80.1	Z4	431	85.0
Z4	662	70.5	Z4	231	53.5	Z1	373	73.6
Z5	558	59.4	Z5	190	44.0	Z5	368	72.6
Z6	441	47.0	Z3	128	29.6	Z6	359	70.8
Z3	179	19.1	Z6	82	19.0	Z3	51	10.1
Z2	62	6.6	Z2	35	8.1	Z2	27	5.3
Z9	20	2.1	Z0	7	1.6	Z9	18	3.6
Z0	10	1.1	Z8	3	0.7	Z0	3	0.6
Z8	4	0.4	Z7	2	0.5	Z8	1	0.2
Z7	2	0.2	Z9	2	0.5	Z10	1	0.2
Z10	1	0.1						

Table 56. cE11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	9	15.3	Z76.0	8	18.2	G54	3	20.0
G54	3	5.1	I11	3	6.8	Z71.2	2	13.3
I10	3	5.1	N40	3	6.8	H61.2	1	6.7
I11	3	5.1	I10	2	4.5	I10	1	6.7
N40	3	5.1	I11+Z76.0	2	4.5	I10+U09	1	6.7
I11+Z76.0	2	3.4	E03	1	2.3	I11.0	1	6.7
I49	2	3.4	E04.1+Z76.0	1	2.3	I49	1	6.7
R10	2	3.4	E11.7	1	2.3	M25.5	1	6.7
Z71.2	2	3.4	E78.2+F01+G20+G30.8+I11+N31+Z76.0	1	2.3	M25.5+S01.2	1	6.7
E03	1	1.7	F01+H53+Z76	1	2.3	M54.3	1	6.7
E04.1+Z76.0	1	1.7	G54+Z76.0	1	2.3	R10	1	6.7
E11.7	1	1.7	H53	1	2.3	Z76.0	1	6.7
E78.2+F01+G20+G30.8+I11+N31+Z76.0	1	1.7	H53+Z76.0	1	2.3			
F01+H53+Z76	1	1.7	H90	1	2.3			
G54+Z76.0	1	1.7	I10+M47+Z76	1	2.3			
H53	1	1.7	I11+I25	1	2.3			
H53+Z76.0	1	1.7	I48	1	2.3			
H61.2	1	1.7	I49	1	2.3			
H90	1	1.7	I83.0	1	2.3			
I10+M47+Z76	1	1.7	J00	1	2.3			
I10+U09	1	1.7	J01	1	2.3			
I11.0	1	1.7	J06	1	2.3			
I11+I25	1	1.7	L24	1	2.3			
I48	1	1.7	M17	1	2.3			
I83.0	1	1.7	M54	1	2.3			
J00	1	1.7	M70	1	2.3			
J01	1	1.7	R10	1	2.3			
J06	1	1.7	R73.0	1	2.3			
L24	1	1.7	S83.4	1	2.3			
M17	1	1.7	Z03.8	1	2.3			
M25.5	1	1.7	Z23+Z76.0	1	2.3			
M25.5+S01.2	1	1.7						

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
M54	1	1.7						
M54.3	1	1.7						
M70	1	1.7						
R73.0	1	1.7						
S83.4	1	1.7						
Z03.8	1	1.7						
Z23+Z76.0	1	1.7						

Table 57. cE11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	16	1.7	Z76.0	15	3.5	G54	3	0.6
I11	7	0.7	I11	7	1.6	I10	2	0.4
I10	5	0.5	H53	3	0.7	M25.5	2	0.4
G54	4	0.4	I10	3	0.7	Z71.2	2	0.4
H53	3	0.3	N40	3	0.7	H61.2	1	0.2
N40	3	0.3	F01	2	0.5	I11.0	1	0.2
F01	2	0.2	Z76	2	0.5	I49	1	0.2
I49	2	0.2	E03	1	0.2	M54.3	1	0.2
M25.5	2	0.2	E04.1	1	0.2	R10	1	0.2
R10	2	0.2	E11.7	1	0.2	S01.2	1	0.2
Z71.2	2	0.2	E78.2	1	0.2	U09	1	0.2
Z76	2	0.2	G20	1	0.2	Z76.0	1	0.2
E03	1	0.1	G30.8	1	0.2			
E04.1	1	0.1	G54	1	0.2			
E11.7	1	0.1	H90	1	0.2			
E78.2	1	0.1	I25	1	0.2			
G20	1	0.1	I48	1	0.2			
G30.8	1	0.1	I49	1	0.2			
H61.2	1	0.1	I83.0	1	0.2			
H90	1	0.1	J00	1	0.2			
I11.0	1	0.1	J01	1	0.2			
I25	1	0.1	J06	1	0.2			
I48	1	0.1	L24	1	0.2			
I83.0	1	0.1	M17	1	0.2			
J00	1	0.1	M47	1	0.2			

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
J01	1	0.1	M54	1	0.2			
J06	1	0.1	M70	1	0.2			
L24	1	0.1	N31	1	0.2			
M17	1	0.1	R10	1	0.2			
M47	1	0.1	R73.0	1	0.2			
M54	1	0.1	S83.4	1	0.2			
M54.3	1	0.1	Z03.8	1	0.2			
M70	1	0.1	Z23	1	0.2			
N31	1	0.1						
R73.0	1	0.1						
S01.2	1	0.1						
S83.4	1	0.1						
U09	1	0.1						
Z03.8	1	0.1						
Z23	1	0.1						

Table 58. cI10 - Age distribution at visits during Covid periods

I10 period	n	age			Wilcoxon test stand. dev.
		mean	stand. dev.	mean	
pre-Covid	2648	60.68	11.66	61	p<0.001
Covid	5862	64.59	11.88	65	
total	8510	63.37	12.00	64	

p - calculated significance level in Wilcoxon test

Table 59. cI10 - Gender distribution at visits during Covid periods

I10 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	1498	56.6	1150	43.4	0.906
Covid	3325	56.7	2537	43.3	
total	4823	56.7	3687	43.3	

p - calculated significance level in Fisher's exact test of independence

Table 60. cI10 - Distribution of the type of visits during the Covid periods

I10 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0.0	2648	100.0	p<0.001
Covid	3080	52.5	2782	47.5	
total	3080	36.2	5430	63.8	

p - calculated significance level in Fisher's exact test of independence

Table 61. cI10 - Distribution of recommendation configurations in total and distribution of recommendation configurations in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5+6	4742	55.7	1+4+5+6	976	36.9	1+4+5+6	3766	64.2
1+3+4+5	914	10.7	1	515	19.4	1+3+4+5	500	8.5
1	760	8.9	1+3+4+5	414	15.6	1+4	285	4.9
1+3+4	641	7.5	1+3+4	382	14.4	1+4+5+6+9	277	4.7
1+4	342	4.0	1+2	65	2.5	1+3+4	260	4.4
1+4+5+6+9	282	3.3	1+4+6	62	2.3	1	245	4.2
1+4+6	152	1.8	1+4	57	2.2	1+2+4+5+6	97	1.7
1+2+4+5+6	102	1.2	1+3	32	1.2	1+4+6	90	1.5
1+2	93	1.1	0	15	0.6	1+3+4+5+6	44	0.8
1+3+4+5+6	50	0.6	1+2+3	15	0.6	1+3+4+5+9	41	0.7
1+3+4+5+9	42	0.5	1+4+5	14	0.5	1+4+5+6+10	30	0.5
1+3	41	0.5	3	13	0.5	1+2	28	0.5
1+4+5+6+10	32	0.4	2	10	0.4	1+4+5+6+8	20	0.3
0	30	0.4	1+3+4+5+6	6	0.2	1+4+5+6+7	19	0.3
3	26	0.3	1+2+4+5+6	5	0.2	1+2+3+4+5+6	17	0.3
1+2+3	24	0.3	1+3+4+5+10	5	0.2	0	15	0.3
1+4+5+6+8	23	0.3	1+4+5+6+9	5	0.2	1+3+4+9	14	0.2
1+4+5+6+7	20	0.2	1+9	5	0.2	3	13	0.2
1+2+3+4+5+6	19	0.2	1+3+4+6	4	0.2	1+2+3+4+5	11	0.2
1+3+4+9	16	0.2	4+5+6	4	0.2	1+2+4+5+6+9	10	0.2
2	15	0.2	1+4+5+6+8	3	0.1	1+2+3	9	0.2
1+4+5	14	0.2	1+4+6+8	3	0.1	1+3	9	0.2
1+3+4+5+10	12	0.1	1+2+3+4+5+6	2	0.1	9	8	0.1
1+2+3+4+5	11	0.1	1+3+4+5+8	2	0.1	1+3+4+5+10	7	0.1
1+2+4+5+6+9	10	0.1	1+3+4+8	2	0.1	1+3+4+5+6+9	7	0.1
9	10	0.1	1+3+4+9	2	0.1	2	5	0.1

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+3+4+5+6+9	7	0.1	1+3+5	2	0.1	1+3+4+6	3	0.1
1+3+4+6	7	0.1	1+4+5+6+10	2	0.1	1+2+3+4+5+9	2	
1+9	6	0.1	1+4+7	2	0.1	1+2+4+5+6+7	2	
4+5+6	5	0.1	1+5	2	0.1	1+3+4+5+6+8	2	
1+4+6+8	3		2+3	2	0.1	1+4+9	2	
1+5	3		2+4+5+6	2	0.1	1+6	2	
1+6	3		9	2	0.1	1+2+3+4	1	
1+2+3+4	2		1+10	1		1+2+3+4+9	1	
1+2+3+4+5+9	2		1+2+3+4	1		1+2+4+5	1	
1+2+4+5+6+7	2		1+2+4	1		1+2+4+5+6+10	1	
1+3+4+5+6+8	2		1+2+9	1		1+2+4+5+6+8	1	
1+3+4+5+8	2		1+3+4+5+9	1		1+2+4+6	1	
1+3+4+8	2		1+3+4+6+8	1		1+2+4+6+7	1	
1+3+5	2		1+3+4+7+8	1		1+3+4+10	1	
1+4+7	2		1+3+9	1		1+3+4+5+6+10	1	
1+4+9	2		1+4+5+6+7	1		1+3+4+5+9+10	1	
2+3	2		1+4+6+7	1		1+3+4+7	1	
2+4+5+6	2		1+6	1		1+4+10	1	
1+10	1		1+6+9	1		1+4+5+10	1	
1+2+3+4+9	1		1+7+8	1		1+4+5+6+7+9	1	
1+2+4	1		1+7+9	1		1+4+5+6+9+10	1	
1+2+4+5	1		10	1		1+4+6+9	1	
1+2+4+5+6+10	1		3+4	1		1+5	1	
1+2+4+5+6+8	1					1+7	1	
1+2+4+6	1					1+9	1	
1+2+4+6+7	1					2+3+5	1	
1+2+9	1					2+4	1	
1+3+4+10	1					4+5+6	1	
1+3+4+5+6+10	1							
1+3+4+5+9+10	1							
1+3+4+6+8	1							
1+3+4+7	1							
1+3+4+7+8	1							
1+3+9	1							
1+4+10	1							
1+4+5+10	1							
1+4+5+6+7+9	1							
1+4+5+6+9+10	1							
1+4+6+7	1							

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+6+9	1							
1+6+9	1							
1+7	1							
1+7+8	1							
1+7+9	1							
10	1							
2+3+5	1							
2+4	1							
3+4	1							

Table 62. cI10 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	8416	98.9	Z1	2598	98.1	Z1	5818	99.2
Z4	7486	88.0	Z4	1962	74.1	Z4	5524	94.2
Z5	6309	74.1	Z5	1446	54.6	Z5	4863	83.0
Z6	5474	64.3	Z6	1079	40.7	Z6	4395	75.0
Z3	1835	21.6	Z3	889	33.6	Z3	946	16.1
Z9	386	4.5	Z2	104	3.9	Z9	367	6.3
Z2	294	3.5	Z9	19	0.7	Z2	190	3.2
Z10	53	0.6	Z0	15	0.6	Z10	44	0.8
Z8	36	0.4	Z8	13	0.5	Z7	25	0.4
Z7	32	0.4	Z10	9	0.3	Z8	23	0.4
Z0	30	0.4	Z7	7	0.3	Z0	15	0.3

Table 63. cI10 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	19	10.1	Z76.0	15	12.8	Z71.2	5	7.0
Z03	12	6.4	Z03	8	6.8	Z03	4	5.6
J06	8	4.3	J06	6	5.1	Z76.0	4	5.6
Z71.2	5	2.7	M70	4	3.4	E11	3	4.2
M70	4	2.1	G54	3	2.6	Z24.6	3	4.2

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
R05	4	2.1	H53	3	2.6	Z71.0	3	4.2
Z24.6	4	2.1	J00	3	2.6	J06	2	2.8
E11	3	1.6	L60	3	2.6	M54	2	2.8
G54	3	1.6	E78	2	1.7	R05	2	2.8
H53	3	1.6	K40	2	1.7	R06.0	2	2.8
J00	3	1.6	M17	2	1.7	Z71	2	2.8
L60	3	1.6	M47	2	1.7	A46	1	1.4
M54	3	1.6	R05	2	1.7	B07	1	1.4
Z71.0	3	1.6	R42	2	1.7	D64.9	1	1.4
B07	2	1.1	R73	2	1.7	E11.8	1	1.4
E78	2	1.1	B07	1	0.9	E66	1	1.4
K40	2	1.1	B86	1	0.9	E78+E79	1	1.4
K80	2	1.1	D02.2	1	0.9	E78+M54.2	1	1.4
L02	2	1.1	D12	1	0.9	F03	1	1.4
L30	2	1.1	D45	1	0.9	H10	1	1.4
M17	2	1.1	D69.6	1	0.9	H11.3	1	1.4
M47	2	1.1	E03	1	0.9	H53.8+H61.2	1	1.4
M54.4	2	1.1	E11+G54+M70	1	0.9	H53+H90.8	1	1.4
N30	2	1.1	E74.8+M17	1	0.9	H53+M54.6 +Z03	1	1.4
R06.0	2	1.1	E78+M25.5+ M70+Z03.8	1	0.9	I11.0	1	1.4
R10	2	1.1	F10.2+H25	1	0.9	I11.9	1	1.4
R42	2	1.1	F32.2	1	0.9	I70.9	1	1.4
R73	2	1.1	F45	1	0.9	J01	1	1.4
Z71	2	1.1	G54+M17	1	0.9	K07	1	1.4
A46	1	0.5	G56.0+Z03.8+ Z76.0	1	0.9	K30	1	1.4
B86	1	0.5	H06	1	0.9	K62	1	1.4
D02.2	1	0.5	H25+H91.9	1	0.9	K80	1	1.4
D12	1	0.5	H52	1	0.9	L02	1	1.4
D45	1	0.5	H53+H90.2	1	0.9	L29	1	1.4
D64.9	1	0.5	H60	1	0.9	L30	1	1.4
D69.6	1	0.5	H61.1	1	0.9	L50	1	1.4
E03	1	0.5	H61.2	1	0.9	M23	1	1.4
E11.8	1	0.5	I11	1	0.9	M53.1	1	1.4
E11+G54+M70	1	0.5	I11+Z76.0	1	0.9	M54.4	1	1.4
E66	1	0.5	I70.2	1	0.9	M77	1	1.4
E74.8+M17	1	0.5	I83	1	0.9	N20	1	1.4

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
E78+E79	1	0.5	J00+M54.2	1	0.9	N20.0	1	1.4
E78+M25.5+ M70+Z03.8	1	0.5	J03	1	0.9	N30	1	1.4
E78+M54.2	1	0.5	J18	1	0.9	R10	1	1.4
F03	1	0.5	J22+Z76.0	1	0.9	R22.2	1	1.4
F10.2+H25	1	0.5	J31	1	0.9	R23.8	1	1.4
F32.2	1	0.5	K21.0	1	0.9	R53	1	1.4
F45	1	0.5	K80	1	0.9	R73.9	1	1.4
G54+M17	1	0.5	L02	1	0.9	U07.1	1	1.4
G56.0+Z03.8+ Z76.0	1	0.5	L08	1	0.9	Z96.1	1	1.4
H06	1	0.5	L30	1	0.9			
H10	1	0.5	L40	1	0.9			
H11.3	1	0.5	M54	1	0.9			
H25+H91.9	1	0.5	M54.4	1	0.9			
H52	1	0.5	M65.3	1	0.9			
H53.8+H61.2	1	0.5	N18	1	0.9			
H53+H90.2	1	0.5	N30	1	0.9			
H53+H90.8	1	0.5	N39.3	1	0.9			
H53+M54.6+ Z03	1	0.5	N45	1	0.9			
H60	1	0.5	R05+Z03.8	1	0.9			
H61.1	1	0.5	R07.3	1	0.9			
H61.2	1	0.5	R10	1	0.9			
I11	1	0.5	R55	1	0.9			
I11.0	1	0.5	S40	1	0.9			
I11.9	1	0.5	S42.2+Z76.0	1	0.9			
I11+Z76.0	1	0.5	S50.0	1	0.9			
I70.2	1	0.5	S61	1	0.9			
I70.9	1	0.5	T00	1	0.9			
I83	1	0.5	T93.2	1	0.9			
J00+M54.2	1	0.5	Z00.1	1	0.9			
J01	1	0.5	Z03.8	1	0.9			
J03	1	0.5	Z23.5	1	0.9			
J18	1	0.5	Z24.6	1	0.9			
J22+Z76.0	1	0.5						
J31	1	0.5						
K07	1	0.5						
K21.0	1	0.5						

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
K30	1	0.5						
K62	1	0.5						
L08	1	0.5						
L29	1	0.5						
L40	1	0.5						
L50	1	0.5						
M23	1	0.5						
M53.1	1	0.5						
M65.3	1	0.5						
M77	1	0.5						
N18	1	0.5						
N20	1	0.5						
N20.0	1	0.5						
N39.3	1	0.5						
N45	1	0.5						
R05+Z03.8	1	0.5						
R07.3	1	0.5						
R22.2	1	0.5						
R23.8	1	0.5						
R53	1	0.5						
R55	1	0.5						
R73.9	1	0.5						
S40	1	0.5						
S42.2+Z76.0	1	0.5						
S50.0	1	0.5						
S61	1	0.5						
T00	1	0.5						
T93.2	1	0.5						
U07.1	1	0.5						
Z00.1	1	0.5						
Z03.8	1	0.5						
Z23.5	1	0.5						
Z96.1	1	0.5						

Table 64. cI10 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	23	0.3	Z76.0	19	0.7	Z03	5	0.1
Z03	13	0.2	Z03	8	0.3	Z71.2	5	0.1
J06	8	0.1	J06	6	0.2	Z76.0	4	0.1
H53	6	0.1	M70	6	0.2	E11	3	0.1
M70	6	0.1	G54	5	0.2	Z24.6	3	0.1
E78	5	0.1	H53	4	0.2	Z71.0	3	0.1
G54	5	0.1	J00	4	0.2	E78	2	
R05	5	0.1	M17	4	0.2	H53	2	
Z71.2	5	0.1	Z03.8	4	0.2	J06	2	
E11	4		E78	3	0.1	M54	2	
J00	4		L60	3	0.1	R05	2	
M17	4		R05	3	0.1	R06.0	2	
Z03.8	4		H25	2	0.1	Z71	2	
Z24.6	4		I11	2	0.1	A46	1	
L60	3		K40	2	0.1	B07	1	
M54	3		M47	2	0.1	D64.9	1	
Z71.0	3		R42	2	0.1	E11.8	1	
B07	2		R73	2		E66	1	
H25	2		B07	1		E79	1	
H61.2	2		B86	1		F03	1	
I11	2		D02.2	1		H10	1	
K40	2		D12	1		H11.3	1	
K80	2		D45	1		H53.8	1	
L02	2		D69.6	1		H61.2	1	
L30	2		E03	1		H90.8	1	
M47	2		E11	1		I11.0	1	
M54.2	2		E74.8	1		I11.9	1	
M54.4	2		F10.2	1		I70.9	1	
N30	2		F32.2	1		J01	1	
R06.0	2		F45	1		K07	1	
R10	2		G56.0	1		K30	1	
R42	2		H06	1		K62	1	
R73	2		H52	1		K80	1	
Z71	2		H60	1		L02	1	
A46	1		H61.1	1		L29	1	
B86	1		H61.2	1		L30	1	

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
D02.2	1		H90.2	1		L50	1	
D12	1		H91.9	1		M23	1	
D45	1		I70.2	1		M53.1	1	
D64.9	1		I83	1		M54.2	1	
D69.6	1		J03	1		M54.4	1	
E03	1		J18	1		M54.6	1	
E11.8	1		J22	1		M77	1	
E66	1		J31	1		N20	1	
E74.8	1		K21.0	1		N20.0	1	
E79	1		K80	1		N30	1	
F03	1		L02	1		R10	1	
F10.2	1		L08	1		R22.2	1	
F32.2	1		L30	1		R23.8	1	
F45	1		L40	1		R53	1	
G56.0	1		M25.5	1		R73.9	1	
H06	1		M54	1		U07.1	1	
H10	1		M54.2	1		Z96.1	1	
H11.3	1		M54.4	1				
H52	1		M65.3	1				
H53.8	1		N18	1				
H60	1		N30	1				
H61.1	1		N39.3	1				
H90.2	1		N45	1				
H90.8	1		R07.3	1				
H91.9	1		R10	1				
I11.0	1		R55	1				
I11.9	1		S40	1				
I70.2	1		S42.2	1				
I70.9	1		S50.0	1				
I83	1		S61	1				
J01	1		T00	1				
J03	1		T93.2	1				
J18	1		Z00.1	1				
J22	1		Z23.5	1				
J31	1		Z24.6	1				
K07	1							
K21.0	1							
K30	1							
K62	1							

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
L08	1							
L29	1							
L40	1							
L50	1							
M23	1							
M25.5	1							
M53.1	1							
M54.6	1							
M65.3	1							
M77	1							
N18	1							
N20	1							
N20.0	1							
N39.3	1							
N45	1							
R07.3	1							
R22.2	1							
R23.8	1							
R53	1							
R55	1							
R73.9	1							
S40	1							
S42.2	1							
S50.0	1							
S61	1							
T00	1							
T93.2	1							
U07.1	1							
Z00.1	1							
Z23.5	1							
Z96.1	1							

Table 65. cI11 - Age distribution at visits during Covid periods

I11 period	n	age			Wilcoxon test p
		mean	stand. dev.	mean	
pre-Covid	2050	73.84	10.13	74	p<0.001
Covid	2170	79.54	8.51	81	
total	4220	76.77	9.76	78	

p - calculated significance level in Wilcoxon test

Table 66. cI11 - Gender distribution at visits during Covid periods

I11 period	gender				Fisher test p
	female		male		
	n	%	n	%	
pre-Covid	1272	62.0	778	38.0	p<0.001
Covid	1477	68.1	693	31.9	
total	2749	65.1	1471	34.9	

p - calculated significance level in Fisher's exact test of independence

Table 67. cI11 - Distribution of the type of visits during the Covid periods

I11 period	visit's type				Fisher test p
	remote		outpatient		
	n	%	n	%	
pre-Covid	0	0	2050	100	p<0.001
Covid	1540	71	630	29	
total	1540	36.5	2680	63.5	

p - calculated significance level in Fisher's exact test of independence

Table 68. cI11 - Distribution of recommendation configurations in total and distribution of recommendation configurations in Covid periods by frequency of occurrence

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+5+6	1918	45.5	1+3+4	944	46.0	1+4+5+6	1693	78.0
1+3+4	1001	23.7	1+3+4+5	530	25.9	1+4+5+6+9	169	7.8
1+3+4+5	568	13.5	1+4+5+6	225	11.0	1+4+6	58	2.7
1+4+5+6+9	173	4.1	1	110	5.4	1+3+4	57	2.6
1	130	3.1	1+4+5	62	3.0	1+3+4+5	38	1.8

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
1+4+6	87	2.1	1+4	46	2.2	1+2+4+5+6	24	1.1
1+4	67	1.6	1+4+6	29	1.4	1+4	21	1.0
1+4+5	66	1.6	1+3+4+9	21	1.0	1	20	0.9
1+3+4+9	28	0.7	1+2	8	0.4	1+3+4+5+6	14	0.6
1+2+4+5+6	25	0.6	0	7	0.3	0	10	0.5
0	17	0.4	3	7	0.3	1+4+5+6+7	9	0.4
1+3+4+5+6	17	0.4	9	7	0.3	9	9	0.4
9	16	0.4	1+3+4+5+9	6	0.3	1+3+4+9	7	0.3
3	11	0.3	2	6	0.3	1+4+5+6+10	7	0.3
1+2	10	0.2	1+4+5+6+9	4	0.2	1+3+4+5+6+9	4	0.2
1+4+5+6+7	9	0.2	1+3+4+10	3	0.1	1+4+5	4	0.2
1+3+4+5+9	8	0.2	1+3+4+5+6	3	0.1	3	4	0.2
1+4+5+6+10	7	0.2	1+4+6+9	3	0.1	4+5+6	3	0.1
2	7	0.2	1+9	3	0.1	1+2	2	0.1
1+3+4+5+6+9	4	0.1	4	3	0.1	1+2+3+4+5	2	0.1
1+9	4	0.1	1+2+3	2	0.1	1+3+4+5+9	2	0.1
4+5+6	4	0.1	1+3	2	0.1	1+3+4+6	2	0.1
1+2+3	3	0.1	1+3+4+7	2	0.1	1+2+3	1	
1+3	3	0.1	1+4+5+9	2	0.1	1+2+3+4+5+6	1	
1+3+4+10	3	0.1	1+4+9	2	0.1	1+2+4+5+6+9	1	
1+4+5+9	3	0.1	1+2+4	1		1+3	1	
1+4+6+9	3	0.1	1+2+4+5	1		1+4+5+9	1	
4	3	0.1	1+2+4+5+6	1		1+9	1	
1+2+3+4+5	2		1+3+4+5+10	1		2	1	
1+3+4+6	2		1+3+4+8	1		2+3	1	
1+3+4+7	2		1+3+4+9+10	1		4+10	1	
1+4+9	2		1+3+5	1		4+5+6+9	1	
1+2+3+4+5+6	1		1+4+10	1		7	1	
1+2+4	1		1+4+5+6+8	1				
1+2+4+5	1		10	1				
1+2+4+5+6+9	1		2+3+4	1				
1+3+4+5+10	1		4+5+6	1				
1+3+4+8	1		4+9	1				
1+3+4+9+10	1							
1+3+5	1							
1+4+10	1							
1+4+5+6+8	1							
10	1							
2+3	1							

recommendation configurations	total		recommendation configurations	pre-Covid		recommendation configurations	Covid	
	n	%		n	%		n	%
2+3+4	1							
4+10	1							
4+5+6+9	1							
4+9	1							
7	1							

Table 69. cI11 - Distribution of individual recommendations in total and distribution of individual recommendations in Covid periods by frequency of occurrence

total			pre-Covid			Covid		
recommendation	n	%	recommendation	n	%	recommendation	n	%
Z1	4155	98.5	Z1	2016	98.3	Z1	2139	98.6
Z4	4015	95.1	Z4	1896	92.5	Z4	2119	97.6
Z5	2811	66.6	Z3	1525	74.4	Z6	1986	91.5
Z6	2253	53.4	Z5	838	40.9	Z5	1973	90.9
Z3	1659	39.3	Z6	267	13.0	Z9	195	9.0
Z9	245	5.8	Z9	50	2.4	Z3	134	6.2
Z2	53	1.3	Z2	20	1.0	Z2	33	1.5
Z0	17	0.4	Z0	7	0.3	Z0	10	0.5
Z10	15	0.4	Z10	7	0.3	Z7	10	0.5
Z7	12	0.3	Z7	2	0.1	Z10	8	0.4
Z8	2		Z8	2	0.1			

Table 70. cI11 - Distribution of configurations of co-morbid diagnoses in total and distribution of configurations of co-morbid diagnoses in Covid periods by frequency of occurrence

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	25	24.5	Z76.0	23	24.7	I10	5	55.6
Z03	10	9.8	Z03	10	10.8	Z76.0	2	22.2
I10	6	5.9	E11	5	5.4	S61.0	1	11.1
E11	5	4.9	E10+Z76.0	2	2.2	Z71.2	1	11.1
E10+Z76.0	2	2.0	E11+Z76.0	2	2.2			
E11+Z76.0	2	2.0	H61.2	2	2.2			
H61.2	2	2.0	J06	2	2.2			
J06	2	2.0	R10	2	2.2			
R10	2	2.0	R73+Z76.0	2	2.2			
R73+Z76.0	2	2.0	Z02	2	2.2			

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z02	2	2.0	B02	1	1.1			
B02	1	1.0	E03+F06.3+ Z76.0	1	1.1			
E03+F06.3+ Z76.0	1	1.0	E11.8	1	1.1			
E11.8	1	1.0	E11+H40+Z76.0	1	1.1			
E11+H40+ Z76.0	1	1.0	E66	1	1.1			
E66	1	1.0	E66+E78.0+R73	1	1.1			
E66+E78.0+R73	1	1.0	E78+Z76.0	1	1.1			
E78+Z76.0	1	1.0	E79	1	1.1			
E79	1	1.0	F32	1	1.1			
F32	1	1.0	G40.2+N40+Z76.0	1	1.1			
G40.2+N40+ Z76.0	1	1.0	H10+J00	1	1.1			
H10+J00	1	1.0	H11.3	1	1.1			
H11.3	1	1.0	I10	1	1.1			
I25.0	1	1.0	I25.0	1	1.1			
I25.2+I48+Z76.0	1	1.0	I25.2+I48+Z76.0	1	1.1			
I48	1	1.0	I48	1	1.1			
I49	1	1.0	I49	1	1.1			
I49+R73+Z76.0	1	1.0	I49+R73+Z76.0	1	1.1			
I69.3	1	1.0	I69.3	1	1.1			
I83+Z76.0	1	1.0	I83+Z76.0	1	1.1			
J02+J22+Z76.0	1	1.0	J02+J22+Z76.0	1	1.1			
J44.9+Z03.8	1	1.0	J44.9+Z03.8	1	1.1			
J98.9+M47+ N40+Z76.0	1	1.0	J98.9+M47+ N40+Z76.0	1	1.1			
L03+M47	1	1.0	L03+M47	1	1.1			
M10+N40+Z76.0	1	1.0	M10+N40+Z76.0	1	1.1			
M13	1	1.0	M13	1	1.1			
M15	1	1.0	M15	1	1.1			
M41+M47+ M79.2+Z76.0	1	1.0	M41+M47+ M79.2+Z76.0	1	1.1			
M54.2	1	1.0	M54.2	1	1.1			
M54.4	1	1.0	M54.4	1	1.1			
N31.8+N40+ R42+R51+Z76.0	1	1.0	N31.8+N40+R42 +R51+Z76.0	1	1.1			
N40	1	1.0	N40	1	1.1			

configurations of co-morbid diagnoses	total		configurations of co-morbid diagnoses	Pre-Covid		configurations of co-morbid diagnoses	Covid	
	n	%		n	%		n	%
N40+R22+Z76.0	1	1.0	N40+R22+Z76.0	1	1.1			
N45	1	1.0	N45	1	1.1			
R05	1	1.0	R05	1	1.1			
R22.2	1	1.0	R22.2	1	1.1			
R73.0	1	1.0	R73.0	1	1.1			
R93.4	1	1.0	R93.4	1	1.1			
S46	1	1.0	S46	1	1.1			
S61.0	1	1.0	S66	1	1.1			
S66	1	1.0	Z23+Z76.0	1	1.1			
Z23+Z76.0	1	1.0						
Z71.2	1	1.0						

Table 71. cI11 - Distribution of individual co-morbid diagnosis in total and distribution of individual co-morbid diagnosis in Covid periods by frequency of occurrence

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
Z76.0	45	1.1	Z76.0	43	2.1	I10	5	0.2
Z03	10	0.2	Z03	10	0.5	Z76.0	2	0.1
E11	8	0.2	E11	8	0.4	S61.0	1	
I10	6	0.1	N40	6	0.3	Z71.2	1	
N40	6	0.1	R73	4	0.2			
R73	4	0.1	M47	3	0.1			
M47	3	0.1	E10	2	0.1			
E10	2		E66	2	0.1			
E66	2		H61.2	2	0.1			
H61.2	2		I48	2	0.1			
I48	2		I49	2	0.1			
I49	2		J06	2	0.1			
J06	2		R10	2	0.1			
R10	2		Z02	2	0.1			
Z02	2		B02	1				
B02	1		E03	1				
E03	1		E11.8	1				
E11.8	1		E78	1				
E78	1		E78.0	1				
E78.0	1		E79	1				
E79	1		F06.3	1				
F06.3	1		F32	1				

co-morbid diagnoses	total		co-morbid diagnoses	pre-Covid		co-morbid diagnoses	Covid	
	n	%		n	%		n	%
F32	1		G40.2	1				
G40.2	1		H10	1				
H10	1		H11.3	1				
H11.3	1		H40	1				
H40	1		I10	1				
I25.0	1		I25.0	1				
I25.2	1		I25.2	1				
I69.3	1		I69.3	1				
I83	1		I83	1				
J00	1		J00	1				
J02	1		J02	1				
J22	1		J22	1				
J44.9	1		J44.9	1				
J98.9	1		J98.9	1				
L03	1		L03	1				
M10	1		M10	1				
M13	1		M13	1				
M15	1		M15	1				
M41	1		M41	1				
M54.2	1		M54.2	1				
M54.4	1		M54.4	1				
M79.2	1		M79.2	1				
N31.8	1		N31.8	1				
N45	1		N45	1				
R05	1		R05	1				
R22	1		R22	1				
R22.2	1		R22.2	1				
R42	1		R42	1				
R51	1		R51	1				
R73.0	1		R73.0	1				
R93.4	1		R93.4	1				
S46	1		S46	1				
S61.0	1		S66	1				
S66	1		Z03.8	1				
Z03.8	1		Z23	1				
Z23	1							
Z71.2	1							