UNIWERSYTET MEDYCZNY
IM. PIASTÓW ŚLĄSKICH WE WROCŁAWIU

ROZPRAWA DOKTORSKA

lek. Mateusz Strózik

Medyczne czynności ratunkowe prowadzone przez zespoły ratownictwa medycznego w przypadku porodów pozaszpitalnych.

Analiza standardów postępowania, skuteczności opieki i czynników wpływających na niepowodzenie położnicze.

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Spis treści

I. Wykaz publikacji stanowiących pracę doktorską

Rozprawa doktorska lekarza Mateusz Strózika „Medyczne czynności ratunkowe prowadzone przez zespoły ratownictwa medycznego w przypadku porodów pozaszpitalnych. Analiza standardów postępowania, skuteczności opieki i czynników wpływających na niepowodzenie położnicze" stanowi zbiór czterech powiązanych tematycznie artykułów, w tym trzech prac oryginalnych oraz jednej przeglądowej. Badania będące podstawą prac oryginalnych zrealizowano po uzyskaniu pozytywnych opinii Komisji Bioetycznej przy Uniwersytecie Medycznym we Wrocławiu (KB-975/2022) oraz opinii Komisji Rewizyjnej Polskiego Towarzystwa Medycyny Katastrof (02.07.2021.IRB). Każdy z artykułów został opublikowany w anglojęzycznych czasopismach naukowych o zasięgu międzynarodowym.
Łączna wartość współczynnika wpływu *impact factor* (IF) zbioru prac wynosi 9,9, a liczba punktów ministerialnych 290.

1. **Strózik Mateusz**, Smereka Jacek, Pomorski Michał Marcin: *Birth before arrival - is there anything to be afraid of?*, Ginekologia Polska, 2022, vol. 93, nr 9, s. 761-764, DOI:10.5603/gp.a2022.0049

   IF: 1,3
   MEiN: 40

2. **Strózik Mateusz**, Szarpak Łukasz, Adam Ishag, Smereka Jacek*: Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women*, Medicina, 2022, vol. 58, nr 6, art.831 [10 s.], DOI:10.3390/medicina58060831
   IF: 2,6
   MEiN: 40

3. **Strózik Mateusz**, Wiciak Hanna, Szarpak Lukasz, Wróblewski Paweł, Smereka Jacek: *EMS interventions during planned out-of-hospital births with a midwife: a retrospective analysis over four years in the Polish population*, Journal of Clinical Medicine, 2023, vol. 12, nr 24, art.7719 [10 s.], DOI:10.3390/jcm12247719

   IF: 3,9
   MEiN: 140

4. **Strózik Mateusz**, Wiciak Hanna, Raczyński Andrzej, Smereka Jacek Robert: *Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis* [published online as ahead of print on March 20, 2024], Adv Clin Exp Med. 2025, DOI:10.17219/acem/184141

   IF: 2,1
   MNiSW: 70

Oświadczenia współautorów prac, określające wkład każdego z nich, zawarte są w części IX.

II. Wykaz stosowanych skrótów

ACOG	American College of Obstetricians and Gynaecologists
BBA	Birth before arrival
COVID-19	Coronavirus disease
EMS	Emergency medical services
ERC	European Resuscitation Council
FIGO	International Federation of Gynecology and Obstetrics
HEMS	Helicopter Emergency Medical Services
ICD-10	International Classification of Diseases, 10th Revision
MERS	Middle East Respiratory Syndrome
NICU	Neonatal Intensive Care Unit
NLS	Newborn Life Support
NMC-EMS	National Monitoring Center for Emergency Medical Services
OOH birth	Out-of-hospital birth
PPH	Primary postpartum haemorrhage
PROM	Premature rupture of membranes
PTGiP	Polish Society of Gynecologists and Obstetricians
SARS	Severe Acute Respiratory Syndrome
WHO	World Health Organization

III. Wstęp

W Polsce zdecydowana większość porodów odbywa się w szpitalach, praktycznie bez większej alternatywy. [1] Zgodnie z Rozporządzeniem Ministra Zdrowia w sprawie standardu organizacji opieki okołoporodowej do praw pacjenta w szczególności należy prawo wyboru miejsca porodu. Brak jest jednak ogólnokrajowego programu zachęcającego do porodów pozaszpitalnych, a usługi takie oferowane są jedynie przez położne, które realizują działania w ramach własnych praktyk prywatnych. [2]

Szczególną uwagę zwraca aktualna sytuacja demograficzna w Polsce i stale zmniejszający się przyrost naturalny, który aktualnie osiąga wartości ujemne. W przyszłości będzie to stanowiło wyzwanie na wielu płaszczyznach- również dotyczących opieki zdrowotnej. [3]

Sytuacja obserwowana w innych krajach np. w Finlandii pokazuje, że w sytuacji malejącej liczby porodów, dochodzi do zamykania oddziałów porodowych, w których jest mniej niż 1000 porodów rocznie. Przyczynia się to do koncentracji porodów w większych ośrodkach, co ma na celu zapewnienie wysokospecjalistyczną opiekę medyczną zarówno dla matki jak i noworodka. W konsekwencji wzrasta częstość interwencji zespołów ratownictwa medycznego w przypadku porodów pozaszpitalnych. [4]

W związku z powyższym istotne jest zwrócenie uwagi na badania, które wskazują na zwiększone ryzyko śmiertelności noworodków w przypadku porodów pozaszpitalnych w przypadku dłuższego czasu dojazdu do szpitala. [5,6] Sugeruje to możliwe przesunięcie sprawowanej opieki nad rodzącymi w stronę opieki przedszpitalnej oraz zmian, które muszą nastąpić w kształceniu personelu zespołów ratownictwa medycznego, celem przygotowania do nowych wyzwań. W latach 2018-2022 wyjazdy do kobiet w ciąży stanowiły zaledwie 0,273% ogólnej liczby zrealizowanych zgłoszeń. Jest to zatem rzadka sytuacja dla personelu ratownictwa medycznego, co sprawia że utrzymanie odpowiednich standardów opieki zgodnych z aktualną wiedzą medyczną stanowi szczególne wyzwanie.[7] Dzięki zmianom w kształceniu personelu zespołów ratownictwa medycznego możliwe jest zapobieganie potencjalnym dramatycznym sytuacjom w przyszłości.

W ciągu ostatnich lat zauważalny został spadek liczby zespołów ratownictwa medycznego z lekarzem. Ten obserwowany trend sugeruje narastającą potrzebę zastosowania przez

ratowników medycznych proaktywnych działań i podejmowania decyzji, szczególnie w przypadkach rzadkich, lecz potencjalnie niebezpiecznych sytuacji, takich jak asystowanie pacjentkom w ciąży czy prowadzenie resuscytacji noworodka. [8]

Rozporządzenie Ministerstwa Zdrowia precyzuje zakres działań ratownictwa medycznego, które ratownik medyczny w ramach zespołu typu P może wykonywać samodzielnie. Jednakże, substancje farmakologiczne wymienione w rozporządzeniu, które może podawać ratownik samodzielnie bez zlecenia lekarza nie obejmują oksytocyny. W konsekwencji ratownik medyczny jest uprawniony do jej podania wyłącznie na podstawie zlecenia lekarza.[9]

Zgodnie z zaleceniami Światowej Organizacji Zdrowia (WHO), oksytocyna jest kluczowym lekiem w profilaktyce krwotoków poporodowych i powinna być stosowana u każdej pacjentki w III okresie porodu. Wdrożenie możliwości samodzielnego podawania jej przez ratowników medycznych może przyczynić się do szybszego i skuteczniejszego działania w sytuacjach zagrożenia krwotokiem poporodowym. [10]

Rozważania na temat poszerzenia kompetencji ratowników medycznych w zakresie stosowania określonych leków powinny być prowadzone w kontekście zabezpieczenia wysokich standardów opieki zdrowotnej oraz skoordynowanej współpracy zespołów medycznych w ramach systemu ochrony zdrowia.

1. Galková G, Böhm P, Hon Z, Heřman T, Doubrava R, Navrátil L. Comparison of Frequency of Home Births in the Member States of the EU Between 2015 and 2019. *Glob Pediatr Heal*. 2022;9.
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III. Założenia i cel pracy

W ostatnich latach coraz więcej przyszłych matek decyduje się na porody poza szpitalem, jednak poród może się zacząć lub odbyć niespodziewanie w nieprzewidzianym miejscu, w samochodzie, samolocie czy na dworcu kolejowym. Opiekę nad rodzącą i noworodkiem sprawują wtedy najczęściej personel zespołu ratownictwa medycznego. Wyniki dostępnych badań naukowych często są ze sobą sprzeczne, a stanowiska ekspertów rozbieżne.

Założeniem niniejszej rozprawy było zbadanie częstości porodów pozaszpitalnych w Polsce oraz analiza sytuacji klinicznym związanych z nagłym zagrożeniem u ciężarnej i noworodka, z którymi spotykają się zespoły ratownictwa medycznego.

Zestawienie publikacji wchodzących w skład rozprawy doktorskiej:

Strózik Mateusz, Smereka Jacek, Pomorski Michał Marcin: **Birth before arrival - is there anything to be afraid of?**, Ginekologia Polska, 2022, vol. 93, nr 9, s. 761-764, DOI:10.5603/gp.a2022.0049

Celem pracy było zebranie i podsumowanie dostępnych informacji na temat nieplanowanych porodów poza szpitalem, z naciskiem na ukazanie zagrożeń, cech klinicznych oraz doświadczeń matek i personelu medycznego.

Strózik Mateusz, Szarpak Łukasz, Adam Ishag, Smereka Jacek Robert: **Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women**, Medicina, 2022, vol. 58, nr 6, art.831 [10 s.], DOI:10.3390/medicina58060831

Celem pracy była identyfikacja głównych czynników wpływających na wybór miejsca porodu przez kobiety w okresie pandemii COVID-19 w Polsce.

Strózik Mateusz, Wiciak Hanna, Szarpak Lukasz, Wróblewski Paweł, Smereka Jacek: **EMS interventions during planned out-of-hospital births with a midwife: a retrospective analysis over four years in the Polish population**, Journal of Clinical Medicine, 2023, vol. 12, nr 24, art.7719 [10 s.], DOI:10.3390/jcm12247719

Celem prac było określenie częstości interwencji zespołów ratownictwa medycznego w przypadku planowanych porodów domowych z udziałem położnej, a także analizie charakterystyki pacjentek oraz działań podejmowanych przez zespoły ratownictwa medycznego w sytuacjach skomplikowanych porodów domowych.

Strózik Mateusz, Wiciak Hanna, Raczyński Andrzej, Smereka Jacek Robert: **Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis** [published online as ahead of print on March 20, 2024], Adv Clin Exp Med., DOI:10.17219/acem/184141

Celem pracy było określenie częstości porodów, które zostały przyjęte przez członków zespołu Ratownictwa Medycznego w Polsce, identyfikacja wykonywanych przez nie zabiegów, porównanie wykonywanych zabiegów w zależności od obecności lekarza w zespole lub jego braku oraz ocena stanu noworodka po porodzie.

IV. Streszczenie

Porody pozaszpitalne klasycznie można podzielić na porody planowe i nieplanowe. W przypadku porodów planowych stanowiska ekspertów są często odmienne, a częstość takich porodów znacząco różni się między krajami. [1] Nie ma jednak wątpliwości odnośnie tego, że aby poród pozaszpitalny planowy mógł być bezpieczny konieczna jest odpowiednia kwalifikacja pacjentki z ciążą o niskim ryzyku tj. donoszona ciąża, z pojedynczym płodem w pozycji główkowej, bez cięcia cesarskiego w przeszłości[2,3] Poród taki może odbyć się tylko w asyście osoby z odpowiednimi kwalifikacjami, przy czym musi być zapewniona możliwość transportu do wyższego poziomu opieki w odpowiednim czasie. [4-7] W przypadku nieplanowych porodów pozaszpitalnych brakuje jednoznacznych wytycznych, co budzi zrozumiały niepokój u praktyków. [8] Śmiertelność okołoporodowa w przypadku takich porodów jest 2-3 krotnie większa niż w przypadku porodów szpitalnych. [9] W związku z tym, że szybką pomoc w takich przypadkach mogą udzielić zespoły ratownictwa medycznego poruszana tematyka ma niezwykle istotne znaczenie praktyczne.

W pracy pt. *Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women* zbadałem czynniki które determinowały wybór miejsca porodu przez pacjentki w ciąży w okresie pandemii COVID-19. Badanie obejmowało 517 respondentek i zostało przeprowadzone przy użyciu oryginalnie opracowanego kwestionariusza rozpowszechnionego za pomocą internetu od 8 do 23 czerwca 2021 roku. W sumie 74 pacjentek (14.3%) rozważało poród domowy, a najistotniejszymi czynnikami skłaniającymi je do tej decyzji był lęk przed izolacją matki od dziecka, brak wystarczająco intymnych warunków do porodu, zbyt duża medykalizacji w szpitalach. Z kolei najistotniejszymi czynnikami zniechęcającymi do porodu domowego były brak profesjonalnej opieki medycznej i brak możliwości znieczulenia. Zbadano również czynniki wpływające na wybór miejsca porodu, gdzie najistotniejsze to możliwość obecności partnera, doskonałe warunki sanitarno-higieniczne, optymalna odległość od szpitala oraz dostępność znieczulenia zewnątrzoponowego podczas porodu.

W pracy pt. *EMS interventions during Planned Out-Of-Hospital Births with a Midwife. A retrospective Analysis over Four Years in the Polish Population* zbadałem częstość i powody wezwań zespołów ratownictwa medycznego do pacjentek, które planowo zdecydowały się rodzić w warunkach pozaszpitalnych w asyście położnej. Badanie retrospektywne oparte było

na danych uzyskanych z Krajowego Centrum Monitorowania Ratownictwa Medycznego i obejmowało wszystkie interwencje w ramach systemu ratownictwa medycznego u kobiet w ciąży w latach 2018-2022. W tym czasie stwierdzono 60 interwencji w przypadku planowego porodu domowego przy asyście położnej. Najczęstszymi powodami wezwań było brak urodzonego popłodu lub niekompletny popłód (18 przypadków; 30%), następnie krwotok pourazowy (12 przypadków; 20%) i pogorszenie stanu noworodka (8 przypadków; 13%). Wartym podkreślenia jest również informacja, że jeden raz zdarzyła się sytuacja w której położna nie była wstanie ukończyć porodu ze względu na dystocję barkową a trzykrotnie wezwano zespół ratownictwa medycznego ze względu na stwierdzone zaburzenia w akcji serca płodu. Ukazane zostało, że poród jest zjawiskiem nieprzewidywalnym i każdy poród fizjologiczny szybko może się przeistoczyć w patologiczny zagrażający życiu matki i/lub dziecka.

W pracy pt. *Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis* zbadałem częstość oraz zakres medycznych czynności ratunkowych, które wykonywały zespoły ratownictwa medycznego w przypadku porodów pozaszpitalnych. Dane pozyskane z Krajowego Centrum Monitorowania Ratownictwa Medycznego za lata 2018-2022 w tym przypadku obejmowały pacjentki, których porody były przyjmowane w bezpośredniej asyście personelu zespołu ratownictwa medycznego. Badanie obejmowało 879 interwencji, a najczęściej wykazywanymi procedurami (w nawisie podano ich kody) wykonywanymi przez nich było manualna pomoc przy spontanicznym porodzie (73.531), pulsoksymetria (89.602), badanie fizykalne (89.79), pomiar ciśnienia tętniczego krwi (89.61), badanie ginekologiczne (89.26). Na podstawie uzyskanych danych stwierdzić można problem w interpretacji niektórych kodów ICD-9, zwłaszcza tych specjalistycznych gdyż, aż w 815 przypadkach wpisano kod 73.531 który jest zarezerwowany do porodu miednicowego. Dodatkowo szczególną uwagę zwróciły braki w dokumentacji tj. brak informacji o stanie noworodka bezpośrednio po urodzeniu, liczby przebytych ciąż, czy tygodnia aktualnej ciąży. W związku ze stwierdzonymi błędami w dokumentacji zaproponowałem stworzoną przeze mnie propozycję zmian w karcie Medycznych Czynności Ratunkowych, która to przesłana została do Krajowego Centrum Monitorowania Ratownictwa Medycznego, co stanowi załącznik do niniejszego opracowania.

W oparciu o powyższe badania wykazałem częstość występowania porodu pozaszpitalnego oraz częstość medycznych czynności ratunkowych, które są najczęściej

wykonywane przez zespoły ratownictwa medycznego w przypadku opieki nad kobietą rodzącą. Wykazałem błędy i braki w dokumentacji oraz przedstawiłem rozwiązanie, które należałoby wprowadzić celem uniknięcia tych błędów w przyszłości. Nieuniknionym również wydaje się konieczność rozważenia uzupełnienia listy leków, które ratownicy medyczni mogą samodzielnie stosować bez konieczności konsultacji z lekarzem. Analiza programu studiów i szkolenia podyplomowego ratowników medycznych w zakresie stanów nagłego zagrożenia życia u kobiet ciężarnych oraz noworodków może pomóc w lepszym ich przygotowaniu ze względu na zmieniające się realia pracy zespołów ratownictwa medycznego. Dodatkowo, może również przyczynić się do unikania typowych błędów przy podejmowaniu medycznych czynności ratunkowych oraz ich dokumentowaniu.

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V. Summary

Out-of-hospital deliveries can classically be divided into planned and unplanned deliveries. Expert positions often differ in planned births, and the incidence of such births varies significantly between countries. [1] However, there is no doubt that in order for a planned out-of-hospital delivery to be safe, the patient must be appropriately qualified with a low-risk pregnancy, i.e., full term, single vertex fetus, and no previous cesarean delivery [2,3] Such childbirth can only take place assisted by a qualified practitioner, and transport to a higher level of care must be provided promptly. [4-7] In the case of unplanned out-of-hospital deliveries, there is a lack of clear guidelines, which causes an understandable concern among practitioners. [8] Perinatal mortality for such births is 2-3 times higher than for hospital births. [9] Regarding the fact that emergency medical teams can provide rapid assistance in such cases, the topic discussed is of inexorably important practical significance.

In the study entitled *Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women*, I investigated the factors that determined the choice of place of delivery by pregnant patients during the COVID-19 pandemic. The study included 517 respondents and was conducted using an originally designed questionnaire distributed via the Internet from June 8 to 23, 2021. A total of 74 patients (14.3%) considered home delivery, and the most significant factors prompting their decision were fear of isolation of the mother from the baby, lack of sufficiently intimate conditions for delivery, and too much medicalization in hospitals. In contrast, the most significant factors discouraging home births were the lack of professional medical care and the lack of anaesthesia options. Factors influencing the choice of the place of delivery were also examined, where the most important was the possibility of the presence of a partner, excellent sanitary and hygienic conditions, optimal distance from the hospital and the availability of epidural anaesthesia during delivery.

In the paper titled *EMS Interventions During Planned Out-Of-Hospital Births with a Midwife. A Retrospective Analysis over Four Years in the Polish Population*, I examined the frequency and reasons for emergency medical teams being called to patients who had planned out-of-hospital births assisted by a midwife. The retrospective study was based on data from

the Polish National Emergency Center and included all emergency medical system interventions for pregnant women between 2018 and 2022. There were 60 interventions for elective home births assisted by a midwife. The most common reasons for the calls were the absence of a born afterbirth or incomplete afterbirth (18 cases; 30%), followed by post-traumatic haemorrhage (12 cases; 20%) and deterioration of the condition of the newborn (8 cases; 13%). Also noteworthy is the information that once there was a situation in which the midwife was unable to complete the delivery due to shoulder dystocia, and on three occasions, the paramedic team was called due to the detected fetal heart abnormalities. It was shown that childbirth is an unpredictable phenomenon, and any physiological birth can quickly turn into a pathological one, threatening the life of the mother and/or child.

In the study titled *Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis*, I examined the frequency and extent of emergency medical interventions performed by emergency medical teams for out-of-hospital deliveries. Data obtained from the Polish National Emergency Medical Center for the years 2018-2022, in this case, included patients whose deliveries were attended by the direct assistance of the emergency medical team personnel. The survey included 879 interventions, and the most frequently reported procedures (their codes are given in the bracket) performed by them were manual assistance for spontaneous labour (73,531), pulse oximetry (89,602), physical examination (89.79), blood pressure check (89.61), and gynaecological examination (89.26). Based on the data obtained, there is a problem in interpreting some of the ICD-9 codes, especially the specialized ones, as in as many as 815 cases, the code 73.531 was entered, which is reserved for pelvic birth. In addition, the deficiencies in the documentation, i.e. the lack of information on the newborn's condition immediately after birth, the number of past pregnancies, or the week of the current pregnancy, drew particular attention. The analysis of errors resulted in creating a proposal for changes to the chart of Medical Emergency Procedures, which was sent to the National Center for Emergency Medical Services and is attached as an appendix to this document.

Based on the above studies, I have shown the incidence of out-of-hospital deliveries and the rate of emergency medical procedures that are most often performed by emergency medical teams when caring for a woman in labour. I have shown the errors and deficiencies in the documentation and presented the solution that should be introduced to avoid these

errors in the future. It also seems inevitable to consider the need to complete the medications that paramedics can use independently without consulting a physician. Analysis of the curriculum and post-graduate training of paramedics in the field of emergencies in pregnant women and newborns may help to better apply them to the changing realities of the work of paramedic teams and new challenges and avoid typical errors in undertaking and documenting emergency medical procedures.

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VI. Publikacje

Publikacje stanowiące rozprawę doktorską:

1. **Strózik Mateusz**, Smereka Jacek, Pomorski Michał Marcin: Birth before arrival - is there anything to be afraid of?, Ginekologia Polska, 2022, vol. 93, nr 9, s. 761-764, DOI:10.5603/gp.a2022.0049
   IF: 1,3
   MEiN: 40
2. **Strózik Mateusz**, Szarpak Łukasz, Adam Ishag, Smereka Jacek Robert: Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women, Medicina, 2022, vol. 58, nr 6, art.831 [10 s.], DOI:10.3390/medicina58060831
   IF: 2,6
   MEiN: 40
3. **Strózik Mateusz**, Wiciak Hanna, Szarpak Lukasz, Wróblewski Paweł, Smereka Jacek: EMS interventions during planned out-of-hospital births with a midwife: a retrospective analysis over four years in the Polish population, Journal of Clinical Medicine, 2023, vol. 12, nr 24, art.7719 [10 s.], DOI:10.3390/jcm12247719
   IF: 3,9
   MEiN: 140
4. **Strózik Mateusz**, Wiciak Hanna, Raczyński Andrzej, Smereka Jacek Robert: Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis [published online as ahead of print on March 20, 2024], Adv Clin Exp Med. 2025, DOI:10.17219/acem/184141
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Birth before arrival — is there anything to be afraid of?

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ABSTRACT

Over the past centuries maternal and neonatal morbidity and mortality has fallen dramatically. This is mainly due to the fact that we achieved a lot in the field of medicine in a very short amount of time. Evidence, mostly from Europe but also from US, suggested that home birth can be relatively safe provided the appropriate conditions are met. The question is "What if something goes wrong?" How to increase patient safety in the case of birth before arrival (BBA) or it may not be associated with any increased risk?

Our study review nowadays available articles and describes rates, obstetrical characteristics and perinatal and maternal outcome of unplanned out-of-hospital deliveries.

Key words: pregnancy; BBA; OOH; paramedics

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INTRODUCTION

Out-of-hospital birth can occur as planned or unplanned. Most of planned childbirths take place at home in the care of dedicated midwife. However, situation of that sort may happen unplanned. The term — birth before arrival (BBA) — is defined as a delivery of a baby that takes place outside healthcare facilities. It also includes home or enroute to a delivery centre or hospital (in an ambulance, private car or on hospital grounds) and are not attended by a midwife. [1, 2].

The incidence of BBA varies worldwide. Overall, rate of BBA in developed countries is less than in developing countries. It is 0.1–0.44% in Europe [3], 1.36–1.8 % in USA [4], 1.8–4.6% in South Africa [5].

Out-of-hospital birth is connected with adverse perinatal outcome and increased neonatal mortality [6, 7].

Our study aims to review the available articles and describes rates, obstetrical characteristics and perinatal and maternal outcome of unplanned out-of-hospital deliveries.

HISTORICAL VIEW

Undoubtedly, looking at human history — most people who lived on our planet have been born at home or in communities. However, it does not mean that it is the best or the safest idea of giving birth. What it means is that, frankly recently, we managed to achieve plenty in the field of medicine in a very short amount of time. And it changed the idea of labour dramatically. The beginning of the hospital births is estimated for the 18th and 19th century but was not the luxury it might seem to be [8, 9]. Patients who were well-off chose to employ an accoucheur and give birth at home [10]. Hospital births concerned only poor and destitute part of society — in order to provide them with support. Therefore, as is easy to guess, hospital delivery was surprisingly not connected with benefits or increased safety [8, 9].

In the middle of 19th century quite a revolution took place. There has been an understanding of bacterial infection, sepsis, and the development of antiseptic techniques [11]. In 1876, an Italian obstetrician Eduardo Porro described his method of amputating the body of the pregnant uterus and stitching the cervical stump as a way to deliver a baby [12]. In 1882, gynaecologist Max Sänger, described the use of a double layer of sutures to close the uterine incision in order to preserve this organ after delivery. It was beginning of the classical operation era [13].

Increasing perfection of surgical techniques coincided in time with the introduction of blood banks and using antibiotics which together led to further extreme reduction of maternal mortality (Fig. 1) [14, 15].

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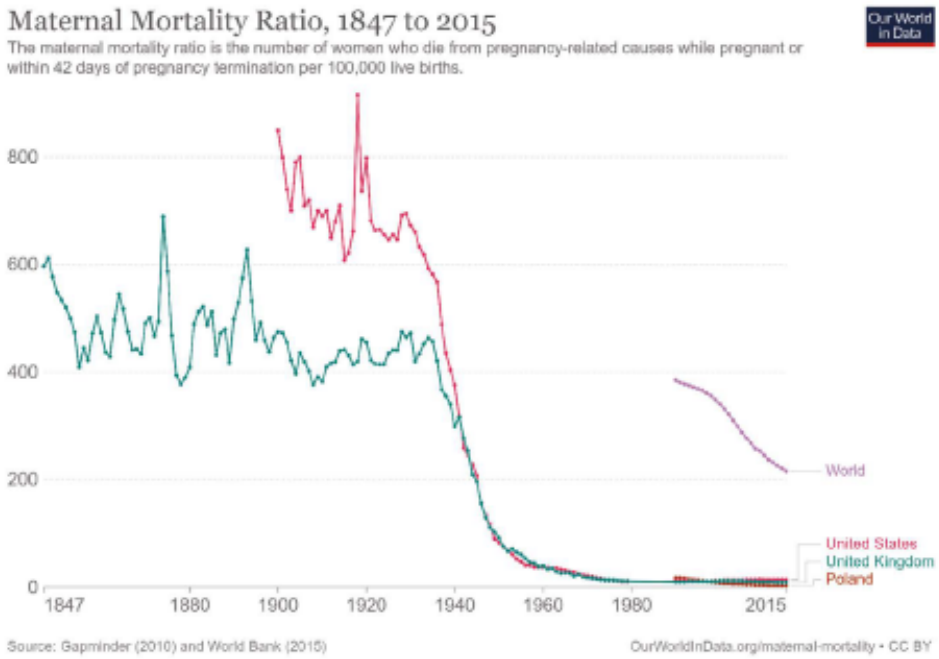

Figure 1. Maternal Mortality Ratio 1847 to 2015

NEONATAL OUTCOMES

Out-of-hospital delivery is indisputably associated with worse perinatal outcomes as well as increased neonatal mortality compared to hospital deliveries [16, 17]. The most unfavourable result described was hypothermia [18, 19]. In most studies, neonatal morbidity and mortality were defined as death or neonatal intensive care unit (NICU) hospitalization at day 7. Neonatal mortality varied widely between the different cohort studies. Moscovitz et al. [20] reported in their study 9 neonatal deaths among 91 out-of-hospital deliveries (9.9%). On the contrary, McLelland [21] reported nine (2.7%) neonatal deaths, including three that were not viable being less than 24 weeks gestation. In a French research study NICU hospitalization or death was recorded in 106 newborns (6,3%) [22]. Ovaskainen et al. [17] found out that out-of-hospital cases were more often admitted to neonatal departments due to infection or hypothermia.

Other complications that have been confirmed in many studies included higher rate of prematurity and lower birth weights [23, 24]. There were also evidence that prolonged transportation time is significant predictor of neonatal mortality among newborns. Moreover, it is clear that proper neonatal intervention before and during transportation significantly decreased neonatal morbidities and mortality [25, 26].

MATERNAL PROFILE AND OUTCOMES

Most previous published papers focused on a neonatal outcome. There have been a few reports of maternal morbidity but the results sometimes contradicted each other [23, 27].

BBA mothers, according to many studies, were characterized by young age and low education. Being multipara, attending antenatal care visits ≤ 4, experiencing preterm birth and rapid labour progression were also named as significant common attributes [28, 29]. An explanation for these factors may be the fact that younger women are less likely to take proper medical care of themselves and that they lack awareness of childbirth. Low education significantly affects their basis and decision about health care. Then, the insufficient number of ob-gyn check-ups effect in poor antenatal education. Furthermore, multiparity and short labour duration are likely to lead to faster childbirth what contributes to BBA.

Women with BBA have increased risk of postpartum haemorrhage and it's the leading cause of maternal death during the immediate postpartum period [23]. In every 4 min one female dies due to massive postpartum haemorrhage [30].

WOMEN'S EXPERIENCES WITH BIRTH SETTING

Research showed that every fifth woman in Western countries is afraid of childbirth. It is simply fear of the unknown. Making effort to reduce this anxiety is essential as it might have a direct negative effect on childbirth process. It is also important to try to minimize stress, to have positive experience of breastfeeding [31]. Access to prenatal medical care and therefore to education seems crucial in this case.

Childbirth may be certainly a beautiful event for many women. However, in the absence of support from medical

professionals and/or family relatives, it can only contribute to negatives. Elina Svedberg et al. [32] in their pilot research described women's experiences of unplanned prehospital births. The results showed that the women are not prepared to give birth to a child outside the hospital, and the course of events usually happen too quickly to adjust. A BBA from the patients' point of view is often described as a tumultuous event. It is also worth highlighting that the patients felt dissatisfaction, frustration, and even shame. Additionally, they blamed themselves and/or their partners for not getting to the hospital in time [32]. In another study, most women despaired of no one being there to help when they understood that they were in labour too advanced to make it to the hospital. Most women described childbirth dramatically, however they were also proud of themselves and/or took responsibility for finding themselves in labour without professional care [33].

TRANSFER TO HOSPITAL

Paramedics play important role in BBA — they provide intrapartum, immediate postpartum and neonatal care. Cases of BBA are described by paramedical staff as "infrequent", yet often "normal" and "uncomplicated". Unfortunately, it turns out that pre-hospital care has not always been carried out properly. For example, several cases documented fundal massage prior to the birth of the placenta. This procedure, is associated with unequal separation of the placenta from the fundus and could contribute to excessive maternal blood loss [34, 35]. Also, as mentioned before, the most common complication among neonates was hypothermia. Despite the existing recommendation of wrapping the baby in cling-wrap or plastic-film with the head exposed without drying beforehand, the paramedic teams did not reported it as their routine [34].

Gayle McLelland et al. [36] reported complications encountered by paramedics at OOH (out-of-hospital) births such as: breech presentation, shoulder dystocia, face presentation, cord prolapse, twins and PPH.

Therefore, the fact that paramedics most often aid BBA patients, it is important to provide sufficient education (including practical skills) to effectively care for them during this period. It is crucial for paramedics to grow confidence that they would be able to secure both the baby's adapting process to the extra-uterine environment and that third stage of labour is progressing without maternal complications. Moreover, ideally, they should have clinical abilities to respond early to any complications that may arise.

CONCLUSIONS

As medical advances were increasing there can be observed the growth of safety for both mothers and their newborns. This contributed to the rising number of patients who decide to give birth at the hospitals. BBA could be the new real problem in the medicine that the paramedics and obstetricians share and face together. In the upcoming years this issue may need more attention due to the popularization of the more natural approach to labour, demedicalization and seemingly safety of home birth. In most studies, the general condition of the mother and newborn after BBA were described as good. For the mother, the greatest risk was postpartum haemorrhage, and for the newborn, hypothermia, which may be effectively prevented by encouraging skin-to-skin contact between mother and child. Undeniably, a tremendous piece of work in this field is done by well-trained emergency medical teams, who are the first to take care of both patients.

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Conflict of interests

Authors declare no conflict of interests.

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Article

Determinants of Place of Delivery during the COVID-19 Pandemic—Internet Survey in Polish Pregnant Women

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Abstract: *Background and Objectives:* COVID-19 is a pandemic disease, and its unpredictable outcome makes it particularly dangerous, especially for pregnant women. One of the decisions they have to make is where they will give birth. This study aimed to determine the factors influencing the choice of place of delivery and the impact of the COVID 19 pandemic on these factors. *Materials and Methods:* The study was conducted on 517 respondents from Poland. The research methods comprised the authors' own survey questionnaire distributed via the Internet from 8 to 23 June 2021. The survey was fully anonymous, voluntary, and addressed to women who gave birth during the pandemic or will give birth shortly. *Results:* A total of 440 (85.1%) respondents were afraid of SARS-CoV-2 infection. The most frequently indicated factors were fear of complications in the newborn, fear of intrauterine fetal death, and congenital disabilities in a newborn. A total of 74 (14.3%) women considered home delivery. The main factors that discouraged the choice of home birth were the lack of professional medical care 73.1% (N = 378), the lack of anesthesia 23.6% (N = 122), and the presence of indications for caesarean section 23.4% (N = 121). The possibility of mother–child isolation caused the greatest fear about hospital delivery. During the COVID-19 pandemic, pregnant women concerned about SARS-CoV-2 infection were more likely to consider home delivery than those without such fears. The most important factors affecting the choice of the place of delivery included the possibility of a partner's presence, excellent sanitary conditions and optimal distance from the hospital, and the availability of epidural analgesia for delivery. *Conclusions:* Our study identifies the determinants of place of delivery during the COVID-19 pandemic. The data we obtained can result in the healthcare system considering patients' needs in case of similar crisis in the future.

Keywords: COVID-19 pandemic; pregnancy; homebirth

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1. Introduction

The first coronavirus disease 2019 (COVID-19) cases were documented in December 2019 in Wuhan, China. This occurrence changed the world we used to know and started the most significant global health disaster of the 21st century [1,2]. As of 20 May 2022, the total number of confirmed cases of COVID-19 infection was 526,455,518 worldwide, with 6,286,610 deaths. Current countries with the highest number of confirmed cases are the United States and India, 83,141,628 and 43,131,822, respectively. In Poland, the numbers are 6,005,101 cases with 116,255 deaths and still are counting [3]. There are a few studies assessing the impact of COVID 19 on the course of pregnancy, especially in the context of the third trimester [4,5]. A total of 767 home deliveries took place in 2017 in Poland [6].

It was certainly influenced by the fact that, according to Kopacz et al., only 10% of Polish hospitals offer women the freedom to choose a position during childbirth, and only 27% of them allow free contact with the newborn after childbirth. Moreover, medical interventions such as episiotomy or amniotomy are often performed without medical indications and consent from the mother [7]. The result of the global pandemic could be observed in all areas of medical care. We noticed an increased incidence of out-of-hospital cardiac arrest, lower rates of successful resuscitation, and increased mortality. It has significantly impacted patient outcomes through decreased access to care and the reshaping of emergency medical response and hospital-based healthcare systems policies. Furthermore, attitudes toward resuscitation have also changed negatively, and providers were challenged with novel ethical dilemmas [8]. To the authors' knowledge, there is currently no research assessing the impact of pandemics on the choice of the place of delivery, which gives pregnancy during the pandemic a new perspective. Many countries worldwide have responded to the COVID-19 pandemic by restricting the movement of citizens, obligating citizens to wear face masks, and transforming many hospitals into dedicated units prepared to treat COVID-19 patients only, which has affected the overall picture of health service availability and general public health [9,10]. These limitations also influenced pregnant patients who as a group have been susceptible to infections caused by other coronaviruses, including Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). In response, the International Federation of Gynecology and Obstetrics (FIGO) recommended routine pregnancy follow-up visits be suspended. As long as possible, it is advised to implement online consultations [11,12]. It is already clear that the pandemic has a significant impact on the human psyche, everyday living, and the quality of life [13–15]. The authors null hypothesis is that the determinants of place of delivery during the COVID-19 pandemic were multifactorial. The study aimed to extract the main determinants for choosing the place of delivery in the SARS-CoV2 pandemic.

2. Materials and Methods

The presented study is based on the authors' own questionnaire. The survey was shared via social networking sites between 8 and 23 June 2021. This period occurred just after Poland's so-called third wave of the coronavirus pandemic. Some gynecological hospitals were transformed into hospitals dedicated to patients who were SARS-CoV-2 positive only. The questionnaire consisted of 22 questions. Participation in the study was fully anonymous and voluntary. The study was addressed to women who gave birth during the pandemic or are about to give birth. The research group was recruited via Facebook groups and linked to the questionnaire shared on Instagram Stories. Participation in the study required informed consent. The right to leave the study was sustained at all times. The elaboration of the results was based on the statistical analysis of measurable (quantitative) and non-measurable (qualitative) features. The analysis of the relationships between the qualitative variables was carried out with the use of cross tables with the use of Chi2 tests, Likelihood ratio Chi2, and the exact Fisher test. The strength of the compounds was measured using the Phi Yule coefficient. A correlation between quantitative variables was verified using Spearman's rho test. A significance level of $p < 0.05$ was adopted, indicating the presence of statistically significant relationships or differences. Statistical analysis was performed using the SPSS 26 software. The research was approved by the Institutional Review Board of the Polish Society of Disaster Medicina (Approval no. 02.07.2021.IRB).

3. Results

The study involved 517 respondents residing in Poland. The average age of the respondents was 30 years, the youngest was 18 years old, and the oldest was 42 years old.

A detailed description of the research group is presented in Table 1.

Table 1. Characteristics of the research group.

	Frequency	Proportions (%)
Place of residence		
Countryside	131	25.3
City of up to 50,000 residents	73	14.1
City of up 50,000–25,0000 residents	80	15.5
City of above 250,000 residents	233	45.1
Marital status		
Single	74	14.3
Partnership	12	2.3
Married	426	82.4
Divorced	5	1.0
Education status		
Higher education	430	83.2
Secondary education	80	15.5
Vocational education	5	1.0
Primary education	2	0.4

One of the most important statistics to obtain in our study was the answer to the question about the factors influencing the choice of delivery place. As a result of the analysis, it was observed that the most frequently chosen answers to this question were: the possibility of a family birth (56.3%; 291 people), very good sanitary conditions (39.5%; 204 people), optimal distance from the hospital (39.3%; 203 people), and the opinion of other patients (36.4%; 188 people) (Table 2).

Table 2. The results of the frequency analysis for the answer to the question "Choose the 3 most important factors that affect your choice of the place of delivery".

	N	%
Family childbirth possible	291	56.3
Very good sanitary conditions	204	39.5
Optimal distance from the hospital	203	39.3
Opinion of other patients	188	36.4
Free choice of birthing position	130	25.1
Possibility of epidural anesthesia	130	25.1
Childbirth according to nature	83	16.1
Possibility of choosing a dedicated midwife	63	12.2
Waterbirth	20	3.9
A higher degree of referentiality in neonatal care	0	0.0

N—group size, %—a percentage of the group.

During the study, the respondents were also asked about fears of getting SARS-CoV-2 during pregnancy and if the SARS-CoV-2 pandemic has/had an impact on the choice of delivery place.

Some 85% of the respondents admitted that they were afraid of being infected with SARS-CoV-2, and only 15% were not afraid.

As a result of the analysis, it was observed that 62.7% (324 women) of the group answered negatively to the question asking if the pandemic had any impact on the choice of delivery place; however, the remaining 37.7% (193 people) admitted it did (see Figures 1 and 2).

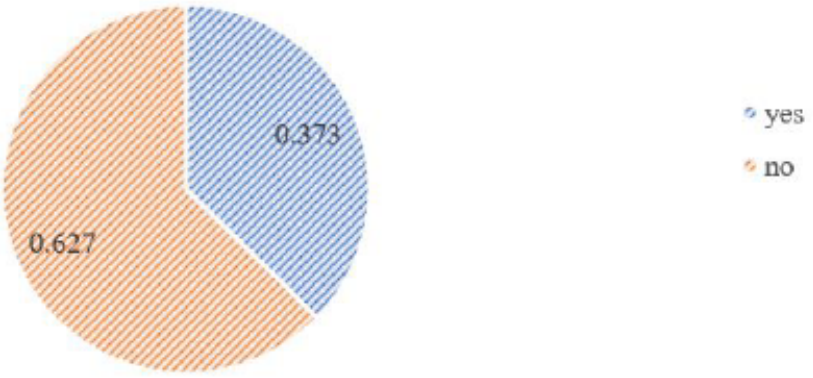

Figure 1. The frequency analysis graph for the answer to the question "Does the SARS-CoV-2 pandemic have/had an impact on the choice of delivery place?".

Figure 2. The frequency analysis graph for the answer to the question "Were you afraid of SARS-CoV-2 infection during your pregnancy?".

Apprehension associated with COVID-19 was multifactorial and is presented in Figure 3.

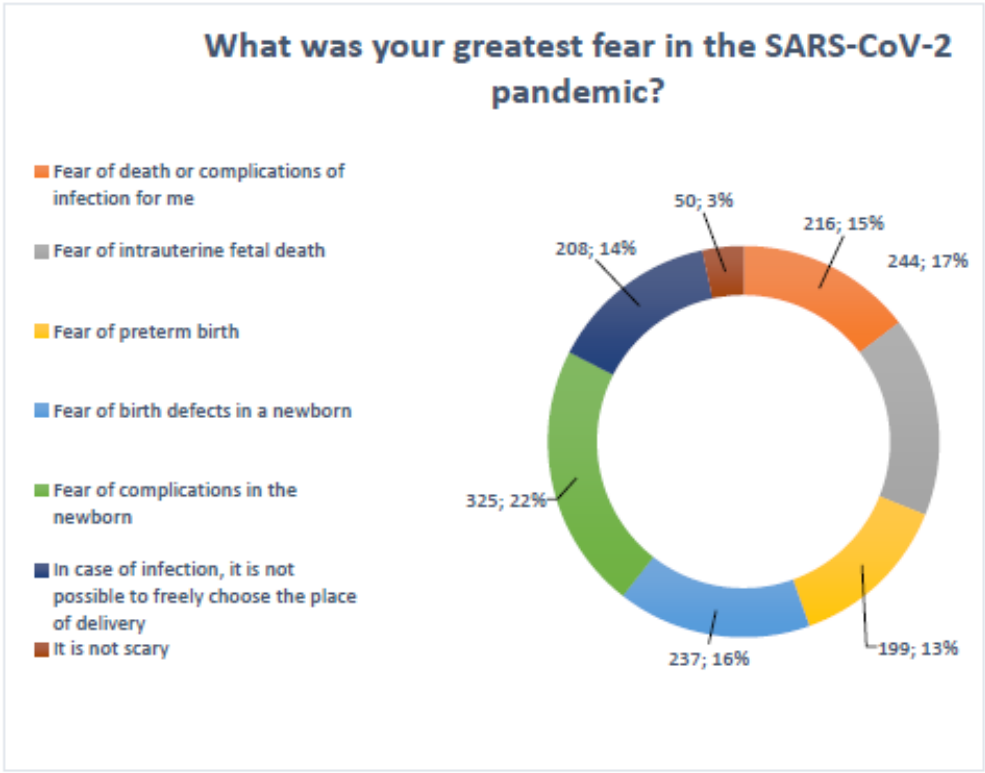

Figure 3. Factors that cause anxiety in pregnant women about the risk of COVID-19 infection.

The impact of the pandemic on pregnancy check-ups was also analyzed. The hardest part for pregnant women was the absence of their partner during the visits (Figure 4).

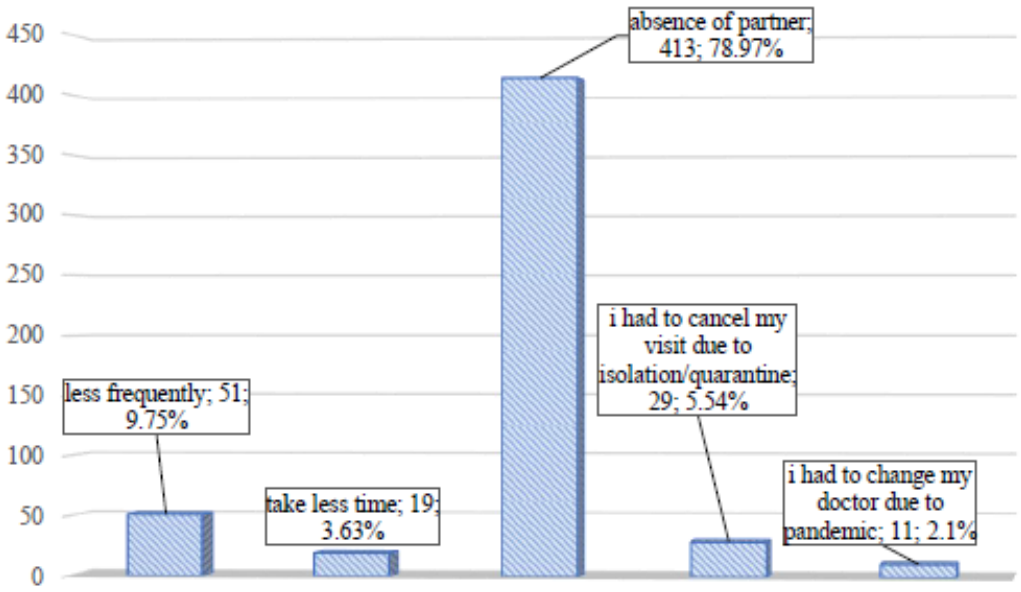

Figure 4. The frequency analysis graph for the answer to the question "How has the SARS-CoV-2 pandemic affected your pregnancy visits?".

Some 14.3% of patients (N = 74) have considered a home delivery. Among the patients who did not consider home birth, the main factors were the lack of specialist medical care 73.1% (N = 378), no possibility of anesthesia 23.6% (N = 122), the presence of indications for caesarean section 23.4% (N = 121), and the lack of local conditions to having home childbirth 15.7% (N = 81). In turn, for patients considering home delivery, the decisive factors are presented in Table 3.

Table 3. The frequency analysis results in the answer to the question, "If you considered giving birth at home, what factors impact your decision?".

	N	%
Fear of infection with SARS-CoV-2 in the hospital	0	0.0
The possibility of giving birth without, in my opinion, unnecessary medications	28	5.4
Distrust of hospital staff	18	3.5
Fear of isolating the mother from the child after childbirth	50	9.7
Intimate conditions	48	9.3

The relationship between the fear of SARS-CoV-2 infection during pregnancy and the consideration of having a home birth was also analyzed (Table 4). As a result of the analysis, it was possible to confirm the significant statistical relationship.

Table 4. The results of the analysis of the relationship between the fear of SARS-CoV-2 infection during pregnancy and the consideration of having a home birth.

Were You Worried about Getting SARS-CoV-2 during Pregnancy?		Have You Considered Giving Birth at Home:	
		No	Yes
No	N	55	22
	%	71.43%	28.57%
Yes	N	388	52
	%	88.18%	11.82%

It was observed that among people who were afraid of infection, the percentage of people who considered giving birth at home (11.82%; 52 people) was significantly lower than those who were not afraid of infection (28.57%; 22 people). The relationship was substantiated by the test: $\chi 2 = 15.00$; df = 1; $p < 0.001$; $\phi = -0.170$; $p < 0.001$.

Additionally, we assessed the relationship between age and the number of delivered vaginal births combined with the consideration of having a home birth (Table 5).

Table 5. The results of the analysis of the relationship between age and number of delivered vaginal births combined with the consideration of having a home birth.

Have You Considered Giving Birth at Home:		*N*	M	SD	U	*p*
Age of patient	No	444	30.11	3.62	14,489.5	0.103
	Yes	74	29.47	3.95		
Natural births in past	No	444	0.57	0.75	10,885	0.001
	Yes	74	1.12	0.95		

The conducted analysis did not show any statistically significant connection between considering home birth and the age of the respondents (U = 14,489.5; $p = 0.103$), but there was a statistically significant relationship between the number of delivered births and considering a home birth.

Another result is the relationship analysis between considering home birth and cesarean delivery (Table 6). The analysis shows that women who did not have a caesarean section more frequently considered giving birth at home 61 (17.2%) than those who chose this way of delivery 13 (8%). Analysis by Fisher's exact test showed that this relationship is statistically significant.

Table 6. The results of the analysis of the relationship between considering home birth and cesarean delivery.

Did Your Pregnancy End with Cesarean Section?		Have You Considered Giving Birth at Home?	
		No	Yes
No	*N*	294	61
	%	82.8%	17.2%
Yes	*N*	150	13
	%	92%	8%

Fisher's exact test = 7.734; df = 1; $p = 0.005$; Cramer V = 0.122; $p = 0.005$.

The elaboration of the results was based on the statistical analysis of measurable (quantitative) and non-measurable (qualitative) features. The analysis of the relationships between the qualitative variables was carried out with cross tables with the use of Chi2 tests, Likelihood ratio Chi2, and the exact Fisher test. The strength of the compounds was measured using the Phi Yule coefficient. A correlation between quantitative variables was verified using Spearman's rho test. A significance level of $p < 0.05$ was adopted, indicating the presence of statistically significant relationships or differences. Statistical analysis was performed using the SPSS 26 software.

4. Discussion

The authors are not aware of the existence of similar work. However, many studies have explored determinants and factors that influence the choice of delivery place, especially the choice between in-hospital and out-of-hospital births; none of them looked into those determinants during the pandemic. For women choosing childbirth at a hospital, the most essential thing was perceptions of safety, choice of medicalization and the option for pain relief, or the availability of medical care [16,17]. Women choosing non-hospital

births emphasized a desire for individual care of the midwife, a familiar environment, control over the birth process, and more involvement from partners, children, and family [18]. We know that women have to extract information from various sources to form their views. They were using the Internet, friends' recommendations and experiences, antenatal and birth preparation classes, and their own experiences of delivery [19]. Perinatal and neonatal mortality rates are different in many studies. Some studies show higher among planned home deliveries than among hospital deliveries [20–22]. In contrast, there are also reports showing no significant difference between them [23–26]. The number of women who deliver in hospitals grew with advanced medical care and a higher ability to rescue newborns and mothers [27]. It allows for providing the necessary care in the case of perinatal complications. The main reason for this reduction in maternal and perinatal mortality is blood transfusions, antibiotics, and safe anesthesia. [28,29]. The reduction in maternal mortality has made many people believe that pregnancy and delivery are now safe. This belief has led to demand for a return to home birth from many social groups and is treated as a woman's right [30]. Home birth supporters are driven by three main factors: the right to choose, high hospitalization cost, and the possibility of having a free birth, which may be dangerous. On the other hand, opponents argue that physiological childbirth can always turn pathological, and transportation to the hospital in time might not be possible [31]. The impact of COVID-19 infection can be divided into infection in the early (up to 12 weeks of pregnancy) and late stages (after 24 weeks of pregnancy). Seasonal influenza has been associated with a higher rate of spontaneous miscarriage [32]. A similar relationship is sought in COVID-19 infection, but there is still no hard evidence. Cosma, in his study, analyzed the cases of 225 early pregnancy patients with confirmed COVID-19 infection [33]. The research showed no connections between severe acute respiratory syndrome in coronavirus infection during the first trimester and early pregnancy loss. The situation is entirely different in late pregnancy. The largest cohort study from the United States included 91,412 women, of which 8207 were pregnant [34]. Pregnancy was associated with an increased risk of hospitalization among COVID-positive patients (RR, 5.4; 95% CI, 5.1– 5.6) and a higher need for mechanical ventilation (RR, 1.7; 95% CI, 1.2–2.4). However, there was no significant peak in mortality (RR, 0.9; 95% CI, 0.5–1.5). The systematic review and meta-analysis by Capobianco et al. [35] reported preterm births, neonatal pneumonia, and respiratory distress syndrome in infants born of COVID-19-positive mothers. Furthermore, some studies report other complications such as premature rupture of membranes (PROM), preterm deliveries, lymphopenia, pre-eclampsia, placenta previa, hypothyroidism, oligohydramnios polyhydramnios, fetal distress, increased cesarean deliveries, abnormal umbilical cord, and sinus tachycardia [35–42].

The study of the factors that influence the choice of the place of delivery seems to be important for both medical staff and patients. Medical staff taking care of a pregnant patient should have information about what is most important for the woman giving birth. During unusual times such as war, pandemic, or economic crisis, it should still be important to be able to provide the best care for the pregnant woman. Factors important for pregnant women for choosing delivery place during the COVID-19 pandemic were identified in our study. However, we do not know what we will have to face in the future, which can be seen in the example of women giving birth in Ukraine in connection with the war in their country [43,44].

This study is innovative and describes the relationship between the pandemic and the pregnant patients' choice of perinatal care. Nonetheless, our research is not without limitations. The most fundamental issue is that our data collection was conducted via the Internet. Nevertheless, that seems to be the only safe data collection tool in the pandemic. Moreover, studies confirm that people feel more comfortable during online surveys [45]. Another limitation is the relatively small research group and the fact that it targets the selected population—Polish pregnant women.

The null hypothesis of the multifactorial effect on the choice of place of delivery during COVID-19 pandemic was confirmed in the study. Some of these factors were more important, some less.

Further research should focus on the analysis of factors influencing the choice of the place of delivery depending on the various types of risks that may await us in the future.

5. Conclusions

The SARS-CoV-2 pandemic has changed people's perception of the world. This special time also affects pregnant women. Patients with concerns about SARS-CoV-2 infection were more likely to consider home delivery than those without such fears. Our study highlights what matters for pregnant women when choosing a place for delivery: the presence of a partner and good enough sanitary conditions. They missed the most during their pregnancy because of the possibility of their partner's presence during the pregnancy check-ups. The whole care system should be revised to be prepared for possible future problems and to meet patients' needs (including pregnant women).

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data can be obtained individually after contacting mateusz.strozik@student.umw.edu.pl.

Conflicts of Interest: The authors declare no conflict of interest.

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EMS Interventions during Planned Out-of-Hospital Births with a Midwife: A Retrospective Analysis over Four Years in the Polish Population

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Abstract: Planned out-of-hospital births, facilitated by highly skilled and experienced midwives, offer expectant parents a distinct opportunity to partake in a personalized, intimate, and empowering birth experience. Many parents opt for the care provided by midwives who specialize in supporting home births. This retrospective study is based on 41,335 EMS emergency calls to women in advanced pregnancy, of which 209 concerned home birth situations documenting obstetrical emergencies over four years (January 2018 to December 2022), of which 60 involved the assistance of a midwife. Data were obtained from the Polish Central System for Emergency Medical Services Missions Monitoring, encompassing all EMS interventions in pregnant women. The most frequent reason for emergency calls for obstetrical emergencies with the assistance of a midwife was a failure to separate the placenta or incomplete afterbirth (18 cases; 30%), followed by perinatal haemorrhage (12 cases; 20%) and deterioration of the newborn's condition (8 cases; 13%). Paramedic-staffed EMS teams conducted most interventions (43 cases; 72%), with only 17 (28%) involving the presence of a physician. Paramedics with extensive medical training and the ability to provide emergency care are in a unique position that allows them to play a pivotal role in supporting planned out-of-hospital births. The analysed data from 2018–2022 show that EMS deliveries in Poland are infrequent and typically uncomplicated. Continuing education, training, and adequate funding are required to ensure the EMS is ready to provide the best care. EMS medical records forms should be adapted to the specific aspects of care for pregnant patients and newborns.

Keywords: planned out-of-hospital births; EMS interventions; home births

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1. Introduction

Home births have historically been the basis for the survival of our civilization, but the institutionalization of care for the pregnant woman and the newborn, and the desire to provide optimal medical care, has led to the fact that home births in Western civilizations make up a relatively small percentage compared to births taking place in hospitals or other healthcare units. While this traditional approach has deep roots in human history, it prompts contemplation about its safety and efficacy compared to modern medical practices [1,2]. Exploring the historical context reveals a shift from home births to the emergence of hospital deliveries during the 18th and 19th centuries. However, the dynamics of childbirth underwent a paradigm shift with revolutionary insights into bacterial infections, sepsis, and the advent of antiseptic techniques in the mid-19th century. Proponents of

home births emphasize the progressive and unnecessary medicalization of perinatal care and the unique experience of home birth, including psychological aspects. At the same time, opponents stress the risks associated with complications of childbirth, as well as risks to mother and child, stressing that these risks can be minimized by planning birth immediately in a hospital or other medical institutions for this purpose. Advocates of home births stress the need for proper qualification for home births to reduce the risk of complications in the case of obstetric abnormalities that are foreseeable [1].

The rate of home births varies significantly across countries. In the Netherlands in 2015 and 2019, the percentage of home births was 16.3%, with the percentage in other countries as follows: 1.4% in Denmark, 1.3% in Germany, 1.1% in Belgium, 0.9% in Hungary, 0.32% in Spain, 0.2% in Finland, and 0.03% in Poland. The Netherlands has the highest rate of home births, which is most likely due to the uniqueness of prenatal care. The healthcare model for pregnant women is bifurcated into primary and secondary care. Patients with a low risk of complications are categorized under primary care, while those with a potential for complications receive specialized care, referred to as secondary care [1]. However, a noticeable trend can be observed in the United States, where planned home births have increased. From 2004 to 2017, there was a 75% surge in the incidence of planned home births [2].

Home births take place in Poland relatively infrequently, and a midwife provides care for a patient who decides to have a home birth. In some cases, pregnant patients decide to deliver without the presence of a medical professional. In almost all cases, births in Poland occur in a hospital setting, and maternity care is free of charge. The problem facing hospitals and maternity wards is the reduction in the number of births, which leads, for economic and organizational reasons, to a reduction in the number of hospitals with obstetric units, which may, in some cases, lead to longer EMS transport times for a patient during delivery to the nearest hospital with an obstetric unit.

The system of emergency medical services in Poland is based on paramedic emergency medical teams, which include paramedics trained by legal requirements; an increasing number of paramedics in Poland have a bachelor's degree in medical rescue, and during their studies, there are courses in obstetrics and the practical and theoretical aspects of providing emergency care to women in pregnancy-related emergencies, as well as delivering a baby in a prehospital setting. An decreasing number of teams include physicians, a minority of whom specialize in emergency medicine. The Helicopter Emergency Medical Service system is based on the presence of a physician specializing in or having specialized in emergency medicine and a paramedic with very high professional qualifications.

For EMS personnel, the primary focus should be promptly transporting the mother to a hospital that possibly offers tertiary care of obstetrics while providing the necessary emergency actions, including medical care for the pregnant woman, the ability to deliver the baby, and care for the mother and the newborn. In such controlled settings, specialized healthcare providers can deliver the baby, ensuring the availability of appropriate equipment and expertise to manage any potential complications. In many studies, it is emphasized that unplanned birth outside a medical facility is linked to a higher peripartum mortality rate. Emergency medical teams also handle cases such as eclampsia/HELLP, which pose a direct threat to the life of both the mother and the child [3,4].

It is worth noting that up to one-third of nulliparous patients may require transfer to a hospital setting. The chance that multiparous females will have to be transferred to the hospital is significantly lower at about 8% [5]. Therefore, birth plans should include contingencies for urgent and nonurgent transport to a nearby hospital, which, through proper organizational measures, will reduce the time to reach the hospital and, thus, the risk in the event of the transfer to the hospital [6].

However, in some cases, there may be insufficient time to transport the mother to an appropriate medical facility. Unplanned prehospital deliveries have been associated with increased perinatal mortality and morbidity, posing risks to both the newborn and

the mother. It should be noted that in the case of unplanned births, the risk of death of the newborn in the first week of its life may be even five times higher [7].

Whether homebirth is beneficial remains a topic of ongoing debate. A consensus is needed among scientific organizations, with contradictory recommendations provided. When assessing the feasibility of home births, many factors should be taken into account, including the course of the pregnancy and obstetric history, the ability to provide professional midwifery care at home, the potential time to reach the hospital, and most importantly, the likelihood of a smooth, natural home birth taking into account the wishes of the pregnant woman and her awareness of the risks and benefits [8,9].

In planned out-of-hospital births, the need for transfer to hospital care may arise during labour due to cord prolapse, haemorrhage, malpresentation, maternal exhaustion, slow labour progress, foetal distress, and suspected intra-amniotic infection. In some cases, the following may occur after childbirth: low Apgar score, congenital malformation, suspected sepsis, respiratory distress, lacerations requiring repair by an obstetrician, or retained placenta [9,10]. Other authors explicitly highlight the correlation between unplanned births outside a medical facility and an elevated peripartum mortality rate [11].

Emergency medical service (EMS) providers are called upon to deliver prompt medical attention and facilitate transportation in birth complications requiring emergency care for a mother or a child. However, many paramedics note issues that affect them, such as a lack of adequate training, a mismatch between societal expectations regarding EMTs and the reality they encounter in out-of-hospital maternity care, difficulties in deciding whether to transport a patient or manage childbirth on-site in challenging situations, and even a lack of understanding from midwives when transferring a patient to the hospital. All these factors contribute to exceptional challenges and stress in providing care [12].

This study aimed to assess the rate of EMS interventions in planned home births in Poland and analyse the characteristics of patients who require EMS assistance and the scope of response by EMS teams for complicated planned home births.

2. Materials and Methods

We conducted a cross-sectional study based on the National Centre for Emergency Medical Services data from 2018–2022 encompassing all interventions conducted by EMS within the country. This register held by the National Centre for Emergency Medical Services covers all rescue actions undertaken by Emergency Medical Services teams in Poland in a unified manner according to a set form; the introduction of this system made it possible to make analyses and data comparisons. The period of analysis we performed covered the years in which all EMS team rescue actions were subject to the same record-keeping rules.

Inclusion criteria in the study were emergency team calls to the patient in planned home births with a midwife, regardless of the reason for the call. The analysis did not consider exclusion criteria; the only inclusion criteria were planned home births with a midwife.

Due to no diagnostic code reliably identifying OOH (out-of-hospital) delivery, we utilized multiple search strategies to identify planned out-of-hospital births. Two independent researchers manually conducted searches for information describing planned OOH births with a midwife.

The original database was in the range of ICD-10 codes between O30–O92 to isolate cases of pregnant women. This range of codes allowed the inclusion of maternal care related to the foetus and amniotic cavity and possible delivery problems, complications of labour and delivery, and delivery complications predominantly related to the puerperium.

Subsequently, the database underwent manual searches conducted by two independent researchers to identify patients who had planned home deliveries. Home births were identified by manually analysing the selected records, their contents, descriptions, and EMS rescue actions taken. Within the category of home births, a specific subgroup was

distinguished consisting of cases where there was documented information regarding a planned birth involving the participation of a midwife.

Before conducting the research, the study was approved by the Bioethics Committee of the Wroclaw Medical University, Poland (Approval No: KB-975/2022). The analysed database did not contain information that would enable the identification of the patient and the emergency medical team providing care to the patient.

3. Results

Between 2018 and 2022, 41,335 EMS interventions involving pregnant patients were recorded using ICD-10 codes within the range of O30–O92. Of the identified interventions associated with planned childbirth, 209 cases were documented in EMS medical records at the scene and during the transfer to the hospital. Among these cases, only 60 involved the presence and assistance of a midwife, and further analysis is focused on this group of patients.

The age range of the patients varied from 23 to 44 years. On average, the patient's age was 33 years. The description of the EMS mission lacked information on gravidity in 15 cases (25%). Of the patients, 31 were multiparous, including 15 who had experienced two pregnancies. Additionally, there were 14 visits recorded for primiparous patients. Detailed information on the gravidity of patients calling for help is shown in Figure 1.

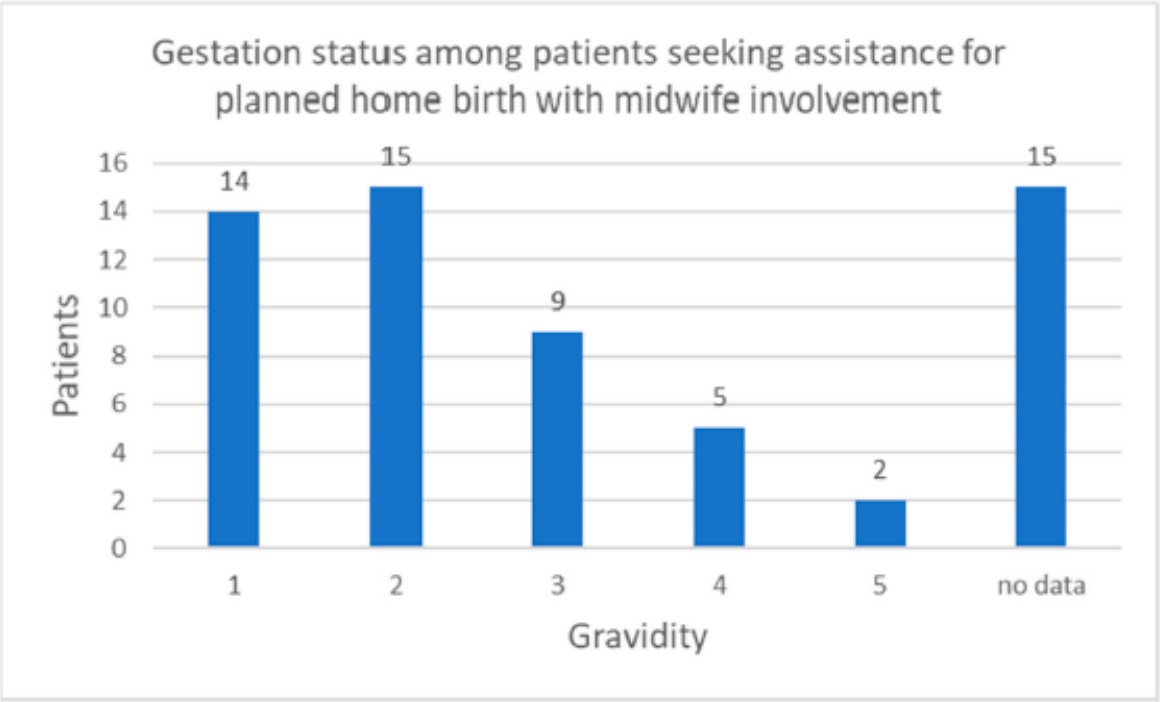

Figure 1. Gravidity of patients calling for help with a planned home birth with the participation of a midwife.

Table 1 shows the reasons for EMS calls to patients who had a planned delivery with midwife care. Retained placenta (30.0%) and postpartum haemorrhage (21.7%) were the most common reasons for EMS team calls, followed by newborn's condition deterioration (13.3%), mothers' birth injuries (11.7%), abnormal delivery mechanism (5.0%), abnormal foetal heart rate (5.0%), breech delivery (3.3%), and shoulder dystocia (1.7%), with the reason for the call not documented in 8.3% of cases.

Table 1. Reasons for calling EMS for planned home births conducted by midwives.

Complication	N	%
Retained placenta	18	30.0
Postpartum haemorrhage	13	21.7
Newborn's condition deterioration	8	13.3
Mothers' birth injuries	7	11.7
N/A	5	8.3
Abnormal delivery mechanism	3	5.0
Abnormal foetal heart rate	3	5.0
Breech delivery	2	3.3
Shoulder dystocia	1	1.7

We categorized the time of interventions into three different time frames: between 6 AM and 2 PM; between 2 PM and 10 PM; and at night, between 10 PM and 6 AM. Half of the interventions occurred between 6 AM and 2 PM. Figure 2 contains detailed data.

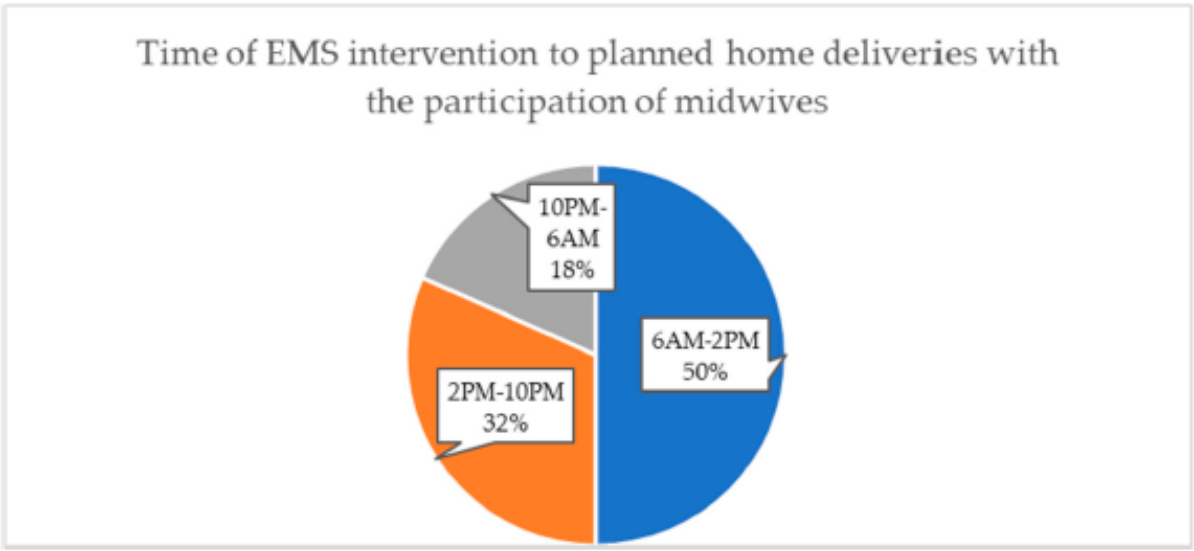

Figure 2. The number of interventions for planned home deliveries with the participation of midwives based on different time intervals.

The majority of interventions occurred with the involvement of the core team, comprising a minimum of two medical professionals authorized to perform medical actions, including a system nurse or a paramedic, accounting for 43 cases (72%). In contrast, teams including a physician comprised only 17 cases (28%).

Out of the total 60 interventions, in 7 cases, the delivery was not advanced; therefore, the EMS team managed to transport the patient to the hospital. In the remaining 53 interventions, the delivery occurred either before the EMS teams arrived or during their presence.

Figure 3 shows neonatological outcomes of EMS interventions in planned home births with the assistance of a midwife. Apgar scores were not provided in most of the reports submitted by EMS teams. Among the cases where Apgar scores were assessed, 16 received 10 points, one scored 9 points, two were scored at 8 points, one received 7 points, and one was at 2 points.

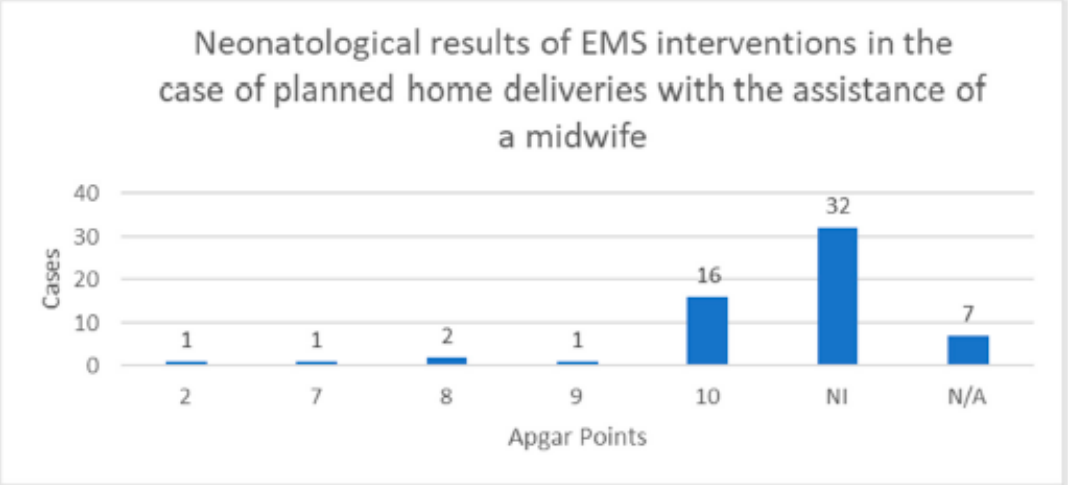

Figure 3. The neonatological outcomes of EMS interventions in planned home deliveries with the assistance of a midwife. NI—No information. N/A—Not applicable.

4. Discussion

Our findings highlight the crucial role of emergency medical teams in prehospital care for pregnant women, analysing the basic medical challenges and looking at the role of teams with no physicians. In our study, the most frequent reason for emergency calls for obstetrical emergencies with the assistance of a midwife was a failure to separate the placenta or incomplete afterbirth, followed by perinatal haemorrhage and deterioration of the newborn's condition. Paramedic-staffed EMS teams conducted most interventions, with only 28% involving the presence of a physician. Half of the interventions took place between 6 AM and 2 PM.

In the studies conducted by Eisenbrey et al., the primary reasons for EMS team intervention were as follows: postpartum haemorrhage (8 cases, 25.0%), non-transient apnoea including CPR (4 cases, 12.5%), foetal demise (2 cases, 6.3%), abnormal presentation of congenital anomaly (2 cases, 6.3%), and others. However, our research does not specifically reference these findings. In our analysis, we included home births attended by midwives, but in the study by Eisenbrey et al., only 31 out of 223 births in the presence of EMS teams were attended by a midwife. In this study, in the case of EMS teams being called for home births in the presence of a midwife, the study showed a high rate of complications (61.3%), which is undoubtedly related to the fact that no EMS team was called for an adequately precipitated home birth attended by a midwife. The most common reasons for intervention in our study were retained placenta (18 cases, 30%), postpartum haemorrhage (13 cases, 22%), and newborn condition deterioration (8 cases, 13%). Nonetheless, it is undeniable that each of the above situations was a significant challenge and stressful for EMS teams [13].

Bernhardt et al., in their research, reported 40 interventions over five years. The results of the study in Germany are similar to those we assessed. However, it is essential to note a significant disparity regarding the timing of these interventions. Seventy-three percent of the interventions occurred during nighttime hours between 4 PM and 7 AM. In contrast, our data indicate that 50% of the interventions occurred between 6 AM and 2 PM [14]. The emergency medical system in Poland is generally based on 12-h shifts from 7 AM to 7 PM and 7 PM to 7 AM. However, our proposed time slots facilitate better identification of deliveries and interventions at night and indicate that home births are more likely to occur during daytime hours, which are the typical daytime working hours of the medical personnel. Several studies have shown that interventions by EMS teams to patients delivering in out-of-hospital settings mainly occur at night. However, it should be noted that in our study, we only analysed home births, where the final decision by the parturient regarding the place of delivery (home or hospital) may have depended on the

hour at which labour began or the anticipated end of labour, as well as the availability of medical personnel who could attend the home birth, including primarily the midwife.

Women often place their trust in the natural process of birth [15]. Furthermore, motivations for opting for home births may stem from the belief that hospital personnel are unsupportive of natural physiological birth processes, rely heavily on unnecessary interventions, and may not prioritize patient preferences [16,17].

The decline in maternal mortality rates has created a perception that pregnancy is now entirely safe, causing some to overlook the advancements in hospital care that have contributed to this improvement. However, it is essential to recognize that our ability to save lives in medical facilities has significantly evolved. Despite this progress, a growing movement advocates for home births, often defined as one of women's rights, which is noticeable in the research of Catlings et al. [18]. Proper selection of patients delivering at home, providing opportunities for support by professional staff in home conditions, and considering transportation options are primary factors affecting safety.

Women chose OOH birth primarily due to a sense of enhanced safety, the desire to avoid unnecessary medical interventions often associated with hospital births, previous negative experiences in hospitals, the need for personal control, and the comfort and familiarity of their environment [15]. A suggested option to consider is to undertake such organizational and facility measures so that a woman giving birth in a hospital is provided with professional care while reducing the stress of being in a hospital environment. The right approach of the personnel and the atmosphere and care, including the opinions of other parturients about the unit, can influence patients' decisions about where to give birth.

In the Netherlands, scientific studies have indicated that planned home births exhibit comparable levels of safety to planned hospital births [15]. This is also confirmed by other studies in different countries, which did not show an increase in neonatal morbidity and mortality associated with planned home births [19–21]. This can result from proper obstetric qualification and perinatal care, which can ensure that patients with an increased risk of perinatal complications do not undertake planned home birth. Studies indicating that there is no difference in obstetric complications and the newborn's condition between home and hospital births are based mainly on the good qualification of patients and the management of pregnancy, which ensures that potentially complicated births will take place in a hospital setting.

Additionally, maternal outcomes, in the case of planned home births, are characterized by reduced interventions and complications [22,23]. However, due to the relatively small percentage of home births, it is difficult to draw definitive conclusions based on these studies, as severe complications were very rare in home births and in hospital settings.

Several studies, including the work of G. McLelland et al., highlight that most interventions conducted by paramedics during childbirth involve uncomplicated cases. It is crucial to acknowledge that, apart from spontaneous deliveries that necessitate no intervention, there are unique circumstances where specialized care is essential to prevent potential risks to the health or life of both the mother and the newborn [24]. This study showed that over 88% of out-of-hospital births were uncomplicated deliveries at term. This analysis showed that the most common perinatal problems were postpartum haemorrhage, breech, cord prolapse, prematurity, and neonatal death. Interestingly, in more than 16% of the cases, the labouring women had a complicated medical history that could affect the delivery. Most deliveries took place at night between 10 PM and 6 AM.

The most common procedures that emergency medical teams perform during intervention cases of pregnant women are pulse oximetry, medical history, and blood pressure measurement [25]. These are the typical actions taken to assess vital functions in any patient in an EMS operation.

In a large study that analysed data from Finland from 1996 to 2013, the authors identified an issue similar to the one observed in our study. The lack of standardized documentation for out-of-hospital deliveries and the flexibility in completing the records resulted in specific gaps within the documentation process. Consequently, the analysis of

Apgar scores could not be conducted in their study due to missing data. This problem was solved by creating a birth register in 2004, in which this information must be included [26]. This study and the measures taken point to similar problems with the form of documentation and the importance of the correct assessment of the newborn's condition and data entry.

Our preliminary observations indicate that midwife-attended births can pose unique challenges for emergency medical services (EMS). Although EMS team personnel are prepared to deliver normal births and emergencies in the case of complications, the limited options for taking action, including action related to obstetric emergencies, can be a significant challenge for staff. In Poland, paramedic teams are not equipped as standard with oxytocin or other drugs with similar effects, nor is it a drug that can be administered by a paramedic alone without a physician's consent.

Due to the relatively infrequent nature of responding to women in labour compared to other EMS interventions, the teams may need more readiness to handle obstetric complications, as indicated by incompletely filled-out patient charts. Paramedics face numerous occupational hazards daily, with the most significant ones in terms of serious disease development being exposure to harmful biological factors, musculoskeletal risk factors, fatigue, and mental overload associated with their occupational responsibilities. Despite shouldering such burdens, transporting a labouring woman or a distressed baby poses one of the most challenging situations for healthcare professionals, particularly those without midwifery experience [27,28]. This is due to both legal responsibility and societal expectations, which sometimes do not take into account the natural occurrence of severe obstetric complications with high mortality rates, largely regardless of where medical care is provided. In the setting of prehospital care, these opportunities are particularly limited compared to the conditions of a well-equipped and well-staffed multi-profile hospital.

In our study, we did not observe any patient deaths; however, we encountered a case in which a patient's delivery was managed by a midwife, resulting in the child being born in a highly critical condition. A Norwegian study detected that a significant percentage of the liveborn cases died due to abuse, i.e., in indistinct circumstances [29]. Such cases appear challenging to prevent and are unlikely to be significantly influenced by the proximity to the nearest delivery unit. Mental health issues, substance abuse, and social exclusion are potential contributing factors in these instances. To improve pregnancy outcomes in these complex situations, comprehensive multidisciplinary interventions are necessary for the mother and her family.

As for future research directions and possible applications of the research, in our opinion, it is necessary to include the specifics of care for the pregnant patient and the newborn in the documentation of EMS teams, which should enhance the quality of documentation and the quality of care. A detailed documentation scheme covering obstetric emergencies facilitates both the maintenance of medical records and makes it easier for paramedics to take a more extensive medical history related to the current pregnancy and previous pregnancies. It can facilitate a better assessment of the condition of the mother, foetus, or newborn, as well as specific risks in pregnancy. Further analysis will be needed to determine whether expanding EMS team forms including specific forms regarding the pregnant patient, delivery, and newborn care helps facilitate care delivery and documentation analysis.

5. Limitations

This study has some limitations primarily attributed to its data source. The data from narrative summaries written by EMS providers at the scene and during the transfer to the hospital and collected in the database are restricted due to a specific structure of prehospital emergency medical charts, which is not specifically adjusted to the state of pregnancy and labour complications. Therefore, these circumstances make EMS teams improvise, resulting in varying data quality concerning resuscitative efforts or prenatal care. The dataset was limited in its ability to reliably identify the mother who had just delivered and the infant, as

some records combined documentation for both patients. In contrast, others documented separate records for each case. Not all intervention descriptions contained sufficient data, including important information such as the Apgar score of newborns or data directly associated with pregnancy. This limitation arises from using a universal form by EMS that was not specifically tailored for pregnant patients. In order to ensure the comprehensive capture of important interview information during interventions with pregnant women, it appears logical to establish a distinct card specifically designed to document these events. Implementing such a measure can enhance the accuracy and completeness of data related to visits involving pregnant patients.

6. Conclusions

The analysed data from 2018–2022 shows that EMS deliveries in Poland are infrequent and typically uncomplicated. However, if complications occur, they often put paramedics in a challenging situation. Therefore, continuing education, training and adequate funding are required to ensure the EMS is ready to provide the best possible care. EMS medical records forms should be adapted to the specific aspects of care for pregnant patients and newborns.

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Informed Consent Statement: Not applicable.

Data Availability Statement: The Polish Ministry of Health holds administrative control and authority over the data obtained from the Central System for EMS Missions Monitoring, forming this study's foundation. The Ministry provided the clinical data for this study after an individual institutional request to access the database.

Conflicts of Interest: The authors declare no conflict of interest.

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AHEAD OF PRINT

Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis

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Abstract

Background. Emergency medical teams are a crucial component of healthcare systems, routinely providing essential care to pregnant patients in various situations.

Objectives. To evaluate the rate and outcomes of out-of-hospital deliveries attended by Emergency Medical Services (EMS) in Poland and identify areas for improvement in the care provided by emergency medical teams.

Materials and methods. This retrospective study was based on 41,335 EMS emergency calls to women in advanced pregnancy, of which 879 births were delivered directly by medical teams between January 2018 and December 2022. Data were obtained from the Polish National Monitoring Center for Emergency Medical Services, encompassing all EMS interventions in Poland.

Results. The study involved 879 EMS team interventions for pregnant women, with an average patient age of 29.87 years. Most patients were in their 2nd pregnancy (28.26%) and delivering for the 2nd time (25.77%). The postnatal condition of newborns, assessed using the Apgar score, was missing in 408 cases (46.52%) due to incorrect completion of documentation. Emergency Medical Services teams, predominantly P-type (basic) teams, handled 69.78% of deliveries, while S-type (specialist) teams were involved in 30.22% of cases. Medical procedures often performed during childbirth included manual assistance in spontaneous delivery, pulse oximetry, physical examination, examination of systemic blood pressure, obtaining peripheral intravenous access, and gynecological examination.

Conclusions. Given the rate of encountered cases and the gaps identified in medical documentation, there is merit in potentially implementing a dedicated form to be completed by medical teams when caring for a pregnant patient. Ongoing training and enhancements in the range of assistance provided to the mother and newborn are imperative for ensuring appropriate care.

Key words: pregnant women, health care, Emergency Medical Team, out-of-hospital birth

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Background

As in many other countries, the number of births in Poland is progressively decreasing.[1] In the first half of 2023, 139,000 live births were registered in Poland, reflecting a decrease of 14,700 compared to the corresponding period during the previous year. The natural increase, calculated as the difference between live births and deaths, was negative, reaching about 70,400. Such a reduction in the number of deliveries necessitates further measures to optimize the care of pregnant women and make every possible effort to reduce the risk to the newborn, which is particularly important in the case of out-of-hospital (OOH) deliveries.

In Poland, the primary location for childbirth is centralized in hospitals, with very limited alternatives. Despite the option for patients to choose the delivery location based on perinatal care standards, no public national maternity program is available. Home births are exclusively facilitated by midwives operating within their private practices.[2]

Examining the situation in other European countries, such as Finland, reveals that when the number of deliveries declines, maternity wards with fewer than 1,000 deliveries per year are often closed. This trend leads to a centralization of births in larger units, aiming to guarantee the highest standard of care for the mother and the newborn. Consequently, the risk of intervention by emergency medical teams in pre-hospital deliveries increases.[3]

In 2019, the total number of Emergency Medical Services (EMS) teams in Poland was 1,585, including those operating on a seasonal basis. The current organized EMS system is referred to as the National Monitoring Center for Emergency Medical Services (NMC-EMS). Modern EMS also incorporate specialized medical staff and are integral to the system. In addition to established professions like physicians and nurses, there is the (relatively new in Poland) profession of paramedics.[4]

Polish EMS constitutes a critical pillar of the healthcare system, designed to deliver timely and specialized care to individuals confronted with life or health-threatening emergencies. This all-encompassing system comprises essential elements, ranging from hospital emergency departments and EMS teams to advanced units like Helicopter Emergency Medical Services (HEMS) teams. Within this structure, both EMS and HEMS teams share the unified goal of providing on-site emergency medical care and ensuring the secure transport of patients to hospitals. Emergency Medical Services teams consist of diverse healthcare professionals, including physicians, emergency medical technicians and nurses. Notably, Polish EMS teams are classified as basic (non-physician-staffed) or specialist (physician-staffed), with team size of 2 or 3 responders.

The foundation of EMS in Poland rests on paramedic emergency medical teams, comprising paramedics trained to meet legal requirements. Notably, an increasing number of paramedics in Poland hold bachelor's degrees in medical rescue. Their education includes courses in obstetrics and the practical and theoretical aspects of providing emergency care to women in pregnancy-related emergencies, encompassing pre-hospital deliveries. As the landscape of EMS in Poland undergoes evolution, there is a decreasing inclusion of physicians within these teams. While a minority specialize in emergency medicine, their expertise significantly enhances the overall capabilities of the teams. The integration of diverse healthcare professionals and the continuous development of skill sets underscore the adaptability and effectiveness of the Polish EMS in addressing a wide array of medical emergencies.[5] Current provisions in the law on state EMS stipulate the existence of 1 specialist team for every 10 basic teams.

The current landscape is changing, with a noticeable decrease in ambulances with on-board physicians. This trend implies an increasing need for emergency medical responders to take proactive measures and decisions, especially in rare but perilous situations such as assisting a pregnant patient or performing neonatal resuscitation. Such transformation underscores medical professionals' need to be well-prepared to handle critical scenarios. It is crucial to reference established guidelines, such as those outlined by the European Resuscitation Council (ERC), to ensure the highest standards of care.[6,7]

Numerous scientific studies underscore the pivotal role of pre-hospital care as one of the pillars of care in managing emergencies. Proper optimization, thorough staff preparation and prompt transportation consistently and substantially influence the patient's subsequent outcomes.[8]

An important point is that pregnant women and childbirth represent a small percentage of all realized calls for emergency medical teams. In the period during which the calls were analyzed (2018–2022), 41,335 calls involved assisting a pregnant woman. According to data from the Statistics Poland, the EMS realized a total of 15,139,193 notifications during this period, with calls related to pregnancies accounting for only 0.273% of the total. Therefore, we can assume that working with pregnant women is rare for members of the emergency medical teams, which makes it challenging for them to maintain proper standards of care and current medical knowledge.

Objectives

The study aimed to determine the rate of births attended by EMS teams in Poland, identify the procedures performed by them, compare the procedures performed based on the presence of a physician in the team, and assess newborn condition following delivery by the EMS team.

Materials and methods

Study design

We conducted a cross-sectional study using data from the NMC-EMS from 2018–2022, encompassing all interventions conducted by EMS within the country. As no specific diagnostic code reliably identified OOH deliveries, we employed multiple search strategies to identify OOH deliveries that EMS took, defined as the 2nd stage of labor.

Before commencing the study, ethical approval was obtained from the Bioethics Committee of Wroclaw Medical University, Poland (approval No. KB-975/2022).

Participants

In the International Classification of Diseases, 10th Revision (ICD-10), the range designated by codes O30 to O92 encompasses categories related to pregnancy, childbirth and puerperium complications. Specifically, O30–O48 addresses complications associated with pregnancy and fetal development, O60–O77 pertains to issues related to childbirth, O80–O84 involves complications during the puerperium, and O85–O92 focuses on complications related to maternal healthcare.

Variables

The original database was filtered within the range of ICD-10 codes from O30 to O92 to isolate those involving pregnant women, amounting to 41,335 cases. Subsequently, 2 independent researchers conducted a manual search within the descriptions of interventions prepared by emergency medical teams. The focus of the search was to gather information about direct EMS involvement during childbirth. The 2nd stage of labor, involving the actual birth of the newborn, was defined as the focal point of the analysis.

Relying on the descriptions provided by the EMS, we identified 879 cases of interventions involving childbirth. Instances in which the delivery occurred in a gynecological emergency room in the presence of a physician or midwife were excluded from the analysis. Adhering to the definition outlined by the World Health Organization (WHO), individuals who experienced labor after the 22nd week of pregnancy were considered to have given birth.

Statistical analyses

The relationships between qualitative variables were analyzed using Pearson's χ^2 independence test followed by Bonferroni correction to reduce the chances of obtaining false positive results (type I errors). The Kolmogorov–Smirnov (K–S) test was used to verify the normal distribution of the participant's age (K–S test: $D = 0.053$, $n = 818$; $p < 0.001$). A significance level of $p < 0.05$ was adopted to indicate the presence of statistically significant relationships or differences. Statistical analysis employed IBM SPSS v. 26 software (IBM Corp., Armonk, USA).

Results

The survey encompassed 879 interventions by EMS teams for pregnant patients. The median patient age was 30 years (1st quartile (Q1) = 25 and 3rd quartile (Q3) = 34), with the youngest being 15 and the oldest 45. Most patients were in their 2nd pregnancy (249, 28.33%), and 227 (25.82%) were experiencing their 2nd childbirth. Unfortunately, some reports from EMS teams were incomplete, leading to missing information about the specific pregnancy and childbirth in 138 cases (15.70%) and 268 cases (30.49%), respectively. Additionally, in 403 cases (45.85%), emergency medical teams omitted information about the week of pregnancy.

The cases considered included 360 instances of full-term pregnancy (after 37 weeks of pregnancy) (40.96%) and 116 cases (13.20%) involving premature deliveries (before 37 weeks of pregnancy). In the remaining cases, there was no information about the week of pregnancy (403, 45.85%). The postnatal condition of the newborn, assessed using the Apgar score, was evaluated in 471 cases. Among these, 428 (48.69%) were rated as having a good condition (8–10 points), 23 (2.62%) an average condition (4–7 points) and 20 (2.28%) a poor condition (0–3 points).

Table 1. Characteristics of the study population

Variable		Value
Age [years] median (Q1–Q3)		30 (25–34)
Number of pregnancies n (%)	1st	51 (5.80)
	2nd	249 (28.33)
	3rd	193 (21.96)
	4th	124 (14.11)
	5th or more	124 (14.11)
	no data	138 (15.70)
Number of labors n (%)	1st	52 (5.92)
	2nd	227 (25.82)
	3rd	158 (17.97)
	4th	96 (10.92)
	5th or more	78 (8.88)
	no data	268 (30.49)
Duration of pregnancy n (%)	preterm pregnancy	116 (13.20)
	term pregnancy	360 (40.96)
	no data	403 (45.85)
Apgar score n (%)	8–10 points	428 (48.69)
	4–7 points	23 (2.62)
	0–3 points	20 (2.28)
	no data	408 (46.42)

Q1 – 1st quartile; Q3 – 3rd quartile.

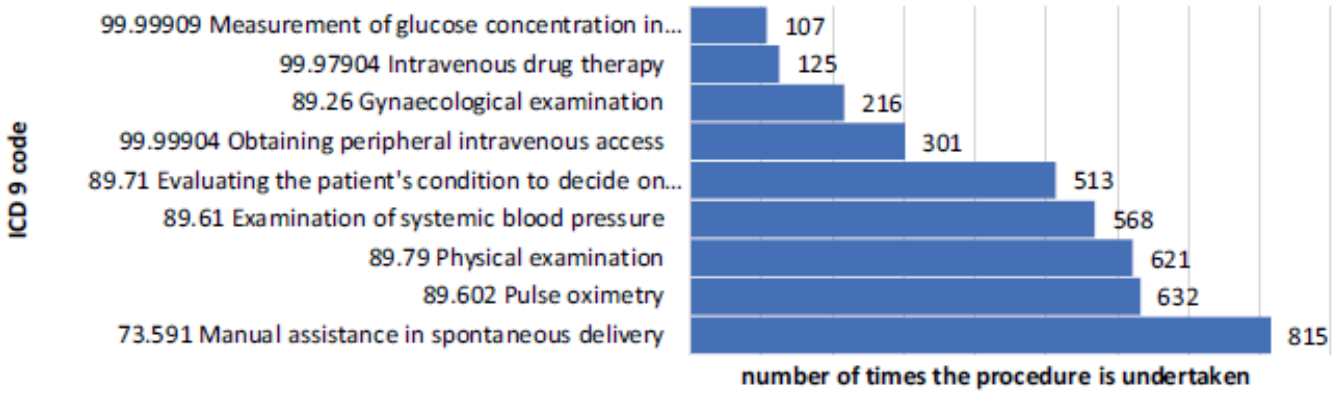

Fig. 1. Emergency medical procedures performed by Emergency Medical Services (EMS) teams attending a birthing patient

Table 2. Emergency Medical Services (EMS) group characteristics and intervention time

EMS team type, n (%)		Value, n (%)
Basic		612 (69.62)
Specialist		267 (30.38)
Intervention time, n (%)	6 AM–2 PM	273 (31.06)
	2 PM–10 PM	228 (25.94)
	10 PM–6 AM	378 (43.00)

However, in 408 cases (46.42%), no information was available regarding the Apgar score. Further details are presented in Table 1.

Most deliveries attended by emergency medical teams occurred under the care of P-type (basic) teams (612, 69.62%), with specialist teams handling deliveries in only 267 (30.38%) cases. The majority of deliveries occurred between 10 PM and 6 AM, totaling 378 (43.00%), followed by 273 (31.06%) interventions between 6 AM and 2 PM, and 228 (25.94%) between 2 PM and 10 PM (the data are presented in Table 2).

The medical procedures most frequently performed during the care of women giving birth included manual assistance in spontaneous delivery (815 cases, 92.72%), pulse oximetry (632 cases, 71.90%), physical examination (621 cases, 70.65%), examination of systemic blood pressure (568 cases, 64.62%), obtaining peripheral intravenous access (301 cases, 34.24%), and gynecological examination (216 cases, 24.57%). Detailed data are presented in Fig. 1. Emergency medical teams included oxytocin administration during labor in their reports in only 9 cases. However, there were no detailed descriptions of the reasons and purposes of its administration.

Table 3 contrasts the activities conducted based on the type of medical team, i.e., basic compared to specialized. Medical procedures, including physical examination, blood pressure measurements and pulse oximetry, were undertaken more frequently by primary emergency medical teams ($p < 0.05$). There were no significant differences in the frequency of gynecological examination, obtaining peripheral intravenous access and measurement of glucose concentration in arterialized capillary blood. However, it is worth emphasizing that these examinations were conducted less frequently than those mentioned above, being undertaken in 1 in 3 women at most.

Table 3. Comparison of the frequencies of procedures conducted by EMS P-type and EMS S-type medical team

Procedures conducted by EMS		EMS P-type	EMS S-type	χ^2 p-value*
Pulse oximetry, n (%)	yes	487 (79.58)	152 (56.93)	48.03
	no	125 (20.42)	115 (43.07)	<0.001
Physical examination, n (%)	yes	463 (75.65)	165 (61.80)	17.49
	no	149 (24.35)	102 (38.20)	<0.001
Examination of systemic blood pressure, n (%)	yes	439 (71.73)	136 (50.94)	46.73
	no	173 (28.27)	131 (49.06)	<0.001
Gynecological examination, n (%)	yes	157 (25.65)	59 (22.10)	1.27
	no	455 (74.35)	208 (77.90)	1.000
Obtaining peripheral intravenous access, n (%)	yes	228 (37.25)	76 (28.46)	6.35
	no	384 (62.75)	191 (71.54)	0.072
Measurement of glucose concentration in arterialized capillary blood, n (%)	yes	89 (14.54)	22 (8.24)	6.69
	no	523 (85.46)	245 (91.76)	0.060

χ^2 – χ^2 statistic value, degrees of freedom for all comparisons = 1; p-value considers the Bonferroni correction for multiple comparisons; EMS – Emergency Medical Services; P-type – basic team; S-type – specialized team.

Discussion

The current study illustrates the clinical support extended by EMS teams to women delivering OOH, shedding light on the most prevalent medical procedures and the postnatal condition of newborns. To the authors' knowledge, no prior studies in Poland, except for one describing the actual rate of deliveries attended by EMS, explored this aspect.[9]

The choice of birthplace is a subject of ongoing discussion among various organizations and associations in many countries, as is defining the necessary conditions and criteria for qualifying pregnant individuals for a planned home or hospital birth. The Polish Society of Gynecologists and Obstetricians (Polskie Towarzystwo Ginekologów i Położników (PTGiP)) has not formulated a clear position on home births.[10]

Hospital-based maternity care is frequently criticized for its medicalization of childbirth, and patients opting for community birth often intend to avoid, in their opinion, unnecessary interventions such as cardiotocography, episiotomy and epidural anesthesia. They consider an OOH birth to be safer than a hospital birth.[11]

The American College of Obstetricians and Gynaecologists (ACOG) recognizes that "many common obstetric practices are of limited or uncertain benefit for low-risk women in spontaneous labor."[12] However, it is important to note that childbirth is unpredictable and may sometimes occur in an unplanned setting, in which case medical assistance from EMS personnel may be required.[13,14]

Our study highlights deficiencies in the medical documentation maintained by emergency medical teams. It is crucial to underscore that deliveries are exceptional situations that do not occur daily, making them the most stressful emergency for EMS providers.[15] Therefore, it is understandable that documentation gaps may arise due to significant effort, exhaustion and lack of experience. However, the authors advocate for creating a dedicated card for OOH deliveries to enhance monitoring analysis and improve staff performance, ensuring comprehensive and appropriate information collection. Documentation deficiencies have also been acknowledged in other countries, indicating that the issue can also be expected in Poland.[13,16]

The additional documentation should be an integral part of the Command Support System for Polish EMS, in which the EMS team leader maintains each patient's medical records. The system should automatically run additional options for the assessment of a pregnant woman and possibly a newborn baby whenever a pregnant woman is assisted. Such a solution would not only guide the members of the EMS on the correct procedures but also provide better opportunities to monitor the quality of care.

Considering the declining birth rates in Poland and the consequent decrease in the number of gynecological and maternity hospitals, there is a significant likelihood that medical care will encounter new challenges. Many studies suggest a correlation between prolonged travel time for OOH births and an increased risk of neonatal mortality.[17,18] In light of the above, emergency medical team interventions could increase despite the declining number of deliveries. This would entail heightened expectations and encountering progressively complex clinical scenarios. It appears essential to proactively prepare to prevent dramatic situations in the future.

Mothers exhibiting abnormal vital signs during the intrapartum period may be experiencing conditions that pose potential complications for both the birthing process and the newborn's wellbeing.[19] Paramedics may overlook these conditions unless they are familiar with typical maternal vital signs during pregnancy and understand the physiological changes that occur in the mother. For example, hypertensive disorders are linked to elevated maternal and fetal morbidity and mortality levels.[20] Increased blood pressure during labor can contribute to placental insufficiency and fetal hypoxia.[21] Additionally, it has been demonstrated to elevate the incidence of postpartum preeclampsia.[22] Due to the above, it is essential not to forget basic activities such as measuring blood pressure, even in non-standard situations involving emergency medical teams.

In their 2021 study, Schultz et al. underscored the pivotal role of active management in the 3rd stage of labor, particularly the immediate administration of oxytocin postpartum.[23] Given the potential life-threatening implications of primary postpartum hemorrhage (PPH) for the mother, this practice is a standard preventive measure against it in many Polish hospitals. Analyzing Queensland Ambulance Service data, Schultz et al. reported a robust 63.4% administration rate of oxytocin postpartum. Contrastingly, our research, derived from the available data, indicates a notably lower frequency of oxytocin administration, with only 9 mission descriptions of its use. The reasons for the infrequent use of oxytocin by emergency medical services are not apparent from the mission descriptions alone.

Nevertheless, aligning with WHO guidelines and the recommendations of various scientific societies, e.g., the Royal College of Obstetricians and Gynecologists, it is prudent to consider oxytocin administration in every woman giving birth without risk factors.[24,25] In cases where the administration is declined, this refusal should be fully documented in adherence to best practices and WHO recommendations. Further investigation into the factors influencing the variance in oxytocin administration rate is warranted to ensure the optimal application of preventive measures for PPH in emergency obstetric care.

The Polish Ministry of Health regulations define EMS activities performed autonomously by a paramedic in a type P-team, and the medications listed therein to be administered by the paramedic do not include oxytocin – therefore, the paramedic can only administer it on a physician's orders.[26] The Polish National Health Service's guidelines for the minimum equipment of a P-team do not specify what medications the P-team should be equipped

with. As a result, dispatchers do not equip the EMS teams with oxytocin. Therefore, it is worth considering expanding the table of pharmacological agents administered by the paramedic autonomously, which will give the possibility of introducing it to the EMS. It can be considered that the introduction of its administration is similar to drugs such as clopidogrel and ticagrelor, which are administered after consultation with the physician on duty at the facility to which the patient is transported.

An essential aspect of our study was the exploration of rarely addressed, real challenges encountered by EMS teams involved in delivering babies in Poland. Further research appears imperative to enhance education and support for emergency medical teams, ultimately ensuring the highest level of safety for both the delivering patient and her newborn. The authors believe a discourse on developing a new card tailored for EMS teams during visits to pregnant women is necessary to ensure the comprehensive inclusion of essential data. Our working group is poised to submit its proposal for these changes to decision-makers shortly.

Paramedics in emergency medical teams proceed mainly based on guidelines from recognized organizations such as the ERC. Therefore, instead of the Apgar scale, one could consider introducing a simplified assessment following the Newborn Life Support (NLS) guidelines for the resuscitation of a newborn based on the evaluation of 4 parameters: skin color, muscle tone, respiratory rate, and heart rate.[7] The compatibility of such an assessment with current guidelines will provide consistency in the algorithm and completed documentation.

Within medical records, it is worth considering introducing a separate section for evaluating the newborn and the procedures performed, activated when the field "childbirth" is marked in the existing documentation. The study showed that intravenous access was performed in 301 cases. However, the design of the current documentation does not allow for an unambiguous statement of whether the access was performed on the woman giving birth or the child. There is no clear place in the current documentation to record whether the child had an assessed level of saturation, required oxygen support or lung ventilation, given that the teams assessed 23 cases (2.62%) as medium (3–7 points) and 19 cases (2.16 %) as poor (0–2 points).

Considering some specific aspersions of the assessment and management of a woman in labor, it is worth considering the development of "Good Practices for the Management of a Woman in Labor," employing the necessary elements of assessment, management and documentation in such cases. Similar documents already exist, approved and published by the Polish Ministry of Health, including "Good Practices for the Conduct of Medical Dispatchers, Emergency Medical Teams and Emergency Department to a Patient with Hemophilia or Related Hemorrhagic Diathesis" and "Good Practices for the Management of a Patient with Suspected Stroke."[27]

Limitations

Despite the valuable insights gained from this study, several limitations merit consideration. The retrospective nature of the study is one of the most significant limitations. The reliance on EMS team reports, some of which needed to be completed, poses a challenge in constructing a comprehensive understanding of each obstetric intervention. Additionally, we are concerned that some paramedics may misunderstand the ICD-9 procedures associated with childbirth and birth assistance. Missing Apgar scores further limit the depth of the analysis and hinder a comprehensive assessment of neonatal outcomes.

The study's focus on EMS team reports might only capture some clinical context, potentially leading to underestimating or misrepresenting certain variables, though the focus on basic and specialized EMS teams offers valuable insights into their distinct roles. However, the specific criteria determining the assignment of teams to cases were not explored. This lack of clarity limits the depth of understanding regarding the decision-making process for team allocation. Despite these limitations, this study constitutes a foundational exploration of the challenges and complexities associated with emergency obstetric care. A noteworthy strength of this work is the meticulous manual examination of all descriptions of medical interventions, a process that demanded a considerable investment of time and thorough analytical scrutiny.

Conclusions

Childbirth is inherently unpredictable and can take place in unplanned pre-hospital settings, posing a significant risk of requiring the intervention of emergency medical teams. This is particularly important considering the decreasing number of deliveries and gynecological wards, and the distance from the patient's home to the nearest hospital. According to our study, significantly more medical procedures were conducted by teams lacking a doctor. The challenges posed by unique situations for emergency medical teams, such as childbirth, contribute to a need for sufficient diligence in maintaining documentation. Developing new forms for EMS teams to enhance documentation quality is crucial. Further research is warranted to enhance our understanding of the factors influencing emergency obstetric outcomes and to guide the development of targeted interventions for pregnant patients in emergency settings.

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VII. Podsumowanie i wnioski

Niniejsza rozprawa doktorska przedstawia częstość występowania porodów pozaszpitalnych w Polsce oraz medyczne czynności ratunkowe, które są wykonywane przez zespoły ratownictwa medycznego udzielające pomocy w tych przypadkach.

W załączonej pracy poglądowej opisana jest częstość tego zjawiska w zależności od miejsca występowania. Przedstawiony jest również rys historyczny i sposób w jaki częstość porodów pozaszpitalnych zmieniała się na przestrzeni ostatnich dziesięcioleci. Celem pracy poglądowej było zebranie najnowszej literatury opisującej problematykę porodów pozaszpitalnych. Dane literaturowe wskazują, że porody pozaszpitalne jednoznacznie są związane ze zwiększoną umieralnością noworodków w porównaniu z porodami w szpitalu. Matki które rodzą poza szpitalem wedle wielu badań charakteryzują się młodym wiekiem i niższym wykształceniem. Wykazano również, że kobiety, które rodzą w warunkach pozaszpitalnych, mają zwiększone ryzyko krwotoku poporodowego, będącego główną przyczyną śmierci matek w bezpośrednim okresie poporodowym.

Celem pierwszej pracy oryginalnej było określenie głównych czynników determinujących wybór miejsca porodu. Wykazałem, że najczęstszymi czynnikami, które wpływały na wybór miejsca porodu przez rodzącą były: możliwość obecności partnera przy porodzie, dobre warunki sanitarne, stosunkowo niewielki dystans do szpitala, opinia innych pacjentek na temat miejsca porodu.

Celem drugiej pracy oryginalnej była ocena częstości interwencji zespołów ratownictwa medycznego w planowanych porodach domowych w Polsce oraz analiza charakterystyki pacjentek wymagających pomocy przez zespoły ratownictwa medycznego. Wykazałem, że większość interwencji zespołów ratownictwa medycznego w przypadku porodów domowych nie ma skomplikowanego przebiegu. Zdarzają się jednak sytuacje dramatyczne stawiające zespół ratownictwa medycznego przed ogromnym wyzwaniem.

Celem trzeciej pracy oryginalnej była ocena częstości porodów przyjmowanych przez zespoły ratownictwa medycznego w Polsce, wskazanie najczęściej wykonywanych procedur oraz ocena stanu noworodka po porodzie. Wykazałem liczne braki w dokumentacji medycznej, co świadczyć może o konieczności wprowadzenia nowego formularza, w którym nie będzie możliwości ominięcia niezbędnych informacji okołoporodowych tj. ocena stanu noworodka,

informacja o liczbie ciąż, czy tygodniu ciąży. Na podstawie trzeciej pracy opracowałem propozycję zmian w formularzu i przesłałem ją do Krajowego Centrum Monitorowania Ratownictwa Medycznego. Wykazałem również, że istotnym i częstym problemem jest również prawidłowe wpisywanie do dokumentacji właściwych kodów procedur specjalistycznych jak np. 73.531 – pomoc ręczna przy porodzie spontanicznym, zarezerwowana do porodu miednicowego.

Wnioski:

1. Zespoły ratownictwa medycznego stanowią integralną część systemu opieki nad pacjentką rodzącą i sprawują opiekę często w niezwykle wymagających i trudnych sytuacjach położniczych.
2. Analiza dokumentacji medycznej zespołów ratownictwa medycznego ujawniła liczne braki, które mogą być związane z niedostateczną kontrolą nad procesem porodu i opieki nad noworodkiem. Wprowadzenie nowego formularza oraz zmian w systemie dokumentacji elektronicznej może przyczynić się do poprawy jakości opieki okołoporodowej.
3. Lista leków, które ratownicy medyczni mogą podawać w ramach medycznych czynności ratunkowych bez konsultacji z lekarzem powinna zostać poszerzona o oksytocynę, która zgodnie z zaleceniami WHO powinna być zastosowana u każdej pacjentce po porodzie jako profilaktyka przeciwkrwotoczna.
4. Ze względu na spadek liczby urodzeń w Polsce i prawdopodobny wzrost porodów pozaszpitalnych w najbliższym czasie konieczne jest ciągłe monitorowanie i dostosowanie systemu opieki zdrowotnej do nadchodzących zmian.
5. Czynnikami determinującymi wybór miejsca porodu w Polsce to obecność partnera, warunki sanitarne, dystans do szpitala oraz opinie innych pacjentek.
6. Kobiety rodzące poza szpitalem częściej doświadczają powikłań, co prowadzi do zwiększonego ryzyka dla zdrowia matek i noworodków. W związku z tym istotne jest zapewnienie odpowiedniej dostępności interwencji medycznych, w tym realizowanych przez zespoły ratownictwa medycznego.
7. Interwencje w nagłych zagrożeniach w przypadku porodów domowych mogą stanowić istotne wyzwanie dla zespołów ratownictwa medycznego, zwłaszcza w sytuacjach krytycznych. Konieczne jest zapewnienie odpowiedniego szkolenia personelu i

wyposażenia zespołów ratownictwa medycznego, aby mogły skutecznie reagować na różnorodne sytuacje związane z powikłaniami ciąży i porodu.

VIII. Oświadczenia współautorów

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OŚWIADCZENIE WSPÓŁAUTORA

Oświadczam, że w pracy

Strózik Mateusz, Wiciak Hanna, Szarpak Lukasz, Wróblewski Paweł, Smereka Jacek: EMS interventions during planned out-of-hospital births with a midwife: a retrospective analysis over four years in the Polish population, Journal of Clinical Medicine, 2023, vol. 12, nr 24, art.7719 [10 s.], DOI:10.3390/jcm12247719

mój udział polegał na współpracy przy tworzeniu koncepcji i metodologii, pozyskiwaniu danych i finansowania oraz pisaniu i edycji artykułu.

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OŚWIADCZENIE WSPÓŁAUTORA

Oświadczam, że w pracy

Strózik Mateusz, Smereka Jacek, Pomorski Michał Marcin: Birth before arrival - is there anything to be afraid of?, Ginekologia Polska, 2022, vol. 93, nr 9, s. 761-764, DOI:10.5603/gp.a2022.0049

mój udział polegał na współpracy przy tworzeniu koncepcji i metodologii, pozyskiwaniu danych, pisaniu i edycji artykułu.

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OŚWIADCZENIE WSPÓŁAUTORA

Oświadczam, że w pracy

Strózik M, Wiciak H, Raczyński A, Smereka J. Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis [published online as ahead of print on March 20, 2024]. Adv Clin Exp Med. 2025. doi:10.17219/acem/184141

mój udział polegał na współpracy przy tworzeniu koncepcji i metodologii, pozyskiwaniu danych, analizie i interpretacji wyników pracy, pisaniu i edycji artykułu.

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OŚWIADCZENIE WSPÓŁAUTORA

Oświadczam, że w pracy

Strózik Mateusz, Szarpak Łukasz, Adam Ishag, Smereka Jacek Robert: Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women, Medicina, 2022, vol. 58, nr 6, art.831 [10 s.], DOI:10.3390/medicina58060831

mój udział polegał na współpracy przy tworzeniu koncepcji i metodologii, pozyskiwaniu danych i finansowania oraz pisaniu i edycji artykułu.

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Wrocław, 18.12.2023

Oświadczenie

Oświadczam, że w pracy:

Strózik, M.; Wiciak, H.; Szarpak, L.; Wroblewski, P.; Smereka, J. EMS Interventions during Planned Out-of-Hospital Births with a Midwife: A Retrospective Analysis over Four Years in the Polish Population. J. Clin. Med. 2023, 12, 7719. https://doi.org/10.3390/jcm12247719

mój udział polegał na uczestniczenie w stworzeniu ostatecznej wersji manuskryptu, jego recenzji i edycji oraz krytycznej ocenie pracy.

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Wrocław, 18.12.2023

Oświadczenie

Oświadczam, że w pracy:

Strózik M, Szarpak L, Adam I, Smereka J. Determinants of Place of Delivery during the COVID-19 Pandemic-Internet Survey in Polish Pregnant Women. Medicina (Kaunas). 2022 Jun 20;58(6):831. doi: 10.3390/medicina58060831

mój udział polegał na stworzeniu koncepcji pracy, nadzorze nad prowadzoną pracą, stworzeniu ostatecznej wersji manuskryptu, jego recenzji i edycji

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Wrocław, 18.12.2023

Oświadczenie

Oświadczam, że w pracy:

Strózik Mateusz, Smereka Jacek, Pomorski Michał Marcin: Birth before arrival - is there anything to be afraid of? Ginekologia Polska, 2022, vol. 93, nr 9, s. 761-764, DOI:10.5603/gp.a2022.0049

mój udział polegał na nadzorze nad prowadzoną pracą, uczestniczenie w tworzeniu ostatecznej wersji manuskryptu, jego recenzji i edycji.

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Wrocław, 22.03.2024

Oświadczenie

Oświadczam, że w pracy:

Strózik M, Wiciak H, Raczyński A, Smereka J. Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis [published online as ahead of print on March 20, 2024]. Adv Clin Exp Med. 2025. doi:10.17219/acem/184141

mój udział polegał na nadzorze nad prowadzoną pracą, uczestniczenie w tworzeniu ostatecznej wersji manuskryptu, jego recenzji i edycji

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OŚWIADCZENIE

Oświadczam, że w pracy

Strózik M, Szarpak L, Adam I, Smereka J. Determinants of Place of Delivery during the COVID-19 Pandemic-Internet Survey in Polish Pregnant Women. Medicina (Kaunas). 2022 Jun 20;58(6):831. doi: 10.3390/medicina58060831

mój udział polegał na uczestniczenie w tworzeniu ostatecznej wersji manuskryptu, jego recenzji i edycji.

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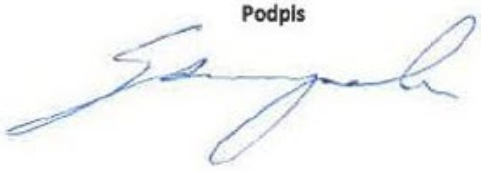
OŚWIADCZENIE

Oświadczam, że w pracy
Strózik, M.; Wiciak, H.; Szarpak, L.; Wroblewski, P.; Smereka, J. EMS Interventions during Planned Out-of-Hospital Births with a Midwife: A Retrospective Analysis over Four Years in the Polish Population. J. Clin. Med. 2023, 12, 7719. https://doi.org/10.3390/jcm12247719

mój udział polegał na uczestniczenie w stworzeniu ostatecznej wersji manuskryptu, jego recenzji i edycji.

Podpis



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OŚWIADCZENIE

Oświadczam, że w pracy

Strózik Mateusz, Smereka Jacek, Pomorski Michał Marcin: Birth before arrival - is there anything to be afraid of?, Ginekologia Polska, 2022, vol. 93, nr 9, s. 761-764, DOI:10.5603/gp.a2022.0049

mój udział polegał na nadzorze merytorycznym, krytycznej ocenie i korekcie manuskryptu.

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OŚWIADCZENIE

Oświadczam, że w pracy

Strózik M, Wiciak H, Raczyński A, Smereka J. Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis [published online as ahead of print on March 20, 2024]. Adv Clin Exp Med. 2025. doi:10.17219/acem/184141

mój udział polegał na pisaniu artykułu oraz jego ostatecznej akceptacji.

Podpis

Unaizah, 03.11.2023

Prof. Ishag Adam
Department of Obstetrics and Gynecology
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Declaration

I hereby declare that in the paper titled "*Determinants of place of delivery during the COVID-19 pandemic - internet survey in Polish pregnant women*," authored by Mateusz Stróżik, Łukasz Szarpak, Adam Ishag, and Jacek Robert Smereka, published in Medicina in 2022, volume 58, number 6, article 831 [10 pages], DOI: 10.3390/medicina58060831, my contribution involved the analysis and interpretation of the research results, as well as a critical evaluation of the article.

I agree that this article will be part of the doctoral dissertation of Mateusz Strozik, MD

Signature

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Podpisano przez:

Jacek Robert
Smereka

Date / Data:
2024-03-28 13:09

Wrocław, 28.12.2023

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we Wrocławiu

OŚWIADCZENIE

Oświadczam, że w pracy
Strózik, M.; Wiciak, H.; Szarpak, L.; Wroblewski, P.; Smereka, J. EMS Interventions during Planned Out-of-Hospital Births with a Midwife: A Retrospective Analysis over Four Years in the Polish Population. J. Clin. Med. 2023, 12, 7719. https://doi.org/10.3390/jcm12247719

mój udział polegał na krytycznej ocenie i korekcie manuskryptu.

Podpis

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2024-03-28 13:11

Wrocław, 21.03.2024

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I Katedra i Klinika Ginekologii i Położnictwa
Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu
50-367 Wrocław

OŚWIADCZENIE WSPÓŁAUTORA

Oświadczam, że w pracy

Strózik M, Wiciak H, Raczyński A, Smereka J. Emergency medical team interventions in Poland during out-of-hospital deliveries: A retrospective analysis [published online as ahead of print on March 20, 2024]. Adv Clin Exp Med. 2025. doi:10.17219/acem/184141

mój udział polegał na pozyskiwaniu danych, analizie i interpretacji wyników pracy, pisaniu i edycji artykułu.

Podpis

Hanna Wiciak

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Uniwersytet Medyczny im. Piastów Śląskich we Wrocławiu
50-367 Wrocław

OŚWIADCZENIE WSPÓŁAUTORA

Oświadczam, że w pracy

Strózik, M.; Wiciak, H.; Szarpak, L.; Wroblewski, P.; Smereka, J. EMS Interventions during Planned Out-of-Hospital Births with a Midwife: A Retrospective Analysis over Four Years in the Polish Population. J. Clin. Med. 2023, 12, 7719. https://doi.org/10.3390/jcm12247719

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Podpis

Hanna Wiciak

Signed by / Podpisano przez:
Jacek Robert Smereka
Date / Data:
2024-03-28 13:08

IX. Załącznik

Propozycja zmian w karcie Medycznych Czynności Ratunkowych

KARTA POŁOŻNICZA WRAZ Z OCENĄ STANU DZIECKA

Dane pacjentki - Zgodnie z kartą Medycznych Czynności Ratunkowych

Wywiad ratowniczy oraz ogólna ocena stanu pacjentki - Zgodnie z kartą Medycznych Czynności Ratunkowych

Dodatkowe elementy, które mogą być umieszczone w przypadku pacjentki ciężarnej/porodu i/lub opieki nad noworodkiem

Wywiad położniczy:

Data ostatniej miesiączki:	□□- □□- □□□□
Ciąża (która):	
Tydzień ciąży:	
Poród (który):	
Problemy zdrowotne związane z obecną ciążą	
Poprzednie ciąże i porody – przebieg, droga porodu	

- Poród dnia □□- □□- □□□□ o godzinie □□:□□
- Odpępnienie □□- □□- □□□□ o godzinie □□:□□
- Popłód (urodzenie łożyska) □□- □□- □□□□ o godzinie □□:□□
- Stan matki bezpośrednio po urodzeniu dziecka (stan ogólny, przytomność, częstość oddechów, ciśnienie tętnicze, częstość akcji serca, SpO_2) ……
- Szacowana utrata krwi…….. ml

Czas trwania (od godz. - do godz.)

- I okresu porodu (od rozpoczęcia czynności skurczowej do pełnego rozwarcia)
  □□:□□ - □□:□□
- II okresu (od pełnego rozwarcia od urodzenia dziecka)
  □□:□□ - □□:□□
- III okresu (od urodzenia dziecka do urodzenia popłodu)
  □□:□□ - □□:□□

STAN NOWORODKA PO URODZENIU

Dziecko urodzone:

A) ŻYWO (ilość) :
- Punktacja APGAR:

Ocena w minucie życia	Punktacja APGAR (zaznaczyć)
…… min Optymalnie po 1 min	0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
…… min Optymalnie po 3 min	0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
…… min Optymalnie po 5 min	0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
…… min Optymalnie po 10 min	0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Przy przekazaniu do szpitala	0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10

	0 punktów	**1 punkt**	**2 punkty**
Kolor skóry	sinica całego ciała	tułów różowy, sinica części dystalnych kończyn	całe ciało różowe
Puls na minutę	niewyczuwalny	<100	>100
Reakcja na bodźce np. drażnienie strony podeszwowej stóp	brak brak	grymas twarzy słabe poruszanie	kaszel lub kichanie płacz
Napięcie mięśni	brak napięcia, wiotkość ogólna	napięcie obniżone, zgięte kończyny	napięcie prawidłowe, samodzielne ruchy
Oddychanie	brak oddechu	wolny i nieregularny	głośny płacz

B) MARTWO (ilość):
- Szacunkowa data wewnątrzmacicznego obumarcia płodu: DD/MM/RR
- Stopień maceracji płodu:
  - I stopnia: skóra płodu barwy szarobiałej, pępowina podbarwiona zielonkawo
  - II stopnia: skóra płodu z pęcherzami, które powodują jej oddzielanie się
  - III stopnia: skóra płodu o zabarwieniu brudnobrązowym, płód skurczony, skóra i stawy bez napięcia, czaszka zapadnięta