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Types and prevalence of adverse events among obstetric clients hospitalized in a secondary healthcare facility in Ghana

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Abstract

Objective: The main objective of this study was to determine the types and prevalence of adverse events among obstetric clients hospitalized in a secondary health facility in Ghana.

Design: A retrospective study that reviewed medical records of obstetric clients on admission at the Obstetrics Unit of a secondary healthcare facility in Ghana.

Setting: Clinical environment. The study site is the third largest health facility in Ghana that provides maternity services and serves as the major referral facility for Greater Accra Region, the capital of Ghana. About 41% (4676) of its total antenatal cases (11,406) in 2015 were referrals from other facilities in Ghana. The medical records were reviewed retrospectively from 1 January to 31 December 2015. A four-stage review process was used: the first and second stages (by nurse/midwife reviewers) involved the identification and exclusion of records that had a length of stay less than 24 h and inadequate documentation; and were unlikely to include an adverse event. The third stage by obstetrician gynaecologist reviewers included a full review of all the positive trigger folders to determine the types, causes and degree of preventability of the adverse events. The fourth stage involved an independent obstetrician gynaecologist review of all records that had discrepancies. Details of the review process are presented in the figure.

Participants: Obstetric clients (i.e. pregnant women at any stage of gestation or less than 5 days after delivery who were attended to at the hospital). About a third (1402, 49.3%) met the inclusion criteria and were reviewed.

Main outcome measures: The main outcome measure for this study was the prevalence of adverse events among hospitalized obstetric clients.

Results: The prevalence of adverse events was 12% (168) out of 1402 records reviewed. The mean maternal age of the clients was 30.0 ± 5.8 years. Among these, the greatest proportion of adverse events was related to surgical interventions (66.3%) and the smallest were related to patient care (0.7%).

Conclusions: This study has provided the first documented prevalence (12.0%) and types of adverse events among hospitalized obstetric clients in a secondary health facility in Ghana. It provides a preliminary baseline for the burden of adverse events among the obstetric population in Ghana.

Keywords

Adverse events, obstetric clients, healthcare quality, patient safety, hospitalized

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Introduction

The prevalence of adverse events (AEs) in healthcare is an important measure of quality and patient safety among hospitalized patients.[1] AEs among hospitalized patients remain very high since the publication of "*To Err is Human*" some two decades ago despite the enormous efforts and attention paid to patient safety.[2,3] AEs are poor outcomes that occur as a result of medical management rather than the underlying medical condition of the patient. They are numerous and can lead to death, disability, or prolonged hospitalization affecting quality of life and life expectancy.[4] Medical management encompasses all aspects of care including diagnosis, treatment, and the systems and equipment that are used to deliver care.[1,5–7] AEs arise as a result of omission or commission in the healthcare process. They are injurious, detrimental, undesirable or untoward to the patient.[8] They have been identified in 2.5% to 16.6% of hospital admissions in studies beginning with the Harvard Medical Practice Study, and several others.[1,5,9–14]

A significant number of obstetric clients experience an AE that often compromises their ability to receive quality and safe health care. The effect is even more dire because two people can be involved (i.e. the expectant mother and the baby).[15] Obstetric related AEs were the second most prevalent ($n = 373$; 1.5%) AEs in a cross-sectional Canadian study. Surgical related events and infections accounted for 1.0% ($n = 248$) and 0.8% ($n = 211$), respectively.[16] In another Canadian study, Florea et al. identified 578 AEs from 6752 deliveries in a 12-month study equivalent to 1 AE in every 11.7 deliveries.[16] The authors added that, 13.4% (67) showed minor harm to the mother, baby, or both while 7.4% (37) showed major harm. Twijnstra et al. (2010) reviewed 10,470 medical records at the obstetrics and gynaecology departments of six hospitals.[17] They identified 960 (14.5%) obstetrical and 351 (9.1%) gynaecology-related complications. There was no significant difference between general hospitals and university hospitals in the percentage of complications and AEs.

It is estimated that up to half a million people die annually from hospital-associated harms in the United States, making patient harm the third leading cause of death after heart disease and cancer.[2] The incidence of AEs globally is higher in lower-middle income countries (LMICs; such as Ghana) than in high-income countries (HICs). For instance, studies by Jha et al. showed that whereas HICs had an estimated 16.8 million injuries due to AEs among hospitalized patients, the rate in LMIC was 50% more.[18] It is estimated that deaths attributable to AEs affects more than 10,000 people in only 26 health facilities in the Eastern Mediterranean and African regions. This estimate would run into millions of avoidable deaths, if we multiply the affected people (i.e. 10,000) by the approximately 60,000 health facilities situated in sub-Saharan Africa. Similarly, more than 50% of patients admitted for surgery will develop a healthcare acquired infection.[19]

The types and frequency of AEs have been studied in some selected countries in Africa and the Middle East (namely Kenya, Egypt, Morocco, Tunisia, South Africa and Sudan). A total of 15,548 medical records were reviewed and the prevalence of AEs was estimated to be between 2.5% and 18.4% among the general hospital-going population including obstetrics.[20]

There is yet to be any study in Ghana that estimates the prevalence and types of AEs in the general or in any specific patient population. The aim of this study was to identify the types and estimate the prevalence of any AEs among the obstetric population hospitalized in a secondary health facility in Ghana, using a retrospective review methodology. This study fills the void with respect to the absence of any available data in Ghana and scanty evidence from LMICs.

Methods

This study used a retrospective design to explore the types and prevalence of any AE. The medical records of obstetric clients admitted between 1 January and 31 December 2015 at the Obstetrics Unit of a secondary healthcare facility in Ghana were reviewed retrospectively. The study site is the third largest in Ghana that provides maternity services. It serves as a major referral healthcare facility for high-risk obstetric cases in Ghana. There were 8566 deliveries and 11,406 antenatal visits in 2015 to this facility. A four-stage review process was performed. The first and second stages (by nurses/midwife reviewers) involved the identification of medical records that had a length of stay greater than 24 hours and adequate; and were likely to include an AE. The third stage by obstetrician gynaecologist reviewers included a full review and an independent assessment of approximately 50% (191 out of 387) of all the trigger positive medical records and determined their extent. The fourth stage involved an independent obstetrician gynaecologist review of all records that had discrepancies. Detail of the data collection process is presented in Figure 1. Every record was reviewed independently by two obstetrician gynaecologists after the initial review by the nurses/midwives. Records that had conflicting judgments in the review process were referred to a third independent reviewer (i.e. a third obstetrician reviewer whose grade was not lower than a Senior Specialist) who had the final say.

A total of 30 of such discrepant records were reviewed again by the independent reviewer. There

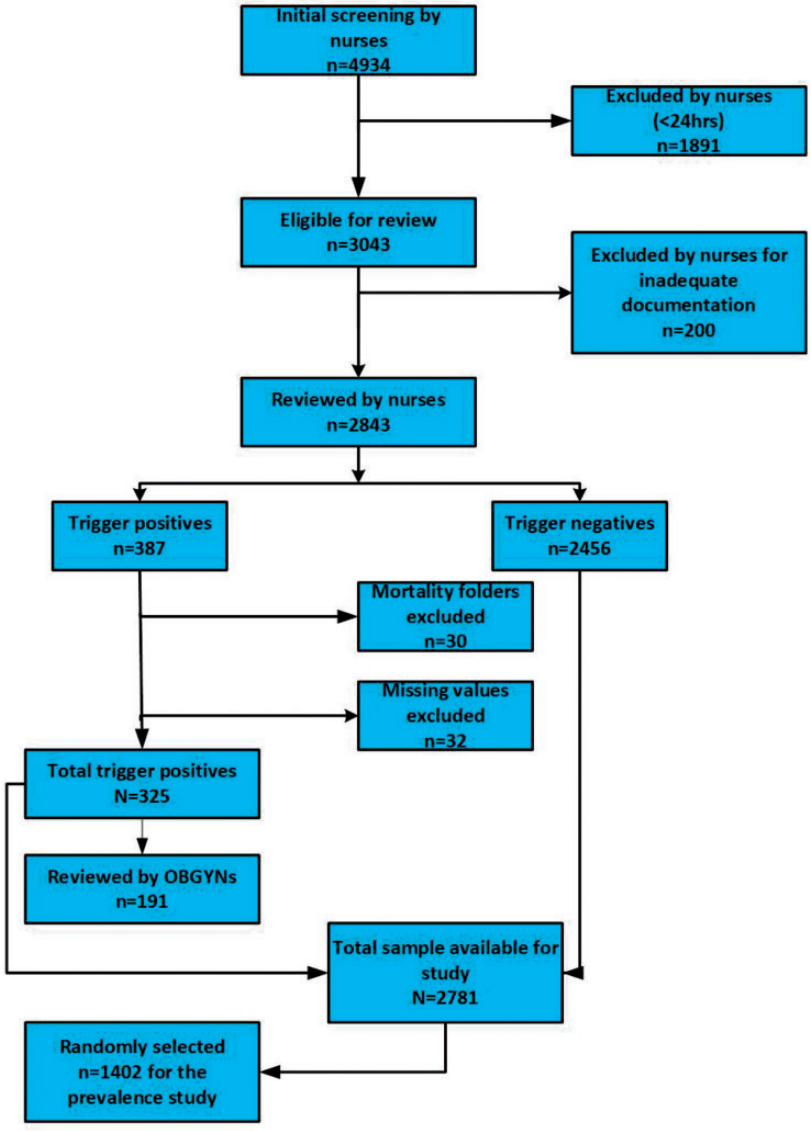

Figure 1. Details of the data collection process.

were seven obstetricians who did the review from 10 March to 29 September 2017. Ten per cent (10%) of all the trigger-negative medical records were randomly selected and reviewed by all seven obstetrician reviewers for AEs as part of a sensitivity analysis of the trigger methodology in stage one. For each event, obstetricians classified its type, associated (i.e. contributing) factors and the degree of preventability. The classification of the preventability of AEs was done by individual experts who worked separately or independently, unlike in other studies[5] that had a panel of experts who shared the same space and worked together. A 6-point (even numbered) Likert-type scale from 1 (virtually no evidence of preventability) to 6 (virtually certain evidence of preventability) for assessing the preventability of the AEs was used to classify the occurrence. Obstetricians used their clinical experience and judgment to determine the degree of preventability. Discrepancies in any two obstetrician reviewers were noted by the PI and were settled by a third independent reviewer. The preventability cut-off point for this study was set at ≥ 2.

The study was approved by the Ghana Health Service Ethical Review Board. Data were analysed using Stata Version 13. Frequencies, percentages, means (SD) and median (IQR) of patients affected by AE were estimated. Chi-square tests and p-value were used to determine any significant relationships among the most commonly reported factors.

All obstetric clients at any gestational age admitted between 1 January and 31 December 2015 and met the inclusion criteria, which included hospital stay of more

than 24 h from the time of admission, in labour or having delivered within the last five days, and presence of a complete medical record. AEs in obstetric clients that occurred prior to the arrival in the hospital premises were excluded.

Results

There were a total 8566 deliveries in the study site in the year 2015. A total of 2843 records were available for review. Out of these, 1402 (49.3%) met the inclusion criteria and were included in the study. More than half of the obstetric clients were married (1164, 83.0%); 1249 (89.1%) of them resided in the Greater Accra region and 1097 (78.2%) were referred from a government facility.

The prevalence rate of AEs among obstetric clients in the study site was 12.0% (95% CI: 10.4 to 13.8). This translates into 12 AEs per 100 admissions implying that, approximately 1 in 10 of every obstetric client admitted to any of the wards in the obstetric department will develop an AE during her hospital stay.

Table 1. Details of the types of adverse events among obstetric clients hospitalized at the study site.

Nature/Types of AEs	*N*	%
Events related to surgery	192	66.0
Obstetric trauma to the mother (i.e. perineal tear, vaginal tear, clitoris tear)	142	48.8
Excessive obstetric bleeding	26	8.9
Trauma to baby	11	3.8
Postpartum haemorrhage	11	3.8
Acute respiratory failure	1	0.3
DVT with or without pulmonary embolism	1	0.3
Burst abdomen	0	0.0
Bladder or ureteric damage	0	0.0
Hypovolaemic shock	0	0.0
Events related to treatment	69	23.7
Avoidable delay in treatment	47	16.2
Eclampsia (institutional)	16	5.5
Inadequate monitoring follow-up of treatments	5	1.7
Failure to provide prophylactic treatment	1	0.3
Blood transfusion reaction	0	0.0
Avoidable delay in responding to an abnormal test	0	0.0
Errors in the performance of an operation, procedure or test	0	0.0
Errors in administering treatment	0	0.0
Events related to diagnosis	16	5.4
Delay in diagnosis	9	3.1
Failure to act on results (i.e. lab) of monitoring or testing	4	1.4
Error in diagnosis	3	1.0
Events related to medication	8	2.7
Severe hypotension	3	1.0
Drug reaction	2	0.7
Drug (inappropriate)	2	0.7
Delirium	1	0.3
Medication error	0	0.0
Events related to infection	4	1.4
Respiratory infection (pneumonia)	2	0.7
Surgical or procedural site infection	1	0.3
Septicaemia	1	0.3
Hepatitis B	0	0.0
Acute hepatic encephalopathy	0	0.0
Events related to patient care	2	0.7
Left ventricular or congestive cardiac failure	2	0.7
Pressure ulcer/bed sore	0	0.0
Foetal distress	0	0.0
Patient fall with injury	0	0.0

AEs: adverse events; DVT: deep vein thrombosis.

More than half (192, 66.0%) of the AEs were related to surgical intervention (Table 1). The least common type of AE recorded was "adverse events related to patient care" (2, 0.7%). Some patients (16, 9.5%) experienced more than one AE out of the total AEs recorded (291, 100%). The majority (93, 55.4%) of the AEs occurred in the labour ward and the majority (208, 64.1%) were preventable.

Obstetric clients aged less than 20 years (11, 16.7%) were more likely to develop AEs than older patients. AEs were higher among obstetric clients referred from government facilities (141, 12.9%) than from private facilities (27, 8.9%); singles (30, 12.6%) than in the married (138, 11.9%); and among Muslims (31, 14.2%) than Christians (137, 11.6%; p-value all= 0.05). The mean maternal age of the clients was 30.0 $\pm$ 5.8 years. The minimum maternal age was 14 years, while the highest maternal age was 48 years. None of the mean differences in these variables was statistically significant. The gestational age was statistically significant (p value = 0.013) and the risk of developing an AE increased with increasing maternal age. Antenatal clinic (ANC) non-attendants also had a higher risk of developing an AE (7, 28.0%) than the attendants (161, 11.7%) and this difference was statistically significant (p value = 0.013). A third (436, 31.0%) of the women were nulliparous while more than half (749, 54.4%) had gravidity $\geq$3. Neither parity nor gravidity was associated with AEs, but AEs decreased with increasing parity and gravidity (Table 2).

More than half (193, 66.3%) of the total AEs were surgically related. Some of these AEs included obstetric trauma to the mother (i.e. perineal, vaginal and cervical tears), excessive obstetric bleeding, etc. The least common type of AE recorded was 'adverse events related to patient care' (2, 0.7%).

Table 2. Maternal characteristics of the study sample in the study area.

Variables	Negative	Positive	p value	Total
ANC attendance				
Attendant	1216 (88.3%)	161 (11.7%)		
Non-attendant	18 (72.0%)	7 (28.0%)	0.013***	1402
Condition				
Normal	228 (87.7%)	32 (12.3%)		
Complication	1006 (88.1%)	136 (11.9%)	0.858	1402
Foetal heart (FH) status				
Absent	20 (87.0%)	3 (13.0%)		
Present	1214 (88.0%)	165 (12.0%)	0.875	1402
Gravidity				
1 or 2	571 (87.4%)	82 (12.6%)		
$\geq$3	663 (88.5%)	86 (11.5%)	0.536	1402
Parity				
0	387 (88.8%)	49 (11.2%)		
1 or 2	575 (86.6%)	89 (13.4%)		
$\geq$3	272 (90.1%)	30 (9.9%)	0.259	1402
Gestational age				
Preterm	456 (91.4%)	43 (8.6%)		
Term	765 (86.3%)	122 (13.8%)		
Post-term	13 (81.3%)	3 (18.8%)	0.013***	1402
Mean gestational age: 37.4 $\pm$ 4.9 weeks				
BP				
Normal BP	328 (86.5%)	51 (13.5%)		
Pre-hypertension	559 (87.2%)	82 (12.8%)		
Hypertension stage I & II	347 (90.8%)	35 (9.2%)	0.131	1402
No. of diagnosis per client				
1	890 (87.5)	127 (12.5)		
2	313 (89.9)	35 (10.1)	0.35	1402
3	31 (83.8)	6 (16.2)		
Mode of delivery				
CS	802 (88.2)	107 (11.8)		
Vaginal delivery	432 (87.6)	61 (12.4)	0.74	1402

***Statistically significant.

Discussion

To the best of our knowledge, this is the first study in Ghana to report on AEs in an obstetric population. The findings of this study showed that, among obstetric clients who had any episode of hospitalization in the study area, the prevalence of AEs was 12.0% (95% CI: 10.4% to 13.8%).

This estimate included first- and second-degree perineal tears as AEs. The overall prevalence of AEs among hospitalized obstetric clients was, however, reduced to 6.3% when first- and second-degree perineal tears were excluded, and the proportion of events related to surgery also decreased (17.2%).

The finding from this study is higher than estimates from previous studies.[5,14,21,22] For instance, an author[3] estimated a prevalence of $1.5 \pm 0.2\%$ among obstetrics cases from 30,121 records of hospitalized patients from a population of 2,671,863 discharged from non-federal acute care hospitals in New York in 1984. Studies to determine the incidence, type, preventability and impact of AEs among hospitalized patients and potentially preventable deaths in Dutch hospitals showed a 4.7% incidence among obstetric patients.[14,21] They used a total sample size of 7926 from 21 randomly selected hospitals of various categories across the Netherlands. Studies from Utah and Colorado in the US[22] also had a much lower AE rates (3.7% and 2.9%) than this study. The obstetric related AEs were 4% of all the 1014 medical records reviewed by Vincent Neale and Woloshynowych[13] in the two teaching hospitals in the UK. Similarly, studies in Swedish hospitals[23] yielded a prevalence of 2% AEs in obstetric related cases. The authors of the New Zealand study estimated an incidence of 6.6% AEs among pregnancy/childbirth.[24]

In this study, AEs were classified into six major categories/themes namely: events related to surgery, treatment, diagnosis, medication, infection and patient care respectively. Surgical, treatment and diagnostic related AEs were the leading categories of events by frequency (Table 2). Studies by various other authors have found AEs to be higher particularly in surgical disciplines than non-surgical disciplines.[5,7,14,25,26] Obstetric trauma to the mother accounted for the highest frequency of surgical related AE with 1st and 2nd degree perinatal tear accounting for about 5.7% of the total AE prevalence rate of 12.0%. This is consistent with the fact that, 1st and 2nd degree perineal tears are common with up to 73% prevalence versus third and fourth degree with up to 8% prevalence.[27]

Various reasons could account for the differences in the prevalence estimates among the various studies and one of these could be the intent or perspective of the study. For instance, the studies with lower prevalence rates compared with this study are often guided by a medicolegal other than a quality improvement perspective. This difference in perspectives greatly influences the outcome of the study findings. For instance, studies[1,13,15,24,26,28] that had a quality improvement perspective all had estimated prevalence rates from as low as 5.7% to a high of 25% similar to this study findings of 12.0%.

The results of this study can be compared with those from previous international studies because the definition of an AE was consistent with what have been used by various authors[5,29] in the field. This study also provides the first estimate and serves as a preliminary baseline measure of the burden and impact of AEs among the obstetric population in Ghana. The type of patient safety issues identified can also be used to help guide appropriate interventions to reduce the burden of AEs and improve the quality of care and patient safety outcomes in Ghana.

Limitations

This study had some limitations. The prevalence of any of the AEs may have been underestimated mostly because of the quality of documentation with respect to availability, adequacy and completeness of the medical records. Comparison of the prevalence rate to those in other studies must be done cautiously, especially as case definitions can vary. Reviewers also found it difficult in a few instances to judge whether a standard of care had been met or not, this however is not surprising in view of the complexities of clinical decision making.

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Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

This study was approved by the Ghana Health Service Ethics Review Committee (GHS-ERC-08/09/2016).

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References

1. Baker GR, Norton GP, Flintoft V, et al. The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *Can Med Assoc J* 2004; 170: 1678–1686.
2. Stockwell CD, Bisarya H, Classan CD, et al. A trigger tool to detect harm in pediatric inpatient settings. *Pediatrics* 2015; 135; 6.
3. Landrigan CP, Parry GJ, Bones CB, et al. Temporal trends in rates of patient harm resulting from medical care – with comments. *N Engl J Med* 2010; 363: 2124–2134. 10.1056/NEJMsa1004404.
4. Magdelijns FJH, Stassen PM, Stehouwer CDA, et al. Direct health care costs of hospital admissions due to adverse events in the Netherlands. *Eur J Public Health* 2014; 24: 1028–1033. 10.1093/eurpub/cku037.
5. Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized patients: results of the Harvard Medical Practice Study I. *N Engl J Med* 1991; 324: 370–376.
6. Hoogervorst-Schilp J, Langelaan M, Peter Spreeuwenberg MC, et al. Excess length of stay and economic consequences of AEs in Dutch hospital patients. *BMC Health Serv Res* 2015; 15: 531.
7. Rafter N, Hickey A, Condell S, et al. Review adverse events in healthcare: learning from mistakes. *QJM* 2015; 108: 273–277. 10.1093/qjmed/hcu145.
8. Walshe K. Adverse events in healthcare: issues in measurement. *Qual Health Care* 2000; 9: 47–52.
9. Rafter N, Hickey A, Conroy RM, et al. The Irish National Adverse Events Study (INAES): the frequency and nature of adverse events in Irish hospitals – a retrospective record review study. *BMJ Qual Saf 2017; 26(2): 111-9*
10. Ennen CS and Satin A. Reducing adverse obstetrical outcomes through safety sciences. 2016, https://www.uptodate.com/contents/reducing-adverse-obstetrical-outcomes-through-safety-sciences
11. Lessing C, Schimtz A, Albers B, et al. Impact of sample size on variation of adverse events and preventable adverse events. *Qual Saf Health Care* 2010; 19: 1–5. 10.1136/qshc.2008.031435.
12. Neale G, Woloshynowych M and Vincent C. Exploring the causes of adverse events in NHS hospital practice. *J R Soc Med* 2001; 94: 322–330.
13. Vincent Neale G and Woloshynowych M. Adverse events in British hospitals: preliminary retrospective record review. *BMJ* 2001: 517–519.
14. Zegers BM, Wagner C, Hoonhout L, et al. Adverse events and potentially preventable deaths in Dutch hospitals: results of a retrospective patient record review study. *Qual Saf Health Care* 2009; 297–302. DOI: 10.1136/qshc.2007.025924.
15. Ansong-Tornui J, Armar-Klemesu M, Arhinful D, et al. Hospital based maternity care in Ghana – findings of a confidential enquiry into maternal deaths. *Ghana Med J* 2007; 41: 125–132.
16. Florea A, Caughey SS, Westland J, et al. The Ottawa hospital quality incident notification system for capturing adverse events in obstetrics. *J Obstet Gynaecol Can* 2010; 32: 657–662. DOI: 10.1016/S1701-2163(16)34569-8.
17. Twinjnstral ARH, Zeeman GG and Jansen FW. A novel approach to registration of adverse outcomes in obstetrics and gynaecology: a feasibility study. *Qual Saf Health Care* 2010; 19: 132–137. DOI: 10.1136/qshc.2008.030833
18. Jha AK, Larizgoitia I, Audera-Lopez C, et al. The global burden of unsafe medical care analytic modelling of observational studies. *BMJ Qual Saf* 2012; 22: 809–15. DOI: 10.1136/bmjqs-2012-001748
19. World Health Organization (WHO). International drug monitoring. The role of the hospital (WHO Technical Report Series No. 425), World Health Organization, Geneva, 1969.
20. Elmontsri M, Almashrafi A, Banarsee R, et al. Status of patient safety culture in Arab countries: a systematic review. *BMJ Open* 2017; 7. DOI: 10.1136/bmjopen-2016-013487.
21. Zegers M, Bruijne MC, de Wagner C, et al. Design of a retrospective patient record study on the occurrence of adverse events among patients in Dutch hospitals. *BMC Health Serv Res* 2007; 7. DOI: 10.1186/1472-6963-7-27.
22. Thomas SDM, Burstin HR, Orav EJ, et al. Incidence and types of adverse events and negligent care in Utah and Colorado. *Med Care* 2000; 38: 261–271.
23. Rutberg H, Borgstedt-Risberg M, Gustafson P, et al. Adverse events in orthopedic care identified via the Global Trigger Tool in Sweden – implications on preventable prolonged hospitalizations. *Patient Saf Surg*. 2016; 10: 23. DOI: 10.1186/s13037-016-0112-y.
24. Davis P, Lay-Yee R, Briant R, et al. Adverse events in New Zealand public hospitals I: occurrence and impact. *NZ Med J* 2002; 115: 1–9. https://www.researchgate.net/publication/10930999
25. Stevens DP. A systematic review: scholarly reports of in-hospital adverse event. *Qual Saf Health Care*. Epub ahead of print 2015.
26. Aranaz-Andrés JM, Aibar-Remón C, Limón-Ramírez R, et al. Prevalence of adverse events in the hospitals of five Latin American countries: results of the "IberoAmerican Study of Adverse Events" (IBEAS). *BMJ Qual Saf* 2011; 20: 1043–1051. DOI: 10.1136/bmjqs.2011.051284.
27. Groutz A, Hasson J, Wengier A, et al. Third-and fourth-degree perineal tears: prevalence and risk factors in the third millennium. *Am J Obstet Gynecol* 2011; 204: 347.e1–4.
28. Wilson RM, Runciman WB, Gibberd RW, et al. The Quality in Australian Health Care Study. *Med J Aust* 1995; 163: 458–471, https://www.researchgate.net/publication/13132921_The_Quality_in_Australian_Health_Care_Study_QAHCS–a_review.
29. Smits M, Zegers M, Groenewegen PP, et al. Exploring the causes of adverse events in hospitals and potential prevention strategies. *Qual Saf Health Care*. 2010; 19: e5. DOI: 10.1136/qshc.2008.030726.