ACORN AUSTRALIAN COLLEGE OF PERIOPERATIVE NURSES | JOURNAL OF PERIOPERATIVE NURSING

Volume 32 | Issue 3 Article 2

9-1-2019

The patient, case, individual and environmental factors that impact on the surgical count process: An integrative review

Victoria Ruth Warwick Dr
Fiona Stanley and Fremantle Hospital Group, vicky.warwick@health.wa.gov.au

Brigid M. Gillespie PhD
Griffith University - Australia, b.gillespie@griffith.edu.au

Anne McMurray
Griffith University, School of Nursing, a.mcmurray@griffith.edu.au

Karen G. Clark-Burg
The University of Notre Dame Australia, karen.clark-burg@nd.edu.au

Recommended Citation

Warwick, Victoria Ruth Dr; Gillespie, Brigid M. PhD; McMurray, Anne; and Clark-Burg, Karen G. (2019) "The patient, case, individual and environmental factors that impact on the surgical count process: An integrative review," *Journal of Perioperative Nursing*: Vol. 32 : Iss. 3 , Article 2.
Available at: https://doi.org/10.26550/2209-1092.1057

https://www.journal.acorn.org.au/jpn/vol32/iss3/2

Authors

Dr Vicky Warwick
DrN, MN, RN
Perioperative nurse unit manager, Fiona Stanley Hospital and Fremantle Hospital Group, Perth, Western Australia

Professor Brigid M Gillespie
PhD RN FACORN
Professor of Patient Safety, School of Nursing and Midwifery, Griffith University and Gold Coast University Hospital, Gold Coast Health, Nursing and Midwifery Education and Research Unit

Professor Anne McMurray
AM, PhD, RN, FACN
Emeritus Professor, School of Nursing and Midwifery
Principle Research Fellow, Integrated Care Program, Centre for Applied Health Economics
Menzies Health Institute Queensland, Griffith University, Gold Coast Campus

Associate Professor Karen Clark-Burg
Acting Dean School of Nursing and Midwifery, The University of Notre Dame Australia

Corresponding author

Dr Vicky Warwick
DrN, MN, RN
Perioperative nurse unit manager, Fiona Stanley Hospital and Fremantle Hospital Group, Perth, Western Australia
Vicky.warwick@health.wa.gov.au

The patient, case, individual and environmental factors that impact on the surgical count process: An integrative review

Abstract

Problem identification

The surgical count is an integral component of the perioperative nurse's role designed to reduce the risk of unintentional retained items (URIs) during surgery. Current literature provides statistical data that URIs continue to occur which has exposed a lack of adherence to the surgical count process as a possible contributing factor. This review was undertaken to identify what is currently known about perioperative nurses' practices in relation to the surgical count and the perceived barriers and enablers when trying to follow best practice as outlined in ACORN's *Standards for Perioperative Nursing in Australia*.

Literature search

The objective of the search was to identify empirical data relating to nurses' knowledge and practices in relation to the surgical count. We identified 215 research papers in the literature search using search terms consisting of instrument counts, culture and patient safety.

Data evaluation synthesis

Studies from 2003 to 2018 were categorised methodologically as qualitative, quantitative and mixed methodologies. All papers were reviewed by the authors separately to extract key information around design, sample size, aim, key findings and limitations. Studies were critically appraised using the mixed method appraisal tool (MMAT) for mixed method studies and the QualSyst tool for quantitative and qualitative studies. The literature search identified a total of 215 studies, 109 of which were identified for further review using the 'preferred reporting items for systematic reviews and meta-analysis' (PRISMA) flow chart. Six exclusion criteria were applied to exclude a further 52 articles from the final review, which resulted in ten articles being included in the final sample.

Implications for practice or research

The review demonstrates that statistical data around URIs is widely reported. However, little is documented about the patient, case, individual and environmental factors that may impede perioperative nurses in following best practice when undertaking a surgical count.

Keywords: surgical, perioperative, count, patient safety, best practice, retained items

Problem identification

Counting surgical instruments and consumables in health care facilities (HCFs) is an important component of perioperative practice in relation to patient safety. Despite HCFs' duty to comply with best practice standards in relation to surgical counts, sentinel events concerning unintentional retained items (URIs) during surgical procedures continue to occur. Contributing factors include non-adherence to hospital policy, procedure, process and guidelines; poor communication; a fast-paced work environment and the levels of knowledge, skills and competence of practitioners involved.

This integrative literature review describes the surgical count process and its relationship to patient safety and the perioperative nurse's role in ensuring the count process is undertaken in accordance with best practice principles. To date, there is limited research that describes factors that impact on the surgical count. There is an abundance of literature that provides statistical data related to URIs but little in relation to the operational aspects of managing the count process. The review revealed a number of themes that researchers attributed to incorrect counts. These included patient, case, individual and environmental factors. All of the studies examined showed little documentation of best practice in relation to the count. No studies were found that directly addressed perioperative nurses' perceptions of factors related to the patient, case, individual and environment, or their perceptions of nurses' ability to follow best practice and policy. Because undertaking accurate and appropriate count processes is prescribed by professional organisations as an integral component of quality and safety, further research is needed to identify and describe perioperative nurses' perceived barriers and enablers to undertaking best practice.

Literature search

The researchers undertook an integrative mixed method review using Whittemore and Knafl's[1] integrative review framework. This enabled a comprehensive review of the surgical count process, using qualitative and quantitative research. The integrative review identifies the current empirical evidence and gaps in knowledge related to surgical counts which provide an in-depth understanding of the potential problems surrounding the surgical count[1]. The research question that provided the focus for this review was 'what factors contribute to URIs in surgery?'

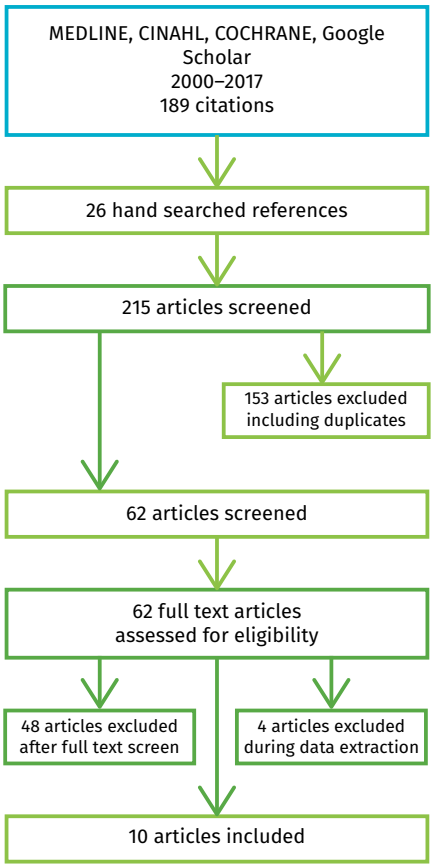

Figure 1: PRISMA diagram of integrative review

Adapted from Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine 2009;6(7):e1000097. doi:10.1371/journal.pmed.1000097.

Inclusion and exclusion criteria

Papers were included if they were full-text, English language, primary research articles, referred to the surgical count from a quantitative or qualitative perspective and were published between January 2000 and February 2018. The time frame was chosen to ensure current relevance to the chosen topic and to provide breadth and depth of relevant literature to be included in the review.

Research papers other than those written in English were excluded as were papers that referred to the key search terms but had no reference to the surgical count process in the article. Quantitative studies that provided data pertaining to retained items were also excluded if they did not detail the reasons these items were retained and relevance to a surgical count process or nursing concerns. Government reports were also excluded as these did not expand on the issue underlying URIs. Papers based on literature reviews, quality improvement projects or with no abstract available were also excluded.

Search strategies

A computerised literature search was undertaken to identify relevant journal articles. Search terms related to surgical counting included 'retained sponges', 'foreign bodies', 'instrument counts', 'surgical counts', 'sentinel/adverse events', 'incorrect counts', 'culture', 'accountable items' and 'patient safety'.

A health librarian assisted with the searches of the Cumulative Index to

Nursing and Allied Health Literature (CINAHL) Plus, Cochrane Library, MEDLINE (Ovid) and Google Scholar. Boolean connectors 'and' and 'or' were used to combine the key words and medical subject headings (MeSH) were used in the execution of the MEDLINE database searches.

The reference lists of sourced journal articles were hand-searched for further relevant articles. Identified articles were screened by the research team in reference to the aims of the review and the inclusion and exclusion criteria.

Data extraction and synthesis

The articles collated for this review included quantitative, qualitative and mixed methods research which were synthesised to provide a clearer picture of the research available relative to the included studies. The content of the results and discussion sections of the included articles was synthesised using inductive thematic analysis. Themes were generated based on patient, case, individual and environmental factors that contribute to URIs. Data extraction from the integrated literature review included the lead author, year, country, study aim, design, sampling and results. Limitations of each of the studies were identified and considered in relation to internal and external validity of study findings and study quality. Data verification was performed independently by two of the researchers who met regularly to consider whether papers met the inclusion criteria.

Quality assessment

To assess the quality of the included papers, the QualSyst appraisal tools developed by Kmet, Lee and Cook[2] were used. QualSyst tools are a hybrid of research assessment tools that provide a framework to critically appraise individual quantitative and qualitative study designs.

Papers that involved a mixed methodology were assessed using the mixed methods appraisal tool (MMAT). The MMAT checklist tool allows assessment of the methodological quality of studies that have diverse designs based on predetermined objective criteria. It provides five domains that a study can be assessed against with a maximum total of 11 criteria[3,4].

Quality scores

The QualSyst scoring process for the quantitative studies included 14 set criteria and for the qualitative studies, 10 criteria. Both types of studies were scored as either 0 ('no') if the criteria were not included or discussed, 1 ('partial') if some elements of the criteria were included but not fully discussed, or 2 ('yes') if the criteria were fully included or discussed in the literature. Mixed methods papers were assessed against the three domains recommended in the MMAT checklist, including qualitative, quantitative descriptive and mixed methods, with the responses corresponding to 0 ('no'), 0 ('can't tell') and 1 ('yes').

Findings

Descriptive characteristics

The literature search identified a total of 215 studies. Of these, 189 were obtained through electronic searching and a further 26 identified through manual searches of reference lists of the included research articles. Following screening, 109 were identified for further review using the preferred reporting items for systematic reviews and meta-analysis (PRISMA) flow chart[5] as shown in Figure 1.

Six exclusion criteria (detailed in Table 1) were applied to exclude a further 52 articles from the final review. In total, 10 articles were included in the final sample, with a date range of 2003 to 2018. Six papers originated from the US, two from Australia and two from the UK. The articles included in the final review related to patient, case, individual and environmental factors that affect the process of undertaking a surgical count.

A summary of the included descriptors from the qualitative, quantitative and mixed methods research articles describing each study is presented in Tables 2, 3 and 4.

Table 1: Exclusion criteria listed in the final review

Reason for exclusion	Number of articles
No reference to the surgical count process	40
Nursing concerns referring to the count process but not providing any further information	6
Quality improvement projects	3
Literature reviews	1
Root cause analysis studies	1
Practice reviews	1

Table 2: Included quantitative studies (n=5)

Lead author, year, country	Design and sample	Aim of the study	Key findings	Limitations	Quality scores
Elsharydah et al. (2016)[7] United States	Design: • retrospective review • 2007 to 2011 • inclusion of abdominal and pelvic surgeries only • case controlled against similar procedures with no URI Sample: • multiple hospital sites • 1144 patients out of 8 677 863 cases • accessed through the Nationwide Inpatient Sample of Healthcare cost utilisation project of the Agency for Healthcare Quality and Research	To assess trend rates of URI incidents. To identify patient, procedure and hospital characteristics associated with URIs.	Patient-related factors: • morbidly obese patients Case-related factors: • elective surgeries • abdominal and pelvic procedures Environmental factors: • teaching and rural hospitals	Retrospective use of an administrative dataset from patient discharge information. Errors in coding and the inability to incorporate relevant data other than that provided. No follow-up information about procedures and outcomes. No ability to investigate complications from a retained foreign body. Lack of information about other risk factors, e.g. instrument counts and blood loss. Reliance on secondary data and self-reporting may be unreliable and inaccurate.	23/28
Cima et al. (2008)[8] United States	Design: • retrospective review of all actual or potential URIs reported to a sentinel event phone line • 2003–2006 Sample: • two acute care facilities on the same site • 191 168 cases • 98 ORs including three obstetric ORs and three labour/delivery suites • 68 reported URIs (34 true URIs and 34 'near misses')	To identify the incidence and characteristics of potential and actual URI events in surgical patients.	Patient-related factors: • increased vigilance for patients with a high body mass index (BMI) Case-related factors: • emergency surgeries • URIs more common in routine surgery individual factors: • breakdowns in communication • complacency around count process Environmental factors: • majority of URIs occurred with correct counts • needles and swabs most common URI	No matched comparison to similar cases that did not experience a retained foreign object. Reliance on secondary data and self-reporting, may be unreliable and inaccurate.	13/28
Gawande et al. (2003)[9] United States	Design: • retrospective case-controlled design • 1985–2001 inclusive • data review of malpractice insurance files from a single insurance company covering 22 hospitals • cases that had a URI and the control cases with similar procedures but no URI • computerised search screened by a physician to review for inclusion suitability • surgeon interviews • surgical demographics Sample: • 10 hospitals • 60 URI cases identified • four case controls per URI case	Identify risk factors for URIs to provide direction for ameliorative efforts.	Patient-related factors: • High BMI Case-related factors: • emergency procedures • unplanned changes in procedure • increased blood loss • most body cavities involved • median time frame to detection of retained foreign object 21 days • 69 per cent cases had retained sponges and 31 per cent retained instruments Environmental factors: • 88 per cent of retained foreign object involved in cases where final count was documented as correct	Reliance on secondary data and self-reporting, may be unreliable and inaccurate. Based on malpractice claims so could be underestimated. Lack of procedure-specific data.	18/28

Lead author, year, country	Design and sample	Aim of the study	Key findings	Limitations	Quality scores
Rowlands (2012)[10] United States	Design: • cross-sectional correlational design • surgical procedure as level of analysis • data from perioperative records • collected primary data from perioperative nurses Sample: • two hospitals – one academic (medical level, one trauma unit), 600 beds, 14 specialties and 18 631 procedures; one community hospital, 150 beds, 12 specialties and 6 593 surgeries • review of 2540 medical records • identified 1122 procedures with URI • 65 per cent at academic unit and 35 per cent at community hospital • 69 RNs	To examine relationships between the occurrence of an incorrect count and nurse/patient characteristics including intra-operative circumstances and staff member involvement.	Patient-related factors: • patient BMI Case-related factors: • complicated procedures • length of procedure • unplanned procedures • multiple surgical teams operating at the same time • increased number of perioperative nurses/ technologists (more than two involved in the procedure)	Human error with data extraction. Permission not given from relevant personnel to include procedure. Limited sample size of perioperative personnel checking influence of nurse characteristics. Reliance on secondary data and self-reporting, may be unreliable and inaccurate.	22/28
Greenberg et al. (2007)[11] United States	Design: • descriptive study of surgical errors in closed claims at four malpractice insurance companies • part of a larger study examining 444 surgical claims • 258 cases relevant to patient injury Sample: • 60 cases had contributing factors to communication breakdown • study discussed miscounts but were excluded from the study	To identify communication breakdowns between perioperative team members.	Individual factors: • a single intra-operative breakdown that involved a broadcast of information to multiple providers and at least three team members • 81 communication breakdowns • 11 related to miscounts • counting errors accounted for 10 of the 16 instances of communication breakdown where the nurse was the transmitter • 10 of the 12 where the nurse was the receiver contributed to a count error	Use of malpractice claims as a proxy for safety in health care. Reliance on secondary data and self-reporting, may be unreliable and inaccurate. Attending surgeon most likely to be named in a lawsuit so is highly likely to be the named instigator for communication breakdown. Does not represent all contributing factors.	16/28

Notes: BMI = body mass index, RN = registered nurse.

References

1. Elsharydah A, Warmack KO, Minhajuddin A, Moffatt-Bruce SD. Retained surgical items after abdominal and pelvic surgery: Incidence, trend and predictors – observational study. Ann Med Surg 2016;12:60–64. doi:10.1016/j.amsu.2016.11.006.
2. Cima RR, Kollengode A, Garnatz J, Storsveen A, Weisbrod C, Deschamps C. Incidence and characteristics of potential and actual retained foreign object events in surgical patients. J Am Coll Surg 2008;207(1):80–87.
3. Gawande AA, Studdert DM, Orav EJ, Brennan TA, Zinner MJ. Risk factors for retained instruments and sponges after surgery. New Engl J Med 2003:348(3):229–235. doi:10.1056/NEJMsa021721.
4. Rowlands A. Risk factors associated with incorrect surgical counts. AORN J 2012;96(3):272–284. doi:10.1016/j.aorn.2012.06.012.
5. Greenberg CC, Regenbogen SE, Studdert DM, Lipsitz SR, Rogers SO, Zinner MJ et al. Patterns of communication breakdowns resulting in injury to surgical patients. J Am Coll Surg 2007;204(4): 533–540. doi:https://doi.org/10.1016/j.jamcollsurg.2007.01.010.

Table 3: Included qualitative studies (n=3)

Lead author, year, country	Design and sample	Aim of the study	Key findings	Limitations	Quality scores
Rowlands, Steeves (2010)[12] United States	Design: • hermeneutic phenomenology methodology • face-to-face interviews with staff involved in an incorrect count within 12 hours of it occurring • demographic questions and personal experiences Sample: • two hospitals – one academic, medical centre, 500 beds, 26 ORs, 13 specialties covering complex surgery, 140 nurses and technicians, 18 631 procedures; one community hospital, 150 beds, 7 ORs, 13 specialties (minimal complex), 35 nurses and STs, 6593 surgeries • 22 participants (55 per cent RNs, 45 per cent STs),12 at academic medical centre and 10 at community centre	To identify retrospective narration of participant experiences regarding an incorrect count.	Case-related factors: • untidy work space • hunting down of equipment • fast-paced • many different circulating nurses individual factors: • lack of respect for others • lack of adherence to standards and hospital policy • inconsistency in count practices • not working effectively together • not sharing relevant information Environmental factors: • loud music, excessive talking, talking at critical moments when counting, deafening (not a reflection of a safety culture, more a threat to patient safety) • use of unskilled personnel to fill voids	Perspectives of surgeons were not obtained and could have provided additional information. Participants' stories may not have encompassed other structural or process information.	13/20
Riley et al. (2006)[13] Australia	• ethnography using observations and interviews • part of a larger study on communication relationships between nurses and doctors • three hospitals – large metro hospital, outer suburban public hospital and inner-city public hospital • observations 230 hours • 11 individual, semi-structured interviews with nurses as key informants • four group interviews with participants from each site. • researcher diary over two years	To explore power relationships in communication interactions between surgeons, nurses and doctors in the OR as they engage in the practice of the surgical count.	Case-related factors: • speed and efficiency in direct conflict with patient safety • dual roles for scrub nurses. Nurses unable to undertake a count due to power exercised by surgeon when having to assist. • counts not seen as important during an emergency, nurses using professional judgement • surgeons unaware of count process decisions • counts varied at each institution and disparities in interpretation of the guidelines and how they applied to each situation individual factors: • misinterpretation of hospital policy • relationships of power control between nurses and doctors, and nurses with nurses (experienced vs inexperienced)	Perceptions of other team members, such as surgeons, not sought Results derived from the larger study of communication practices between nurses and doctors and not specifically related to the count process. Rituals and practices in the count process not reflected.	13/20

Lead author, year, country	Design and sample	Aim of the study	Key findings	Limitations	Quality scores
McDonald et al. (2005)[14] United Kingdom	Design: • qualitative, ethnographic study using observations and interviews • part of a larger two-year ethnographic study exploring threats to patient safety in the OR • document analysis Sample: • large teaching hospital in northern England • 14 consultant surgeons • 14 consultant anaesthetists • 15 nurses (scrub nurse, modern matron and nursing team managers)	To explore the attitudes towards guidelines of doctors and nurses working together in surgical teams and to examine the extent to which trusting relationships are maintained in a context governed by explicit rules.	individual factors: • doctors and nurses have opposing views on protocol violation • nurses are more fastidious in adhering to documented procedures • doctors eschew guidelines and rely on experience and tactical knowledge • differing views on guidelines and what constitutes safe clinical practice affects relationships between doctors and nurses	Small sample size. Single hospital site.	11/20

Note: ST = surgical technologists, RN = Registered nurse

References:

1. Rowlands A, Steeves R. Incorrect surgical counts: A qualitative analysis. AORN J 2010;92(4):410–419. doi:10.1016/j.aorn.2010.01.019.
2. Riley R, Manias E, Polglase A. Governing the surgical count through communication interactions: Implications for patient safety. Qual Saf Health Care 2006;15(5):369–374. doi:10.1136/qshc.2005.017293.
3. McDonald R, Waring J, Harrison S, Walshe K, Boaden R. Rules and guidelines in clinical practice: A qualitative study in operating theatres of doctors' and nurses' views. Qual Saf Health Care 2005;14(4):290–294. doi:10.1136/qshc.2005.013912.

Table 4: Included mixed methods studies (n=2)

Lead author, year, country	Design and sample	Aim of the study	Key findings	Limitations	Quality scores
Butler et al. (2010)[15] Australia	Design: • exploratory descriptive study using survey • 30 months, completed in 2005 Sample: • seven hospitals (five public and two private) • 12 researchers • 140 surveys (23 questions included in the analysis) • completed by RN who was the primary nurse for cases with a URI	To identify type and frequency of count errors. To evaluate impact of various procedural and personal factors in count errors.	Case-related factors: • count errors occurred during elective surgery with one instrument and one circulating nurse • complexity of cases – type of surgery, unplanned changes, need for large quantity of items during case • rushing – fast pace, causing difficulty in completing prescribed process for the count • time pressure from surgeon/anaesthetist to get the next patient on the table • instrument handling – managing small micro needles on non-ratcheted needle holders individual factors: • documentation errors – failure to add items to count sheet, adding items to the wrong column, adding wrong item to a column, adding same item more than once • lost accountable items – recognition by team and course of action to be taken • team performance – cooperation and communication, relief circulating nurses and agency staff • behaviour of surgeons – problematic surgical technique, refusal to accept a count error	Poor survey response rate, impact on generalisability. Data based on self-reporting. High turnover of research team members. Self-selection meant that not all count errors were reported.	9/11

Lead author, year, country	Design and sample	Aim of the study	Key findings	Limitations	Quality scores
Smith, Burke (2014)[16] United Kingdom	Design: • observations and survey • observation of 15 procedures over two months that were randomly selected • survey using Likert scale and open-ended questions Sample: • one large hospital site • ten ORs, four day surgeries and two obstetric theatres • nurses, ODPs and HCAs • 65 in the sample group • 47 questionnaires returned (scrub and circulating only)	To audit nurses' perceptions of policy and competencies. To audit documentation of having read policies, who documents it's been done and effect on PDRs.	Case-related factors: • rushing • more than one circulator Individual factors: • 80.4 per cent respondents reported reading count policy • 90 per cent reported that they followed count policy (not conclusive with observations) • 20 per cent were observed to follow policy • staff observed to be multitasking, not fully concentrating on count • perceived lack of delegation, leadership, teaching, coaching • observed poor practices left unchallenged • length of service observed as having no bearing on count process being followed • observed no compliance with tray list use • no change-over counts observed	Single hospital site. Limited sample size.	6/11

Note: RN= Registered nurse, ODP = operating department practitioners, HCA = health care assistants, PDR = professional development review

References:

1. Butler M, Ford R, Boxer E, Sutherland-Fraser S. Lessons from the field: An examination of count errors in the operating theatre. ACORN J 2010;23(3):6.
2. Smith Y, Burke L. Swab and instrument count practice: Ways to enhance patient safety. Brit J Nurs 2014;23(11):590–593. doi:10.12968/bjon.2014.23.11.590.

Quality assessment

Six quantitative papers were scored against the 14 criteria, with a maximum score totalling 100 per cent. The quality score of these papers ranged between 46 per cent and 82 per cent, with an average score of 66 per cent. Three qualitative papers were reviewed against this criterion with a maximum score of 20 points. The quality scores for these papers ranged from 45 per cent to 65 per cent, with an average score of 57 per cent. Two papers were reviewed using the MMAT tool with the total of 'yes' responses divided by the total criterion (11) to provide an overall percentage assessment. The final assessment ranged from 55 per cent to 82 per cent.

All the studies related to the incidence of URI with a reported range of 68 to 1122 incidences and including a mixture of needles, sponges and instrumentation. They identified areas of perioperative practice that may have contributed to URIs during surgery or the surgical count process. The following sections present a narrative synthesis of the findings of this review under the following categories: patient-related, case-related, individual and environmental factors.

Implications for perioperative nursing practice or research

Patient-related factors

Although age, gender and comorbidities may contribute to increased risks during surgery[6], the only patient-related factor that was identified in four of the papers as contributing to URIs was a high body mass index (BMI). A high BMI may lead to deep surgical incisions that could fill with bodily fluids and make it difficult to keep track of surgical packs and instrumentation[7–10].

Case-related factors

Case-related factors encompassed emergency, unplanned and planned surgery and length of time to undertake a procedure. Multiple surgical teams, perioperative nurses undertaking dual roles and multiskilling are documented factors that may contribute to URIs. Five studies identified emergency and unplanned surgery as circumstances that contribute to incorrect counts. Emergency procedures, a change in the patient's status and a sudden change in the surgical procedure may leave insufficient time to account

for all surgical instruments and consumables at the commencement of the procedure[9,10,13,15,17]. In contrast, three papers identified planned surgery as a contributing factor, with perioperative personnel deemed more complacent during the count process for elective procedures[7,15,17].

Complications and length of time to undertake a procedure was identified as a case-related factor in three papers[10,13,15]. One study identified multiple teams in a surgical procedure as potentially contributing to an incorrect count[10], and another study identified the instrument nurse having to undertake a dual role as a contributing factor[13].

individual factors

Adherence to hospital or departmental policy was a major contributing factor discussed in five of the review papers[12–16]. This was also identified as complacency around the count process[17], with documentation errors also identified[15]. Rowlands and Steeves[12] found that teams working together ad hoc were less likely to share relevant case-related information, contributing to an incorrect count.

Individual factors contributing to incorrect counts included the type of leadership in an operating room (OR) and the manner in which tray lists were used[16]. The impact of hierarchy was identified with surgeons sometimes not allowing nurses to undertake the correct count procedure[13]. Two papers identified the need to treat other members of the perioperative team with respect in the perioperative environment as an individual factor[12,15].

Two studies documented individual factors contributing to incorrect counts as untidy instrument trolleys and the inability to find instrumentation in a timely fashion[9,12].

Difficulty in handling certain pieces of equipment (for example, ratcheted and non-ratchet needle holders)[15], and disparate views of team members in relation to count practices can contribute to a URI[14] and led to surgeons not being aware of which count process is being followed or documented[13].

Environmental factors

Environmental factors influencing the count process included rural and teaching facilities, loud music, excessive talking and nursing skill mix. Non-technical factors encompassed communication breakdowns, adherence to policy, respect for each other, hierarchy structures, multiple perioperative teams and surgical counts being documented as correct (even when the count was later found to be incorrect).

One study identified that teaching and procedures in rural hospitals may affect the outcome of an incorrect count[7]. Loud music and excessive talking along with poor skill mix were identified in another study[12]. Two studies identified that URIs were found in cases that had had a correct count documented. It was unclear why this phenomenon occurred, with the URI only picked up following routine radiography[9,17].

A breakdown in communications was identified in three papers as a major contributor to incorrect counts[11,15,17] and that the sheer pace of surgery, process pressure and time constraints were also causative factors[10,13,15].

Discussion

Papers in this review examined patient, case, individual and environmental deviations that account for inconsistencies in the prescribed surgical count standard of practice. These factors have the potential to culminate in a URI. Although the count procedure is considered a clearly defined, straightforward, step-by-step process, the integrative review studies identified instances where perioperative nurses struggle to follow the count process[7–17].

The review identified individual, non-technical factors that influence count behaviours from a multidisciplinary team perspective. Teamwork and communication include respect for each other, from surgeons, perioperative nurses and other team members. Limited communication may reduce the ability to process required information and influence the ability to follow policy and procedure. An increase in idle conversation and noise escalation were also identified as behaviours that contributed to an ineffective count process[18–22].

Time pressures related to the surgical and anaesthetic teams pushing to get patients in and out of the OR quickly evidently had a negative impact on nurses' ability to undertake the count process and complete documentation[12,15,23]. Team fatigue leading to diminished concentration and change of perioperative personnel mid-procedure was identified as a contributing factor to poor documentation and count process[9,10,24–26].

A lack of professional respect, idle conversation and noise escalation were identified as behaviours that influenced count practices in many of the papers but the missing link in the literature is why these behaviours can continually affect the way the count process is undertaken. Undertaking observational research will help to uncover why such behaviours occur in real time and increase understanding of the circumstances that lead to these behaviours.

While the surgical count is considered a technical skill, it also involves non-technical skills such as communication, situational awareness and cooperation[24,27,28]. Team communication is integral to the culture and smooth running of the HCF and an important component of reducing surgical errors[12,22,24,28,29]. It is important that individual members in the team can voice their concerns if issues arise before, during or after surgery, irrespective of their hierarchical standing[15,23].

Ineffective communication has been identified as a major causative factor for perioperative nurses failing to follow correct policy and procedure in relation to the surgical count[11,12,17,22,24,28]. The inability to follow accepted count practices is often associated with the hierarchical structure in the OR, such as nurse-to-surgeon and male-to-female ratios[11,17,29,30].

Hierarchical confrontations between experienced and inexperienced nurses contributed to junior nurses having difficulty challenging more senior staff regarding the process of undertaking the surgical count[13,23]. Likewise, perioperative nurses who have worked together for years may have adapted the count process to suit their needs and developed shared understandings based on work history[27,31,32].

The authors of several studies identified that nurses relied on their own professional judgement when deciding on what to count. This led to disparate interpretations of the guidelines and their relevance to each surgical situation[8,9,12,13,15,31,33].

Limitations

While this review has strengths, it also has limitations. A robust research process was undertaken, encompassing identifying major key words and MeSH terms. It was identified early in the research process that few studies have examined nurse perceptions of incorrect counts and the patient-related, case-related and environmental factors perceived by perioperative nurses in undertaking a surgical count process.

Only five of the ten papers in this review described nurses' concerns regarding the count process and provided some reflection on causative factors and preventable actions. Studies not available in English were omitted from this review. Such studies may have provided further insights into the phenomenon. Research papers on surgical counts may not represent all works in relation to nurses' perceptions of the count process and therefore may have limited the scope of this review. Finally, appraisal of empirical research is somewhat subjective. However, using previously validated tested tools[2,3] provided rigour in the review process in relation to evaluating and scoring papers based on content and methodology.

Conclusion

Throughout this review it was evident that patient, case, individual and environmental factors may contribute to URIs during surgery and that these factors have some impact on the surgical count process. Quantitative data about how many URIs occur and the causative factors related to this phenomenon is in abundance. However, qualitative research into these contributing factors and the implications for perioperative nurses is limited. The surgical count process is a key component of the perioperative nurse's responsibility towards patient safety, yet this review demonstrates that there is limited research about this subject and the contributing factors that may affect their ability to carry out the prescribed process.

Empirical evidence supports the contention that human error continues to occur in relation to the surgical count. Although the surgical count is sometimes considered onerous and repetitive, counting and documentation are pivotal tasks related to patient safety in surgery. The safety culture of an organisation is the product of individual and group norms, beliefs, attitudes and values. These attributes determine an organisation's commitment to managing critical safety issues. A culture of safety should provide a framework that limits variability in practice and, therefore, has the potential to reduce inconsistency and human error.

References

1. Whittemore R, Knafl K. The integrative review: Updated methodology. J Adv Nurs 2005;52(5):546–553. doi:10.1111/j.1365-2648.2005.03621.x.
2. Kmet LM, Lee RC, Cook LS. Standard quality assessment criteria for evaluating primary research papers from a variety of fields. Vol. 22. Alberta, Edmonton: Alberta Heritage Foundation for Medical Research; 2004.
3. Pace R, Pluye P, Bartlett G, Macaulay AC, Salsberg J, Jagosh J et al. Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. Int J Nurs Stud 2012;49(1):47–53. doi:10.1016/j.ijnurstu.2011.07.002.
4. Souto RQ, Khanassov V, Hong QN, Bush PL, Vedel I, Pluye P. Systematic mixed studies reviews: Updating results on the reliability and efficiency of the Mixed Methods Appraisal Tool. Int J Nurs Stud 2015;52(1):500–501. doi:10.1016/j.ijnurstu.2014.08.010.
5. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine 2009;6(7):e1000097. doi:10.1371/journal.pmed.1000097.
6. Triantafyllopoulos G, Stundner O, Memtsoudis S, Poultsides LA. Patient, surgery, and hospital related risk factors for surgical site infections following total hip arthroplasty. ScientificWorldJournal 2015;1–9. doi:10.1155/2015/979560.

7. Elsharydah A, Warmack KO, Minhajuddin A, Moffatt-Bruce SD. Retained surgical items after abdominal and pelvic surgery: Incidence, trend and predictors – observational study. Ann Med Surg 2016;12:60–64. doi:10.1016/j.amsu.2016.11.006.
8. Cima RR, Kollengode A, Garnatz J, Storsveen A, Weisbrod C, Deschamps C. Incidence and characteristics of potential and actual retained foreign object events in surgical patients. J Am Coll Surg 2008;207(1):80–87.
9. Gawande AA, Studdert DM, Orav EJ, Brennan TA, Zinner MJ. Risk factors for retained instruments and sponges after surgery. New Engl J Med 2003:348(3):229–235. doi:10.1056/NEJMsa021721.
10. Rowlands A. Risk factors associated with incorrect surgical counts. AORN J 2012;96(3):272–284. doi:10.1016/j.aorn.2012.06.012.
11. Greenberg CC, Regenbogen SE, Studdert DM, Lipsitz SR, Rogers SO, Zinner MJ et al. Patterns of communication breakdowns resulting in injury to surgical patients. J Am Coll Surg 2007;204(4): 533–540. doi:https://doi.org/10.1016/j.jamcollsurg.2007.01.010.
12. Rowlands A, Steeves R. Incorrect surgical counts: A qualitative analysis. AORN J 2010;92(4):410–419. doi:10.1016/j.aorn.2010.01.019.
13. Riley R, Manias E, Polglase A. Governing the surgical count through communication interactions: Implications for patient safety. Qual Saf Health Care 2006;15(5):369–374. doi:10.1136/qshc.2005.017293.
14. McDonald R, Waring J, Harrison S, Walshe K, Boaden R. Rules and guidelines in clinical practice: A qualitative study in operating theatres of doctors' and nurses' views. Qual Saf Health Care 2005;14(4):290–294. doi:10.1136/qshc.2005.013912.
15. Butler M, Ford R, Boxer E, Sutherland-Fraser S. Lessons from the field: An examination of count errors in the operating theatre. ACORN J 2010;23(3):6.
16. Smith Y, Burke L. Swab and instrument count practice: Ways to enhance patient safety. Brit J Nurs 2014;23(11):590–593. doi:10.12968/bjon.2014.23.11.590.
17. Cima RR, Kollengode A, Storsveen AS, Weisbrod CA, Deschamps C, Koch MB et al. A multidisciplinary team approach to retained foreign objects. Jt Comm J Qual Patient Saf 2009;35(3):123–132.
18. Berridge EJ, Mackintosh NJ, Freeth DS. Supporting patient safety: Examining communication within delivery suite teams through contrasting approaches to research observation. Midwifery 2010;26(5): 512–519. doi:10.1016/j.midw.2010.04.009.
19. Gillespie BM, Harbeck E, Kang E, Steel C, Fairweather N, Chaboyer W. Correlates of non-technical skills in surgery: A prospective study. BMJ Open 2017;7(1): e014480. doi:10.1136/bmjopen-2016-014480.
20. Milligan J, Cole T. The sterile field: Mad cows and Englishmen. ACORN J 2010;23(3):18.
21. Rydenfält C, Johansson G, Larsson PA, Åkerman K, Odenrick P. Social structures in the operating theatre: How contradicting rationalities and trust affect work. J Adv Nurs 2012;68(4):783–795. doi:10.1111/j.1365-2648.2011.05779.x.
22. Undre S, Sevdalis N, Healey AN, Darzi SA, Vincent CA. Teamwork in the operating theatre: Cohesion or confusion? J Eval Clin Pract 2006;12(2):182–189. doi:10.1111/j.1365-2753.2006.00614.x.
23. Lindwall L, Von Post I. Habits in perioperative nursing culture. Nurs Ethics 2008;15(5):670–681. doi:10.1177/0969733008092875.
24. Bleakley A, Hobbs A, Boyden J, Walsh L. Safety in operating theatres: Improving teamwork through team resource management. Journal of Workplace Learning 2004;16(1/2):83–91. doi:10.1108/13665620410521549.
25. Jun K, Blaha J. Avoiding retained foreign objects. OR Nurse 2012;6(6):34–40. doi:10.1097/01.ORN.0000421979.59820.a1.
26. Norton EK, Martin C, Micheli AJ. Patients count on it: An initiative to reduce incorrect counts and prevent retained surgical items. AORN J 2012;95(1):109–121. doi:10.1016/j.aorn.2011.06.007.
27. Gillespie BM, Gwinner K, Fairweather N, Chaboyer W. Building shared situational awareness in surgery through distributed dialog. J Multidisc Healthcare 2013;6:109–118. doi:10.2147/JMDH.S40710.
28. Schimpff SC. Improving operating room and perioperative safety: Background and specific recommendations. Surg Innov 2007;14(2):127–135. doi:10.1177/1553350607301746.
29. Agrawal A. Counting matters: Lessons from the root cause analysis of a retained surgical item. Jt Comm J Qual Patient Saf 2012;38(12):566–574.
30. Kaufman G, McCaughan D. The effect of organisational culture on patient safety. Nurs Stand 2013;27(43):50–56.
31. Farrell V, Higbie V, Cleveland S. Auditing and improving the sponge count process. OR Manager 2003;19(3):13–14.
32. Gillespie BM, Wallis M, Chaboyer W. Operating theater culture: Implications for nurse retention. West J Nurs Res 2008;30(2):259–277. doi:10.1177/0193945907303006.
33. Kiroff G, Hurley J. System error in the surgical count. ANZ J Surg 2002;72(10):755–756. doi:10.1046/j.1445-2197.2002.02537.x.