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Postpartum readmissions and emergency department care following vaginal delivery in an Italian region

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ABSTRACT

The objective of this study was to estimate hospital readmission and Emergency Department visit rates in puerperium among women discharged from the Italian Hospital of Udine after vaginal delivery. Administrative health databases of the Hospital were used as source of information. Readmissions or visits occurring within 42 days from deliveries recorded from 2000 to 2018 were analysed. Vaginal deliveries were 20756, postpartum readmissions 99 (0.48%) and ED visits 292 (1.41%). Readmissions occurred after a median time of 9 days from discharge, with median length of stay of 4 days. Postpartum ED visits occurred after a median of 15 days; 12.7% were yellow triage tags and 0.7% were red tags. Causes of readmissions and visits did not include only the specific complications of pregnancy, childbirth and puerperium; they differed in case of readmission or visit. Thus, readmissions only depict part of the postpartum hospital care needs of women after vaginal deliveries.

SOMMARIO

L'obiettivo di questo studio era di stimare i tassi di riammissione ospedaliera e di visita nel puerperio al Pronto Soccorso tra le donne dimesse dall'Ospedale Italiano di Udine dopo il parto vaginale. Come fonte di informazioni sono state utilizzate le banche dati sanitarie amministrative dell'Ospedale. Sono state analizzate le riammissioni o le avvenute visite entro 42 giorni dai parti registrati dal 2000 al 2018. I parti vaginali sono stati 20756, le riammissioni postpartum 99 (0,48%) e le visite al pronto soccorso 292 (1,41%). Le riammissioni sono avvenute dopo un tempo mediano di 9 giorni dalla dimissione, con una permanenza media di 4 giorni. Le visite postpartum al pronto soccorso si sono verificate dopo una media di 15 giorni; il 12,7% erano codici triage gialli e lo 0,7% erano codici triage rossi. Le cause delle riammissioni e delle visite non includevano solo le complicanze specifiche della gravidanza, del parto e del puerperio, differivano in caso di riammissione o visita. Pertanto, le riammissioni rappresentano solo una parte delle esigenze di assistenza ospedaliera postpartum delle donne dopo il parto vaginale.

IMPACT STATEMENT

What is already known on this subject?
Postpartum readmissions and Emergency Department treatment of urgent complications affect in particular women who had a caesarean section, however this issue also affects women after vaginal delivery.

What the results of this study add?
Almost 2% of women with a vaginal delivery at the University Hospital of Udine seek hospital care during puerperium: one fourth of them are readmitted whereas the majority is visited at the Emergency Department.

What the implications are of these findings for clinical practice and/or further research?
Problems requiring hospital care are not necessarily the same of patients only visited at the Emergency Department and thus require different solutions.

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Key words
Puerperium; hospital readmission; Emergency Department; administrative database; Italy.

INTRODUCTION

Great attention is given to hospital readmissions as a phenomenon related to quality and cost of health care. In Italy, they are monitored across different health conditions, including stroke, chronic obstructive pulmonary disease, joint replacement surgery, heart failure, and deliveries, within the national program of outcome evaluation Programma Nazionale Esiti (PNE) (1) which is run by the National Agency for the Regional Health Services Agenas through the analysis of a common set of variables included in hospital discharge data from all the Italian Regions. According to PNE, hospital readmissions during puerperium ranged between 0.7 and 0.9 per 100 after Caesarean delivery, and between 0.5 and 0.6 per 100 after natural delivery in Italian hospitals from 2009 to 2016 (1) with enormous variability across Regions and even hospitals, despite the indicators were risk adjusted to take into account the potentially confounding effect of the inhomogeneous distribution of maternal characteristics as recorded in the hospital discharge database. Little is known about the effect of other factors not recorded in such database. In addition, reasons for readmission have not been investigated.

In the United States, a study analysing deliveries in various States and including caesarean deliveries and multiple gestations, found that readmission rate raised from 1.72% in 2004 to 2.16% in 2011; more than half readmissions occurred within the first 10 days and the most common indications for readmission were hypertensive disorders. post-delivery infections, psychiatric diseases, and gallbladder disorders. The study identified predictors of postpartum readmissions, including income, maternal comorbidities, hospital characteristics, and pregnancy characteristics (*e.g.* caesarean delivery and multiple gestation) (2). However, despite the raising frequency of caesarean delivery, and the increased risk of readmissions in case of caesarean or operative vaginal delivery (3), the increasing readmission rate in the United States appeared to be related more to maternal comorbidities than to mode of delivery (4). Other studies conducted all over the world confirmed higher readmission rate following caesarean deliveries than vaginal deliveries (5-8).

Hospital readmissions, however, are not the only type of hospital care for women in their postpartum. In fact, many urgent complications not resulting in a new hospitalization may be treated at the Emergency Department. In a Californian study, for example, ED visits within 90 days of delivery were analyzed: approximately 8% of women used the ED at least once, with half visits made in the first 3 weeks after discharge from the delivery hospitalization (9). The likelihood of an ED visit was higher among younger mothers and in those who had a caesarean delivery, had severe maternal morbidity at birth or pregnancy complications. A small association was also observed between the risk of ED visit and length of stay (9). The most common primary diagnoses were complications of puerperium, urinary tract infections, complications of obstetric surgical wounds, gallbladder calculus, haemorrhage, abdominal pain, and inflammatory disease of breast (9), only partially overlapping with discharge diagnoses reported in hospital readmissions (2).

The Italian University Hospital of Udine, with more than 1500 annual deliveries, is one of the largest birthing centres of the 1,200,000-inhabitant Italian North-eastern Region Friuli Venezia Giulia. According to PNE, readmission rates in Udine are not significantly different from the national average values, both for natural and for caesarean deliveries (1), and it is one of the best performing hospitals in the Friuli Venezia Giulia Region for these indicators. Nonetheless, the PNE indicators do not take into account other types of access to medical care in puerperium, such as ED visits, whose frequency is unknown.

This study has the objectives to estimate both hospital readmission and ED visit rates in puerperium

among the women who were discharged from the University Hospital of Udine after a vaginal delivery, to describe the causes of readmission or visit, and to investigate possible associations with characteristics of women, pregnancy, delivery, and newborns.

MATERIALS AND METHODS

The health administrative databases of the University Hospital of Udine were used as the sources of information. In particular, the database of the population living in the Udine area, the hospital discharge database, the delivery certificate database, and the Emergency Department (ED) database were analysed. These databases are completely anonymous, but they can be linked deterministically at the individual patient level through a stochastic key which is univocal in all databases. The study period spans from 2000, which is the first year for which all the databases are available, and 2018, the most recent available year.

Hospital discharge records with a Diagnosis Related Groups (DRG) codes 372-375, corresponding to vaginal deliveries (372: vaginal delivery with complicating diagnoses; 373: vaginal delivery without complicating diagnoses; 374: vaginal delivery with sterilization and/or dilation and curettage; 375: vaginal delivery with operating room procedure except sterilization and/or dilation and curettage), were extracted from the Hospital of Udine database and linked with the corresponding delivery certificates, matched by individual stochastic key and date of delivery, which had to be included in the hospital stay period. Multiple deliveries according to the delivery certificates and cases with in-hospital maternal death were excluded from further analyses.

The overall hospital stay for the delivery hospitalization and the days from delivery to hospital discharge were analysed for each study year to assess possible trends.

Postpartum readmissions were identified as those hospitalizations occurring from the delivery hospital discharge to 42 days after delivery. Only urgent readmissions with length of stay > 1 day were considered. For women with no such readmissions, ED visits occurring in the same period were searched.

The associations between readmissions or ED visits and characteristics of the women (age and educational level as reported in the delivery certificate; area of residency and citizenship from the population database, and Charlson's comorbidity index in the previous 2 years calculated from hospital discharge data), of the father (age as reported in the delivery certificate), of the newborn (sex, birth weight, and 5-minutes Apgar score from the delivery certificate), of the pregnancy (overall number of obstetrical visits, use of assisted reproductive technology from delivery certificate), of the delivery (spontaneous or instrumental, days from delivery to discharge, complicating diagnoses in DRG) were assessed through chi-square tests for categorical variables and through t-tests for continuous numerical variables. P-values < 0.05 were considered statistically significant. Multivariate logistic regression analyses were also conducted to adjust for the potentially confounding effect of each variable on the others. The odds ratios (OR) and 95% confidence intervals (95%CI) were presented.

Details on readmissions (days after delivery discharge, hospital stay, main discharge diagnosis) and on ED visits (days after delivery discharge, cause of access, triage tag) were also described.

All the analyses were conducted using SAS v9.4 (SAS Institute Inc., Cary, NC, USA).

Compliance with ethical standards

This work complies with the ethical standards of the relevant national and institutional committees on human experimentation and the Helsinki Declaration of 1975 as revised in 2008. This article does not contain any studies with of human or animal subjects performed by any of the authors. Since this analysis was based on anonymous administrative data, patient informed consent cannot be obtained and Ethical Committee approval was not required in Italy.

RESULTS

Overall, 20756 deliveries were included in the analyses. Postpartum readmissions were 99 (0.48%) and ED visits 292 (1.41%). The annual distribution of readmissions and ED visits is shown in **figure 1**. The number of deliveries shows a decreasing trend; on the other hand, no clear pattern appears in the risk of postpartum readmissions and ED visits.

The median hospital stay of the delivery hospitalization was 4 days in all study years; the median of the days from delivery to hospital discharge was 3 days in all years but one (**table I**). However, the mean values of both measures showed a slightly

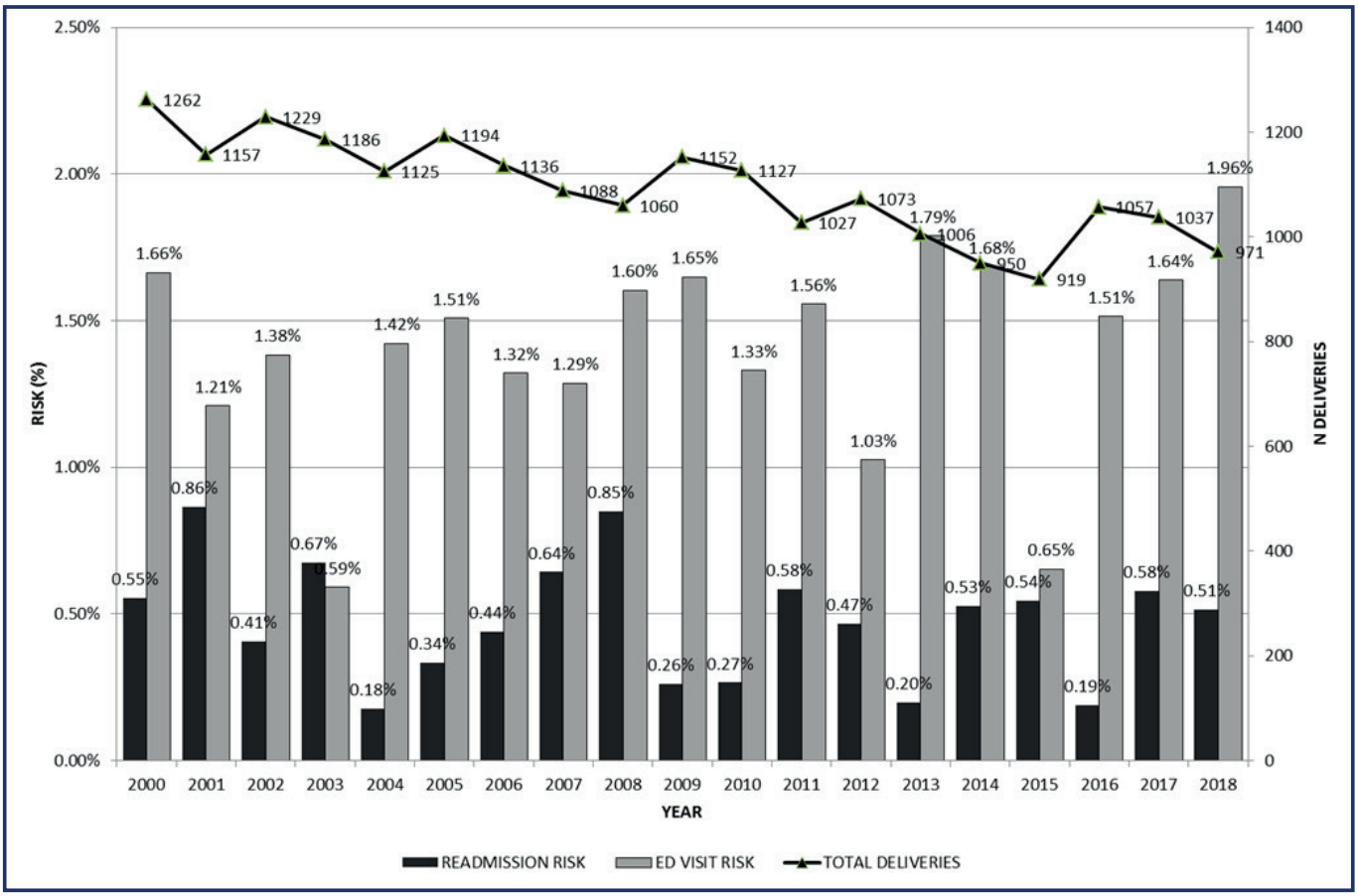

Figure 1. *Annual number of vaginal deliveries at the University Hospital of Udine, Italy, and risk of postpartum readmissions and Emergency Department visits up to 42 days after delivery, years 2000-2018.*

decreasing trend (p-value for linear trend < 0.0001 and 0.0068, respectively).

The associations between the categorical variables regarding characteristics of mothers, fathers, newborns, pregnancies, and deliveries and the risk of postpartum readmission or ED visit are illustrated in **table II**. Among variables measured as continuous numbers, no significant difference between readmitted and non-readmitted women or between women attending or not attending ED were observed according to the number of obstetrical visits during the pregnancy. On the other hand, readmitted women were on average slightly younger than the others (median age 31 *vs* 32, p of Wilcoxon's Rank Sums test 0.0941), as were those attending ED (median 31) as compared with the others (median 32; p-value < 0.0001). Analogous results were found for father's median age: 34 years in case of readmission *vs* 35 for no readmission (p-value 0.1618); 33 years in case of ED visit *vs* 35 for no ED visit (p-value 0.0007).

The results of logistic regression analyses assessing factor associated with postpartum readmissions and ED visits are shown in **table III**.

The average time from discharge from the delivery hospitalization and postpartum readmission was 12.0 ± 10.6 days (median 9); average length of stay of postpartum readmissions was 5.2 ± 6.4 days (median 4). Postpartum ED visits occurred on average 16.4 ± 11.3 days after discharge (median 15 days). White triage tags, indicating non-urgent visits, were assigned to 128 cases (43.8%); 125 (42.8%) were green tags, 37 (12.7%) were yellow tags, and 2 (0.7%) were red tags indicating unstable patient conditions. 242 visits (82.9%) were due to medical non-accidental conditions. The diagnoses of the postpartum readmissions and ED visits are shown in **table IV**.

DISCUSSION

This study showed that almost 2% of women who had a vaginal delivery at the University Hospital of Udine between 2000 and 2018 sought hospital care during puerperium: approximately one fourth of them were readmitted, whereas the others were only visited at the ED. Both the readmission and the ED visit rates had a fluctuating yearly pattern with

Table I. *Delivery hospitalization length of stay and days from delivery to hospital discharge, University Hospital of Udine, Italy, 2000-2018.*

	Length of stay		**Days from delivery to hospital discharge**	
Year	**Mean ± standard deviation**	Median	**Mean ± standard deviation**	Median
2000	4.03 ± 2.53	4	3.52 ± 1.04	3
2001	4.19 ± 2.42	4	3.65 ± 1.13	3
2002	4.19 ± 2.10	4	3.65 ± 1.17	3
2003	4.31 ± 3.01	4	3.69 ± 1.24	3
2004	4.37 ± 3.88	4	3.77 ± 1.07	3
2005	4.15 ± 1.89	4	3.60 ± 0.93	3
2006	4.16 ± 2.19	4	3.65 ± 0.87	3
2007	4.28 ± 3.96	4	3.59 ± 0.97	3
2008	4.25 ± 1.76	4	3.70 ± 0.93	4
2009	4.32 ± 3.05	4	3.66 ± 0.93	3
2010	4.08 ± 1.48	4	3.58 ± 0.92	3
2011	4.15 ± 2.33	4	3.66 ± 1.30	3
2012	4.11 ± 1.77	4	3.76 ± 6.09	3
2013	4.23 ± 3.26	4	3.49 ± 1.30	3
2014	4.09 ± 2.08	4	3.46 ± 0.93	3
2015	4.22 ± 3.33	4	3.38 ± 0.86	3
2016	4.06 ± 2.79	4	3.29 ± 0.88	3
2017	3.97 ± 2.90	4	3.30 ± 0.90	3
2018	3.97 ± 1.71	4	3.28 ± 1.07	3

no clear trend. On the other hand, the delivery hospitalization overall length of stay and the days from delivery to discharge showed a slightly decreasing trend, although the median stays were substantially unchanged during the observation period.

In this hospital, late discharges were associated with increased risk of both hospital readmissions and of ED visits in puerperium. One possible explanation is residual confounding from factors that determine both longer stays and subsequent complications requiring readmission. The issue of unmeasured confounding was raised also in a study of length of stay and readmissions among newborns (10). As an alternative, longer stays during the delivery hospitalization may increase the risk of nosocomial infections, as feared by others (11), although, looking at the causes of readmission, this hypothesis seems unlikely.

Mothers of premature newborns had increased risk of ED visit in puerperium. Both child prematurity and Apgar score < 7 were associated with increased risk of readmission, although non-significantly. The association between maternal comorbidity, as measured by the Charlson's index, and use of post-partum hospital care was inconsistent and non-significant.

Women of non-Italian citizenship and those living out of the hospital catchment area were less likely to be visited at the ED. The last finding may, however, be an artefact, because the administrative data used for this study do not include information on hospital care received in hospitals other than Udine for non-resident subjects: women who delivered in Udine but lived elsewhere might have been subsequently treated at other hospitals. In case of serious reasons leading to readmission, it is likely that those women had returned to Udine, but for less serious conditions it is possible that they sought care at smaller peripheral EDs. To a lesser extent, the same limitation may affect the results about women living in the Udine area, whose readmissions or ED visits might have been missed if they occurred at hospitals not covered by the administrative databases used in these analyses.

The finding that mothers of female newborns were less likely to have ED visits in puerperium is unexplained. Another study showed that female newborns have been shown to have decreased risk of readmission themselves (10). In our study, however, the inconsistency between the direction of the association of the newborn's sex with readmissions and with ED visits suggests that the association may be casual and not causal.

We expected to find a reduced likelihood of post-partum hospital use in case of spontaneous deliveries, as shown elsewhere (5). Although we observed such association it was not statistically significant in our population.

Table II. *Associations between the characteristics of mothers, fathers, newborns, pregnancies, and deliveries (categorical variables) and the risk of postpartum readmission or ED visit, University Hospital of Udine, Italy, 2000-2018.*

	Total	% readmitted	p-value	% ED visits	p-value
Mother's educational level			0.6676		0.0600
Elementary/middle school	6145	0.54		1.68	
High school	10306	0.47		1.36	
University degree	4305	0.42		1.14	
Mother's citizenship			0.1683		< 0.0001
Italian	16466	0.44		1.15	
Other	4290	0.61		2.38	
Mother's residency out of area			0.4283		0.0265
No	16084	0.50		1.50	
Yes	4672	0.41		1.07	
Mother's Charlson's index			0.4792		1.0000
0	20620	0.48		1.41	
≥ 1	136	0.74		0.74	
Assisted reproductive technology			0.3230		1.0000
No	20513	0.47		1.41	
Yes	243	0.82		1.23	
Type of vaginal delivery			0.1850		0.4629
Spontaneous	18474	0.45		1.39	
Instrumental	2282	0.66		1.58	
Complicated delivery (DRG 372)			0.7590		0.7839
No	20171	0.48		1.40	
Yes	585	0.51		1.54	
Gestational age			0.3754		0.0213
< 37 weeks	19487	0.65		2.21	
≥ 37 weeks	1085	0.46		1.37	
Newborn's gender			0.3421		0.0224
Female	10333	0.52		1.22	
Male	10423	0.43		1.59	
Newborn's weight			0.3710		0.7114
< 2500 g	882	0.79		1.70	
2500-4199 g	19294	0.46		1.39	
≥ 4200 g	580	0.52		1.55	
5-minute Apgar			0.0231		0.3842
≥ 7	20530	0.46		1.42	
< 7	226	1.77		0.44	

Among the most frequent causes of readmission, as expected, were postpartum haemorrhage and inflammatory disease of pelvic organs. Postpartum haemorrhage was the most common cause of readmission after vaginal delivery in Ireland (7), in Israel (6) and also in Australia, where it accounted for 18% of readmissions (8). In Ireland, atonic postpartum haemorrhage rates have shown an increasing time trend also among vaginal deliveries (12).

Among causes leading to ED visits but no subsequent hospitalization was thoracic or abdominal pain, which was also described as a cause of ED visit in the United States and of hospital readmission in Australia, as were mastitis and infections of the breast (8, 9). Unspecified fever was a very common cause of both readmission and ED visit in our population.

Haemorrhoids were frequently reported as a cause of ED visit, as were thrombosis and embolism. Life threatening conditions such as acute myocardial infarction, cerebrovascular disease, heart failure were observed, despite being rare.

Psychoses were also a cause of ED visit, as they were in the United States (9), and even readmissions, as in Australia (8).

Gallbladder diseases, including cholelithiasis, were described among causes of both readmis-

Table III. *Adjusted measures of association between the characteristics of mothers, fathers, newborns, pregnancies, and deliveries and the risk of postpartum readmission or ED visit, University Hospital of Udine, Italy, 2000-2018.*

	Readmissions		ED visits	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Mother's age (years)	1.00 (0.95-1.05)	0.9931	0.98 (0.95-1.01)	0.2338
Father's age (years)	0.99 (0.96-1.02)	0.4514	0.99 (0.97-1.01)	0.5534
Mother's residency out of area	0.80 (0.48-1.34)	0.3966	0.71 (0.52-0.96)	0.0285
Mother's university degree (*vs* high school)	0.87 (0.50-1.53)	0.6379	0.95 (0.68-1.32)	0.7565
Mother's elementary/middle school (*vs* high school)	1.02 (0.64-1.62)	0.9300	1.14 (0.88-1.48)	0.3237
Mother's non-Italian citizenship	0.76 (0.45.1.28)	0.3082	0.56 (0.42-0.74)	< 0.0001
Mother's Charlson's comorbidity index ≥ 1	1.64 (0.23-11.91)	0.6239	0.57 (0.08-4.01)	0.5747
Assisted reproductive technology	0.97 (0.13-7.10)	0.9756	1.03 (0.32-3.27)	0.9625
Number of obstetrical visits in pregnancy	1.07 (0.96-1.20)	0.2087	0.95 (0.90-1.01)	0.1018
Spontaneous delivery	0.69 (0.40-1.21)	0.2005	0.87 (0.61-1.24)	0.4337
Complicated delivery (DRG 372)	0.91 (0.29-2.92)	0.8808	1.02 (0.52-2.01)	0.9487
Gestational age < 37 weeks	1.19 (0.49-2.97)	0.7052	1.67 (1.02-2.74)	0.0421
Number of days from delivery to discharge	1.17 (1.08-1.28)	0.0002	1.08 (0.99-1.18)	0.0943
Female newborn's sex	1.30 (0.87-1.96)	0.2029	0.77 (0.61-0.97)	0.0291
Newborn's birth weight < 2500 g	1.17 (0.40-3.43)	0.7778	0.98 (0.51-1.87)	0.9409
Newborn's 5-minute Apgar score <7	2.71 (0.63-11.73)	0.1809	< 0.01 (0-inf)	0.9753
Year of delivery	0.97 (0.92-1.01)	0.1813	1.01 (0.99-1.04)	0.2819

sion and ED visit. This finding is consistent with reports from other studies (8, 9). In fact, impaired gallbladder motility in late pregnancy, with consequent increased risk of gallstone formation, has been known for long time (13).

In our population, the median time from delivery hospitalization discharge to readmission or ED visit was 12 and 16 days, respectively. In the United States, Batra *et al.* found that half ED visits occurred within the first 3 weeks (9). Readmissions lasted an average of 5 days, more than the delivery hospitalization itself. Among ED visits, almost half were assigned a white triage tag, meaning that they were actually due to non-urgent conditions. Women who have recently given birth to a baby may have post-discharge care needs which go beyond the classical postpartum complications and in fact several ED visits were prompted by non-specific symptoms and many conditions were actually non-urgent: better information of new mothers about the challenges that they might face during puerperium could help reducing inappropriate ED visits. Information on personal hygiene and appropriate post-partum lifestyle could also prevent some complications, such as mastitis or other genital infections. Other types of complications, *e.g.*, retained placenta or infections of surgical site, on the other hand, can be prevented by actions on the hospital side. For example, to reduce the risk of postpartum haemorrhage, regular emergency training focused on haemorrhage drills for the obstetric team, multidisciplinary teamwork, improved patient-team communication, and clinical audits have been advocated (12).

CONCLUSIONS

In conclusion, this study showed that postpartum readmissions only depict part of the postpartum hospital care needs of women after vaginal deliveries, with the ED being largely utilized in the Italian Region Friuli Venezia Giulia. Only few maternal, pregnancy, and newborn factors were associated with increase postpartum hospital use. Problems requiring hospital care are not necessarily always the same in case of readmission or ED visit. Each problem should be addressed with appropriate interventions to prevent unnecessary postpartum hospital use, even in a birthing centre where, according to national performance evaluation systems, readmissions after vaginal delivery are not critical.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

Table IV. *Groups of main discharge diagnoses of postpartum hospital readmissions and postpartum ED discharge diagnoses, University Hospital of Udine, Italy, 2000-2018.*

Main diagnosis	Readmissions N (rate per 10,000 deliveries)	ED visits N (rate per 10,000 deliveries)
Non-urinary infections	-	5 (2.4)
Neoplasm	2 (1.0)	-
Blood disease	1 (0.5)	1 (0.5)
Psychoses and mental disorders	3 (1.4)	3 (1.4)
Disease of central nervous system	-	5 (2.4)
Diseases of peripheral nervous system and sense organs	-	12 (5.8)
Hypertension	4 (1.9)	3 (1.4)
Acute myocardial infarction	1 (0.5)	-
Acute heart failure	1 (0.5)	-
Dysrhythmia	-	1 (0.5)
Cerebrovascular disease	1 (0.5)	1 (0.5)
Thrombophlebitis, venous embolism and thrombosis	-	6 (2.9)
Hemorrhoids	1 (0.5)	8 (3.9)
Respiratory disease	-	7 (3.4)
Appendicitis	2 (1.0)	-
Cholelithiasis and gallbladder disease	5 (2.4)	5 (2.4)
Peritonitis	1 (0.5)	-
Acute necrosis of liver	1 (0.5)	-
Acute pancreatitis	1 (0.5)	-
Other diseases of digestive organs	2 (1.0)	14 (6.7)
Inflammatory disease of pelvic organs	8 (3.9)	14 (6.7)
Genitourinary and puerperal infection	5 (2.4)	-
Anemia	1 (0.5)	-
Postpartum hemorrhage	23 (11.1)	-
Retained placenta	8 (3.9)	-
Fever	11 (5.3)	7 (3.4)
Surgical complications	5 (2.4)	-
Mastitis and breast abscess	5 (2.4)	4 (1.9)
Other postpartum complications	1 (0.5)	1 (0.5)
Skin disease	-	11 (5.3)
Musculoskeletal disorder	-	7 (3.4)
Headache	1 (0.5)	4 (1.9)
Thoracic and abdominal pain	-	21 (10.1)
Other ill-defined signs and symptoms	-	45 (21.7)
Injury	-	13 (6.3)
Allergy	-	12 (5.8)
Other or non-specified	5 (2.4)	82 (39.5)

REFERENCES

1. Agenas, 2018. Programma Nazionale Esiti – PNE. Available from: http://pne2017.agenas.it/. Accessed 04/17/2019.
2. Clapp MA, Little SE, Zheng J, Robinson JN. A multi-state analysis of postpartum readmissions in the United States. Am J Obstet Gynecol 2016;215(1):113.e1-113.e10.
3. Liu S, Rouleau J, Joseph KS. Risk of maternal postpartum readmission associated with mode of delivery. Obstet Gynecol 2005;105(4):836-42.
4. Clapp, MA, Robinson, JN, and Little, SE. The relationship between the rising cesarean delivery and postpartum readmission rates. J Perinatol 2017;37(4):355-9.
5. Lydon-Rochelle M, Holt VL, Martin DP, Easterling TR. Association between method of delivery and maternal rehospitalization. JAMA 2000;283(18):2411-6.
6. Ophir E, Strulov A, Solt I, Michlin R, Buryanov I, Bornstein J. Delivery mode and maternal rehospitalization. Arch Gynecol Obstet 2008;277(5):401-4.

7. Ade-Conde JA, Alabi O, Higgins S, Visvalingam G. Maternal post natal hospital readmission-trends and association with mode of delivery. Ir Med J 2011;104(1):17-20.
8. Ford JB, Algert CS, Morris JM, Roberts CL. Decreasing length of maternal hospital stay is not associated with increased readmission rates. Aust N Z J Public Health 2012;36(5):430-4.
9. Batra P, Fridman M, Leng M, Gregory KD. Emergency Department Care in the Postpartum Period: California Births, 2009-2011. Obstet Gynecol 2017;130(5):1073-81.
10. Harron K, Gilbert R, Cromwell D, Oddie S, van der Meule J. Newborn Length of Stay and Risk of Readmission. Paediatr Perinat Epidemiol 2017;31(3):221-32.
11. Cegolon L, Campbell O, Alberico S. Length of stay following vaginal deliveries: A population based study in the Friuli Venezia Giulia region (North-Eastern Italy), 2005-2015. PLoS One 2019;14(1):e0204919.
12. Lutomski JE, Byrne BM, Devane D, Greene RA. Increasing trends in atonic postpartum haemorrhage in Ireland: an 11-year population-based cohort study. BJOG 2012;119(4):306-14.
13. Hahm JS, Park JY, Song SC. Gallbladder motility change in late pregnancy and after delivery. Korean J Intern Med 1997;12(1):16-20.