

Study of the Design, Validation and Evaluation of Nursing Audit Tool in Perioperative Care

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ABSTRACT

Background: It is expected that health care will be provided at the highest quality. To achieve a high level of quality in nursing perioperative care is necessary the continuous monitoring, measurement and subsequent evaluation of quality indicators. Perioperative care is defined as care for a patient before, during and immediately after the end of the operation. An audit is appropriate instrument for the monitoring of quality of care. Audits inspect the status of the established processes and lead to the prevention of risks. The quality of perioperative care focuses on the safety and health protection as patients so staffs of operating theatres.

Aim: The aim of the paper is to present the checklist, designed for audits of nursing perioperative care. This paper describes a methodology of making the checklist and the procedure was validated. Another aim is to present the results of the external audits, when the proposed checklist was used.

Methods: The first step in the research framework was extensive search of relevant legislation and literature in the databases Scopus and Medline for the period 2010–2015. Then the checklist for nursing audits on the operating theatres was designed. The checklist was evaluated by a pilot audit and expert interviews with experts. Reliability and validity of the checklist was verified by the five audits of nursing perioperative care and with comparison of the audit's results. The audit was realized in the course of the entire perioperative process, i.e. from the beginning of an operation to finishing of the surgery. Subsequently the checklist was again discussed together with the results of the audits on the individual departments.

Results: The study has verified the applicability and validity of the checklist and brought a feedback about the level of nursing perioperative care from five acute care hospitals. Perturbations in processes of hygiene-epidemiological regime were the most serious. Least three adverse events were logged in the course of all audits.

Conclusions: The evaluation was submitted to the management audits of hospitals as the basis for the planned improvement of nursing practice within the operating tract. The control sheet on quantitative verification passes within acute care hospitals in Czech Republic.

KEY WORDS

quality, operating theatre, nursing care, nursing audit, perioperative care

INTRODUCTION

Every surgery is considered to be a risky job for all people involved at the operating theatre. A degree of risk is perceived foremost at the level of hazard to health of the patients and personnel. However, the roots of risks in perioperative environment are of deeper nature. An unpredictable reaction of the patient can arise. Both people and instruments can fail. Certain hazards can arise from establishing inappropriate operational measures. Numerous threats represent financial damage for the third party, e.g. the hospital. In order to ensure a smooth course of the surgery, all its aspects

(personal, financial, technologically – operational) must run flawlessly. Technical problems can be prevented by regular inspections and instrument calibrations. Human failure or momentary drop in efficiency, human efficiency and reliability, can be prevented by systemic measures (1). Hence it is necessary to set such rules and systemic measures which alert in case of potential risk before its occurrence or prevent risk incidence.

Some rules are created by health institutions themselves based on their operation and on department

routines. Other rules are strictly given by legislation. Ministry of Health has determined in the Act n. 372/2011 Sb., on health services and conditions for their administration, a duty making all health institutions liable to introduce internal audits of quality levels. Due to the fact that not all institutions dispose of financial resources to fund external audit services, the Ministry has created so called Minimal assessment standards and quality and safety indicators, and also a manual for their determination and monitoring. These are determined by Decree 102/2012 Sb. (2). Minimal quality requirements, including recommended procedures, are defined by seven Departmental Safety Objectives. These objectives were created in 2010 based on the most hazardous areas in medicine and in nursing (3). Perioperative care is closely related to all these objectives as demonstrated in the list below.

The words in *italics* indicate areas of single Departmental Safety Objectives transformed into procedures in perioperative care:

1. Perioperative nurses are supposed to conduct active *patient identification*.
2. They are supposed to adopt such measures to avoid *mistaking patients or administration or place of administration*.
3. They care about safe positioning of the patient on the operating table from the point of view of *risk of fall*, but also from the point of view of burn risk, decubitus risk, or peripheral nerve paralysis caused by malposition, etc.
4. Regardless of how infectious the surgical wound is, all invasive operations must proceed under high hygienic and epidemiological conditions. Clients who are being operated on are more susceptible to *nosocomial infections* due to having a surgical wound.
5. *Intercommunication* of all members of the operating team before the start of perioperative safety procedure, during its progress, and also immediately after its termination is extremely important.
6. Upon termination of the operation there is a *transfer of patients* to the Intensive Care Unit. The information about the operation should always be passed in a complete, clear, and understandable, both oral and written form.
7. Prescription of *hazardous drugs* is firstly a responsibility of an anaesthesiologist (3).

In risk management, the most important role is played by people. According to Marx (4): „Under the valid principles of formal logic, stating that all people make mistakes and health professionals are also people, logically health professionals also make mistakes.“ The most important factor in decreasing prevalence of

mistakes is personnel education. The workers who are not interested in further education need to be motivated. If the people have knowledge, skills, and motivation, they should also be provided the conditions to perform their work in quality and by the rules. If the workers have skills, whether they perform work in a required quality can be checked by regular audits. Auditing means a process which should be an integral part of the quality management system. The conditions of established procedures and can be investigated and that leads to prevention of malpractice (5). In case of repeated audit findings of adequate compliance with established procedures, the management can then start concentrating on another field of quality improvement. If some flaws are detected, the management should not ask whose fault it is and why. The department manager should in cooperation with the quality manager carry out e.g. a root analysis which can reveal the true reasons for breaching the requirement. The standards are suggested in correspondence with the cause and by implementing these standards in practice the probability of error occurrence is lowered and reliability of human agent is increased (1).

OBJECTIVES

The objective of the contribution is to introduce a methodology of the research instrument, a check list created as a ground for realized audits in nursing perioperative care. As the check list has already been verified in practice, the partial goal of the contribution was to assess nursing perioperative care and present the most important findings of single audits.

METHODOLOGY

The study consisting in the analysis of nonmedical employees during the course of perioperative process by means of active observation method started in November 2013. Observation of nursing care in the environment of central operating theatres became a basis for later expert interview execution and a basis for five audits in five hospitals. The six-month period of observation served as a mapping tool of specific perioperative nursing care and for obtaining necessary knowledge in the field quality management and risk management.

The observation phase was followed by another research method selected in order to clarify the question of setting perioperative safety procedures according to practice of single departments. A method of semi structured interviews with operating theatre managers was chosen. The terms of semi structured interviews with the respondents were always arranged ahead. The only criterion before the interview realiza-

tion was an oral and written informed consent given by the respondent with the recording of the interview using a Dictaphone and with further verbatim transcript of the interview.

The method of active observation and semi structured interviews was complemented by literature review focused on information survey on availability of assessment tools and on techniques of audit execution in the environment of operating theatres. The literature review using variations of key words in English and Czech language was carried out in the databases of Scopus and Medline in the period of time between years 2000 and 2015. The selected key words are: audit and perioperative safety list, perioperative process, standardized questionnaire and perioperative care.

Based on the literature review, legislative of the Czech Republic, and results of above mentioned applied research methods, a suggested design of a check list was created. The methodology of the proposed checklist is primarily based on the World Health Organisation recommendations and its 'Surgical safety checklist' (6). The checklist serves as an evaluation tool in nursing audits performed during perioperative care administration. Each tool introduced into the research practice should fulfil the following criteria: specificity, validity, sensitivity, practicality. The checklist should firstly be characterised by specificity, in particular in such specific field such as perioperative care. The checklist should be valid, it means that it should measure the features which are supposed to be measured, e.g. quality of care. The checklist should be sensitive, which signifies its ability to detect changes, e.g. the case in which nurses do not conduct numerical checks of auxiliary material. Another criterion of every quality designed tool is its practicality. Hence the work with the tool should be simple and understandable (7). Single criteria have been met.

The checklist designed by the author is focused on two main areas of observation – safety and hygienic and epidemiological part. Safety section of the checklist deals with nursing jobs that should be performed by the perioperative nurses immediately before operation, during the operation, and immediately after the operation is finished. The checklist contains items related to the patient identification, localization of the side, and identification of the intervention type. The checklist further aims at examination of a proper patient bedding either for the reason of decubitus incidence risk or the reason of prevention of causing burns to the patient being operated on during perioperative use of high frequency coagulation. The list contains

items referring to numerical checks of medical material and there is also space for record of other process problems or undesirable events occurring during the audit.

Reliability of the checklist was verified using the list in practice. Before that there was conducted a repeated audit by the project team members and by expert interviews with staff nurses from involved hospitals. There were also present independent perioperative nurses and representatives of Joint Accreditation Board. Reliability of the checklist was also verified in a pilot study at one of the surgery care providers.

Announced audits were performed within two months of the year 2014. The mandatory criteria of the initiated audits included: approval of the medical facilities of survey execution, of the selected method and choice of operation administration lasting minimally one hour. The selection of the operation depended on the head nurses of the operating theatres. The choice was always dependent on the schedule and load of the workplace. This reason did not allow the researchers to observe the course of similar operations (e.g. abdominal surgical operations) in all hospitals. Observation of the perioperative process was targeted only at nursing procedures of perioperative nurses, not on the procedures performed by a surgeon and by the anaesthesiological team.

Before the sole audits, the auditor (author of this article) intended to consult internal regulations of the selected care providers in advance. Only four out of five medical institutions provided for this procedure. Prior consultation of the perioperative standards of individual hospitals allowed the auditor to adjust their assessment criteria of the audited operations. Assessment criteria of the auditor were created using literature review, the World Health Organisation recommendations, the safety objectives of the Ministry of Health and Resorts, and requirements of the accreditation standards, etc. were all taken into account. It is obvious that the criteria of the auditor differed only minimally from the hospital standards. The auditor preferred an assessment of nursing procedures compliance according to internal hospital regulations. The auditor together with the hospital management could thus obtain undistorted feedback within the survey results. In case the monitored audited procedures were not based on internal regulations, they were assessed using the auditor's criteria. Auditor differentiated whether the procedures were fully or partially in concord with the audit criteria or whether the criteria were not in concord, which meant the standard or the criterion was not met.

After the audit there was performed an analysis of obtained findings. As an outcome of the study there were organized seminars with perioperative nurses, operating theatre management, quality managers and assistant managers of nursing care. These seminars were followed by discussions of practicality and validity of the audit tool and its degree of detection of inaccuracies. Once the results were processed, they were provided to the managements of all involved health care providers.

SELECTED RESULTS

The realized audits revealed both nursing processes, which were suggested certain changes, and also examples of good practice which can be further spread by means of benchmarking of the operating theatres. The most serious findings contained, for instance, negligence in verification process in case of neutral electrode application as a means of prevention of burns using monopolar coagulation (Table 1). In one incident it was negligence of the perioperative nurses during the checking procedure whether the patient had been isolated from the metallic parts of the operating table.

As it can be seen in Table 1, in two cases out of five, perioperative nurses did not perform identification of the operated patient. There is a high risk of mistaken patient identity in case of negligence in active patient identification. Particularly in the situation when in one hospital the printed operation programme was not in concord with the information in the electronic information system. In two institutions there occurred a common practice of leaving the pre-medicated patient unattended in the hospital corridors of the surgical ward.

The forms of the nursing perioperative record of one of the providers did not contain the information about double-check of the allergy anamnesis of the operated patient, or there was missing information about the type and location of the operation administration also belong to important findings. The audit positively verified the fact that double-checks of the

allergy anamnesis verification of the type and location of the cut in one side intervention were performed in all observed cases. The side of operation and the place of administration were frequently marked in patients already at the ward.

The most critically assessed cases were related to hygienic-epidemiologic practice. The situation in certain operating theatres where there were incidents of absent decontamination of used medical equipment was alarming. The instruments were only rinsed under running water due to lack of time. After drying they were put in steriliser. The auditor also considered repeated sterilisation of disposable equipment, including sewing material and preoperatively unused tampons, as incompetent behaviour.

A well-known safety recommendation is to strictly check the amount of all armamentarium, including the finest instruments. Considering the fact that in one case, after the operation, the auditor found a needle on the floor in the operating theatre, there could not have been performed an appropriate recalculation of all medical equipment – including the smallest items. According to the auditor's opinion the above listed lapses primarily arose from shortage of staff being on duty on the day of the audit. The smell of cigarette smoke present in the premises of the surgery ward recorded during one incident was perceived as very serious and unpardonable.

As it is demonstrated in Table 2, two operations out of five were performed totally aseptically. In some cases there were shorter surgical masks used, in other recorded case there was an incident of unsterile mask kit. In several cases the process of complete drying of skin disinfection before the operation was omitted. In three cases out of five the staff violated the Regulation 306/2012 Sb. about conditions of prevention and spreading of infectious diseases and about hygienic requirements. The jewellery was worn during the working hours of the staff. On the contrary, in the remaining two providers the rule was strictly obeyed and also the jewellery – earrings were prohibited at the ward.

Table 1 Comparison of selected audit results among individual providers of perioperative care

Monitored areas	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E
Patient identification	no	yes	yes	yes	no
Allergy anamnesis check	yes	yes	yes	yes	yes
Type and side of administration check	yes	yes	yes	yes	yes
Check of neutral electrode application	no	yes	bipolar coagulation	yes	no

Table 2 Comparison of selected results of audits in the area of hygienic-epidemiological nursing care

Monitored areas	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E
Maintained sterility during manipulation with masks	yes	no	yes	no	yes
Wearing jewellery, gel and polished nails	yes	no	no	no	yes
Ashing hands after operation	no	yes	yes	yes	no

Table 3 Occurrence of exceptional incidents in the environment of surgery wards

Monitored areas	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E
Occurrence of process problems during operations	Conflict in longeta number; Perioperative detection of Hepatitis B	none	Burning out of the coagulation cable	none	none
Previously recorded undesirable incidents	A patient's fall from the hospital trolley	Burning the patient	side confusion	malfunction of an instrument	Burning the patient; perioperative decubitus occurrence; malfunction of an instrument

Monitoring prevalence of process problems within the meaning of exceptional incidents was also included in the checklist of monitored items. The authors considered the probability of occurrence of such events during the five audits to be very low. The opposite came true and during the five audits, in two hospitals there occurred three such instances. (see Table 3). In hospital C there was an unexpected incident of burning out the electrocoagulation cable in place of electrode. The defect, however, was also demonstrated by flying sparks. The ignition or fire accident did not happen. In hospital A the operating team learnt only during performing the operation that the patient suffers from Hepatitis B. At the same time the number of longetas calculated before the operation did not match the number of longetas reported after the operation. A sterile longeta was for incomprehensible reasons moved from the container with gauze material, probably by the auxiliary nurse. The missing material was then found. The occurrence of such incidence was also recorded in previous years as it is recorded in the second row of Table 3.

Every single workplace, even though it is liable to valid legal norms, put into the work their own know how. Usage of standard number of surgical needles in the needle case or recalculation of the medical aids performed in two people was very positively evaluated by the auditor. Standard numerical checks of abdominal cloths and longets, both eyed surgical needles and atraumatic needles, gauze squares and swabs of various sizes in all types of operations not only in large

scale abdominal surgeries with peritoneum disruption, but also in laparoscopic and small scale short-time surgical interventions. So far there is no legislative background for the way how and what medical tools must be strictly recorded in perioperative care. The degree of observance depends on pre-set rules in a concrete medical facility, and also on self-consideration of each member of staff.

The finding that in one of the five hospitals the skin state is checked before the operation in case of assessed risk of decubitus formation was affirmed and welcome. According to the local standard the degree of risk is tied to the age, patient anamnesis, and length of the operation. As long as the risk is recorded, the operated person has the places of predilection lubricated. In some wards there is an emphasis given to thorough door closing supporting the overpressure and laminar air flow in the operating theatre. One out of the five institutions was distinguished by the standard describing changing of shoes from common shoes used at the operating theatre to the rubber shoes dedicated strictly to operating theatre use.

The overall image of the quality of perioperative care was in cooperating institutions perceived generally positively. Not only the most of the nonmedical personnel has demonstrated professionalism and loyalty to their position, but also good relationships and level of communication taking place among perioperative and anaesthesiology nurses. The degree of stress in patients before the surgery is frequently minimized by introducing and providing basic information

by the perioperative nurses in the range of their competence. In summary, perioperative nurses expressed positive emotions about their profession. The nurses are highly motivated to be further educated. Unfortunately, not all nurses are allowed to educate themselves. The management of each hospital was informed about the results. In accordance with the findings of absences the first changes have already been suggested. The positives empower us.

DISCUSSION

The dissimilarities in nursing practice which were found by audits reflected in differently set know how of individual medical institutions. Each of the care providers had particular internal regulations adapted to organisational conditions of each ward. For example, perioperative safety protocol, whose introduction was put in force by the World Health Organisation (6), could be modified by some workplaces according to established practice. Other differences were observed in documentation and used medical equipment. The principal inaccuracies in nursing routines were revealed by means of audits and the checklist. The checklist implements all particulars of newly introduced tool into practice as pointed by Gladkij (7). The checklist fills requirements of practicality, specificity – accuracy, and validity – relevance, and also sensitivity for discrepancy detection.

The dissimilarities in care providers were exhibited in certain cases, e.g. under conditions of checking the safe placement of the operated patient. Whereas in one of the operating rooms they use adjustable safety belts and lead windows, which allow comfortable transfer of the patient onto the operating table, in other case a mobile stretcher is used, from which the patient is transferred onto the operating table either autonomously with professional inspection, or with manual help of the personnel. Variability of the procedures brings a large scale of footing mechanisms, which are to prevent problem origination. For instance, at one of the workplaces there was an incident of negligence in checking the safety positioning of the operated patient. The check should have been executed particularly in terms of prevention of the risk of burns. If the patient had not had applied the neutral electrode, or if they were touching metallic parts of the operating table when using the monopolar coagulation, the risk of burns in patients would have been rather high. In respect of the fact that three operating theatres presented that they experienced an undesired incident of 'burns in patient' in the past, there should be priority attention paid to this sphere.

In this context the mentioned situation was compared to the research of Štefková (8), who focused on perioperative undesired events and discrepancies viewed by perioperative nurses reflecting their work experience. Perioperative nurses were asked to formulate what events they had met during their practice. In most cases the burns of patients were mentioned. As mentioned above, in one out of five institutions the predilected places are preventively treated to avoid occurrence of decubitus. According to the research of Štefková (8), the perioperative contusions were encountered by 21 % of perioperative nurses and more serious decubitus was recorded by 10 % of perioperative nurses. An importance of numerical checks was also mentioned in the contribution. The respondents of Štefková have in the course of their career met negligence of material in the surgical wound in 14 %, 6 % of perioperative nurses have experienced fire ignition, which means 8 respondents out of the total number of 125 answers.

LIMITATIONS

The limits of the study can be perceived in relation to the process of audit itself and in relation to the auditor as a person. Auditor's insufficient experience with auditing activity was minimized after participating in three certified courses on auditing theme, a half-year observation regime in central operating theatres and after running pilot audits (firstly in an industrial company – in order to obtain experience, later in the operating theatre – in order to verify the checklist).

Another limit lies in changing legislation. According to the legislation there must be continuously adjusted criteria of audited activities also in future. An obstacle can be seen in a short period of time dedicated to orientation in the number of internal regulations, which differ in every single institution. A noticeable defect is also the fact that the audits were not performed in similar or directly the same operations. However, this was not possible considering the organisational aspects of single institutions. Observations of various operations brought certain advantages. From the results the auditor and the hospital management obtained broader range of answers on how the processes at single workplaces were run.

It is necessary to recall the fact that audits were realized within one operation on one particular day, with random selection of observed personnel. It is possible that under other circumstances the results would vary. However, the authors operate with a hypothesis that if there is one instance of failure to perform according to the standard. There exists a risk of reoccurrence of si-

milar case in future. Therefore it is necessary to set the rules clearly, comprehensibly, and to check adherence to the rules on regular basis.

CONCLUSIONS

The audit has brought several findings. Many of these findings were controversial. Some may concern the reader. However, it is important to accentuate that the results originate out of only five performed audits, one audit in each hospital. The other day, with different personnel on duty, with other patient, other operation, could bring different results.

The cause of all deviations probably dwells in pre-set processes. These processes could have been sufficient in the past considering the past state of medical knowledge and equipment. After certain period of time and progress in medicine the situation could have changed and the set processes started to be insufficient. Provided this aspect is accompanied by press of time factor, which is a decisive one in the operating theatres, the risk of inaccuracy occurrence in nursing care increases. Depending on this fact, a need for audits grows too.

If the audits had not been performed, there would not be revealed failures and the situation would fail to improve and would last till the present time. If the audit had not been run, it would not be possible to state which processes were functioning properly and which processes needed to be cared for intensively and which needed less attention. To sum up, there would be no awareness of what the state of running processes was.

Based predominantly on negative findings, the management introduced certain measures. Ordinary nonmedical personnel was acquainted with the results, which led to understanding for an introduction of necessary changes – for example in regular intervals there will be education provided to each profession (medical and nonmedical) present at the surgical ward, focused on hygienic-epidemiological regime of operating theatres. There will be more emphasis given to correct performance of patient identification and last but not least there will be more attention paid to prevention of perioperative burns in patients. Within the association of all the hospitals there is unification of the documentation in progress. The management works continuously on the quality of perioperative care.

The objective of the realized audits was also an evaluation of the checklist which was used during the audits to record observed findings. The pilot audit had shown that some items on the list proved useless or

they poorly reflected the current situation. These items were consequently removed from the list. Thanks to the methodical procedures, the whole study has proven feasibility of the checklist. A valid checklist makes a result usable in practice.

The article was among others aimed at highlighting an importance of quality check in operating theatres and during providing sophisticated and specific nursing perioperative care. „To be able to improve something we have to make certain changes. To be able to make certain changes we need to understand them first. You cannot manage what you cannot measure. What you cannot measure, does not exist“ W. Edwards Deming (9).

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