Chapter

Improving the Quality of Care in Surgery: The Role of Guidelines, Protocols, Checklist and the Multidisciplinary Team

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Abstract

Today's surgical environment is a complex multifaceted one that has eroded the traditional doctor patient relationship. Increasingly a discerning public expects surgery to be efficiently performed and be free of complications. Decisions about choosing a doctor are now data driven and the health system must adapt accordingly in order to attract patients. The streamlining of the patient: treatment: outcome continuum can be made better with the use of various standard operating procedures such as the use of guidelines, protocols and checklists with a multidisciplinary team where all stakeholders are actively engaged. This is especially important in developing countries for the potential savings in lives and finances. Still the need for individualization and good clinical judgment remains. The basis of all our decisions however must be evidence-based, and once applied in the best interest of the patient will benefit health care systems. There is good evidence that this is the case, and the only limitation currently is the lack of more widespread implementation.

Keywords: quality of surgery, guidelines, checklists and protocols, multidisciplinary teams

1. Introduction

Medical knowledge is increasing at an exponential pace and as such standard of care applicable a decade ago may not necessarily apply today, depending on the condition and the level of evidence supporting the change. Patients now have access to a wide range of information, proportionate on their resources, motivation and level of education. In fact they can be seen no longer as 'patients' but 'clients' who are consumers and shoppers of care. As such they expect that their doctors will be professional, compassionate and with up-to-date knowledge and skills, providing at least a basic standard of care that *guarantees* a good outcome. The duty of a certain standard is owed to the public by the doctors, nurses, administrators, and all other members of the health team irrespective of the patient's resources, social class or religion.

Oftentimes there is a gap in new medical knowledge and its translation to clinical practice, and on average this can take up to a decade [1, 2]. The consequences of these evidence-to-practice gaps are potentially significant, with risk of mortality, morbidity and significant healthcare and financial impact. Importantly, once there is

a concerted effort to improve quality in clinical care, gradually over time we will see improved results [3, 4] across the spectrum of quality outcomes. For example there is evidence that cancer outcome can be improved by up to 30% with optimum application of best evidence with a 10% reduction in cancer mortality if the evidence for best practice was used.

Confronted with overwhelming evidence that substantial harm was being done to the public due to inadequate patient safety and the failure to practice using the best currently available evidence, the World Health Assembly (WHA) mandated the WHO to take a lead in setting global norms and standards and supporting countries in preparing patient safety policies and practices [5]. In 2008 the WHO choose the 'safety of surgical care' for its second Global Patient Safety Challenge. This Safe Surgery Saves Lives Program brought together surgeons, gynecologists, anesthetists, ward and theater nurses, operating theater managers, patient advocates, infection control experts and biomedical engineers to identify opportunities to improve the safety of surgical patients [6]. The groups were tasked with considering four pillars for improved outcome: infection prevention, anesthetic safety, teamwork and communication and measurement of surgical capacity and outcomes. It has been a decade since the launch of this mandate and although the measures identified were not new, they certainly brought into focus the importance of clinical practice guidelines, checklists and protocols as tools available to improve the quality of surgical care. Increasingly more recently especially with the importance of a multimodal approach to the treatment of cancers, an additional area of focus to improve the quality of surgical care is the role of multidisciplinary rounds.

The process for the successful systems improvement was divided into three stages: teaching, which has a widely variable performance rate; mandates/regulations, which results in modest level of performance improvement; and systemization including data feedback loops, coaching, and checklists, which result in high reliability [7]. Once implemented, this improvement is noticeable both at 'well-performing' hospitals and 'worse-performing' hospitals [8] and would have a substantial impact in achieving more from the limited spending allocated annually in the national budget to healthcare. This is because meaningful implementation of these safety measures occurs when there is a shift in the mindset of the surgeon from solo practitioners (autonomous cowboys) to a team-based or 'pit crew' approach. Dr. Gawande [7] noted that this change in the operating room involves humility, discipline, and teamwork. He emphasized three critical pause points for surgery as identified by the checklist: before the induction of anesthesia, before the incision in the skin, and before the patient leaves the operating room (OR). Whereas the purpose of the checklist was to help the OR team remember important details that may be missed during an operation, it certainly encourages teamwork and communication.

2. The scope of the problem

Surgical care is essential in improving population health. It is estimated that there is one operation performed annually for every 25 human beings alive [9]. With this volume there is a great potential source for a public health crisis. Globally perioperative mortality has declined significantly over the past 50 years, with the greatest decline in developed countries. It is in developing countries where avoidable surgical complications disproportionately account for a large proportion of preventable medical injuries and deaths globally [10]. A surgical complication is any undesirable, unintended and direct result of an operation affecting the patient that would not have occurred had the operation gone well as could reasonably be hoped [11]. Whereas complications of medical care may occur as a consequence of

both the illness and the treatment, in general its regarded as 'a complication' when it was not caused by the underlying disease [12]. This 'complication' is perhaps better labeled 'an adverse event' which is defined as an unintended injury caused by medical management rather than by the underlying disease or condition of the patient [13]. In developed countries up to 17% of all inpatient surgeries will have a major complication [14]. Nearly 30% of all adverse events were as a result of negligence, and these events were much higher in the elderly. Often complications occur as a result of errors of commission or acts of omission. While accepting that 'To err is human', the Institute of Medicine in recognizing this fatal flaw still called for a 50% reduction in the number of unexpected deaths in American hospitals [15].

The WHO estimates that 7 million surgical patients suffer significant surgical complications and 1 million die during or immediately after surgery and akin this to the maternal and neonatal survival crisis with its suggested public health intervention and educational campaign in an attempt to improve surgical safety and quality of care [5]. The surgical mortality in developing countries is 10 times higher than developed nations [9] and deaths attributed to anesthesia are 1000-fold higher, clearly demonstrating the need to improve safety in this setting [16, 17].

Its estimated that 8 million amendable deaths occurred in 2015, with 96% in low and middle income countries. The value of lost output resulted in a projected cumulative loss of $11.2 trillion in these countries during 2015–2030, with a potential economic output loss of up to 2.6% of gross domestic product (GDP) in low-income countries by 2030 [18]. Quality of care in surgery has garnered increased attention both globally, regionally and nationally [5, 19–21]. For example the introduction of guidelines for preoperative investigations for elective surgery in 2012 at the Queen Elizabeth Hospital in Barbados resulted in savings of US $40,745.50 per year, mainly due to a significant reduction in the number of full blood count and chest X-ray tests that were ordered [20]. There is therefore a strong ethical and economic case for promoting is can be reduced with the implementation of evidence-based best practice in developing countries. Following the implementation of the WHO SSC, evidence suggests it is particularly effective in a resource-poor setting. The largest decrease in complications (74.3%) was in low-income or middle-income countries [22].

3. Guidelines, checklist and protocols

Clinical practice guidelines are evidence-based recommendations for the treatment of patients with specific problems. Guidelines are developed by groups that combine people with expertise in conducting systematic reviews and health economic analyses, with those with the expertise in the clinical area (from health professionals and patients) [1]. The uptake of clinical practice guidelines has been inconsistent despite their potent to improve the quality of care and patient outcome. The WHO recommends that for each problem to be addressed by the development of guidelines, the following steps should be taken:

a. Define the specific issue to be addressed by the guidelines

b. Undertake a systematic review of the evidence available

c. Develop recommendations linked to the strength of evidence

d. Draft guidelines and for each recommendation it is best to list "highly recommended", 'recommended' or 'suggested'. These should be shared initially with all stakeholders for feedback before a final version.

e. Finally the guidelines should be tested through pilot evaluations with appropriate feedback and a full dissemination strategy implemented.

The use of guidelines usually covers common surgical problems and brings together the evidence and risks/benefits considerations for certain recommendations such that the best decisions can be made. There is still some individuality that is left to the managing team. Oftentimes guidelines are cumbersome documents of multiple pages and interpretation and implementation is made easier by a one-page summary document in simple easy to understand wording and should be readily available to all areas where patients are cared for.

Guidelines differ somewhat from protocols and checklists as here the adopted strategy should be strictly adhered to. The checklist was adapted from the field of aviation, where it was developed in response to a crash after investigations revealed the crash was as a result of a pilot failing to perform one of the steps necessary for safe takeoff [23]. Another similar area is Formula 1 racing where a high level of teamwork, focus and performance lead by team leader is necessary for optimal outcome. Meticulous training and practice is required for ideal F1 pit stop. It takes significant resources to change behavior and incorporate its use into routine daily practice [6, 7, 23]. In adjusted analysis, the use of and compliance with a checklist-based safety system was associated with a more than a 30 percent decrease in mortality and morbidity respectively [24, 25]. The decrease in surgical adverse events after implementation of checklists seems to be greater in developing countries [26] but even in well performing systems in developed countries stand to improve [27], proving that even highly skilled operating room teams need tools to help them achieve optimal results. Still it is in the low and middle income countries that the checklist use is not universally promoted or implemented, suggesting an opportunity for advocacy and education in the use of this safety tool [6].

It has been shown that the communication failures are common, affecting up to 30% of interactions in the operating room [28] and the use of a checklist may prevent more than half of the communication failures from occurring [29] by orienting the team to the individual patient, alerting each member to potential complications and encouraging team members to voice concerns when they notice an error occurring [30]. The proper use of the checklist may be a marker for teamwork and cooperation within the operating room. This calls into question whether it is the improved teamwork or the checklist. While it may be difficult to be absolutely sure of the underlying reasons for the use of checklists and improved patient outcomes, and while it is accepted that the checklist culture improves the safety culture within an institution, a firm sense of commitment is necessary, as it may become a routine activity of checking off boxes without actually driving behavior change or improvement, giving a false sense of security [31, 32]. The lack of benefit after the widespread implementation of a checklist in a hospital system is well documented and may in fact represent a more 'real world' situation [33] but also speaks to the need sometimes to modify these instruments to suite the local population.

Protocols are a set of standardized orders governing the management of a surgical problem and as such represent another means of attempting quality improvement in surgery. The development and introduction of standardized enhanced recovery and fast-track protocols in the preoperative management of surgical patients occurred over 20 years ago [34] and is well known for the benefits of reduce length of hospital stay, infection rates and costs as evidenced by various publications [35, 36]. A well-executed enhanced recovery protocol requires a multi-disciplinary team buy-in (both medical personnel and administration) and the active participation of both the patient and family. The pillars of this successful program will include the principles of carbohydrate loading, early feeding, early

ambulation, goal-directed fluid therapy, and opiate-sparing analgesics. Newer anesthetic techniques, minimally invasive surgery and an emphasis on greater patient education will reduce the physiologic stress of surgical trauma and therefore less organ dysfunction. The ERAS protocols also uses evidence-based adjustments in the use of nasogastric tubes, drains, urinary catheters, preoperative bowel preparation and the use of antibiotics [37]. Although they were popularized with colorectal surgery, they have now been extended to a wide spectrum of other gastrointestinal and non-gastrointestinal surgery with maintenance of the gains [38–40].

4. Multidisciplinary meetings

The multidisciplinary approach is a concept that has been around for at least 50–60 years [41]. In fact the theoretical concept is revolutionary and as the base of medical knowledge increases the role of the single "super doctor" is now becoming obsolete. Daily hundreds of new articles filled with research done by even larger numbers of medically trained personnel enter the world of medicine. The National Health Service (NHS) defines this concept as follows: "A multidisciplinary approach involves drawing appropriately from multiple disciplines to explore problems outside of normal boundaries and reach solutions based on a new understanding of complex situations" [42]. This definition in itself is very broad but at least offers a framework in which to operate. There are some definitions used for defining the concept of the Multidisciplinary Team (MDT). According to the NHS in the UK, "a Multidisciplinary Team Meeting is defined as a care activity, a care activity referring to an individualized point of care service for patients." Furthermore, a MDT meeting is defined as, "...a meeting of the group of professionals from one or more clinical disciplines who together make decisions regarding recommended treatment of individual patients. Multidisciplinary Teams may specialize in certain conditions, such as Cancer. Clinical decisions are made based on reviews of clinical documentation such as case notes, test results, diagnostic imaging, etc. The patient may or may not be present [43].

According to specialist opinion across many surgical fields, the role of multidisciplinary teams is integral in improving patient quality care as it relates to time to time to diagnosis and treatment. There is also an economic benefit as there would be less requests for unnecessary tests therefore improving resource management [44]. In fact although there is much evidence that these multidisciplinary systems are effective in improving different parameters as it relates to different fields in medicine, the very definition of a multidisciplinary team itself is lacking. Not only is a standardized definition lacking but there is no well defined, internationally recognized set of criteria that can be used to determine if the "MDT" being assessed in each study is operating at a certain standard. It is therefore reasonable to assume that the evidence may not always point in the accurate direction due to the assessment of possibly "substandard" multidisciplinary teams littering the pool of literature. This being said, there is still overwhelming support for the use of these teams in recent literature and this is most certainly a positive indicator considering the previous point.

As mentioned before there are many advantages to the use of MDTs in clinical practice however many obstacles to their effective implementation remain. The one to one traditional clinician:patient interaction is lacking in many ways and MDTs seek to fill those gaps. One of the most obvious advantages is the sharing of knowledge across specialties. This leads to new perspectives on patient care and improved resource management as it relates to patient investigations. The multidisciplinary team meeting is a learning opportunity for specialists and this increases their

exposure to evidence-based protocols and guidelines from other disciplines. One cannot fail to mention that the patient perceives this as having the benefit of a second opinion and in addition to improving the clinical intervention through consultation, may improve their perception of the quality of care they are receiving. There are also several reasons to explain the difficulty in integrating the use of multidisciplinary teams as a routine part of patient care. The ambiguity of who is needed at these meetings may lead to having not enough, or too many clinicians attending the meetings. It is an investment of time that may not be perceived as effective by some. There is an additional structure required to maintain these meetings which would mean more finances poured into human resources. If no dedicated staff for this purpose is chosen then the question of which existing department would be responsible for holding multidisciplinary meetings for which subset of patients [45].

According to the WHO in February 2015, cancer is a leading cause of morbidity and mortality worldwide, with approximately 14 million new cases and 8.2 million cancer-related deaths reported in 2012 [46]. Great interest has been generated in the application of the use of multidisciplinary teams toward the management of patients with potentially high risk and major cancer surgery [47]. In 2012, the NHS published a retrospective cohort study where breast cancer survival in intervention and non-intervention groups not treated by an MDT were compared with intervention and non-intervention groups treated by an MDT. This study found a significant decrease in mortality among the intervention group for those treated by an MDT [48]. Another example of the benefit of this application is in a retrospective cohort study done by Stephens MR et al. where a cohort of patients for R0 oesophagectomy treated by an MDT was compared with a cohort of patients treated by six individual general surgeons. A statistically significant difference in major parameters was found. Operative mortality (5.7% vs. 26%, chi2 = 8.22, P = 0.004), 5-year survival (52%vs. 10%, chi2 = 15.05, P = 0.0001) and rate of open and closed laparotomy and thoracotomy all had statistically significant improvements [49]. This is one of the very few pieces of available publications providing evidence of the utility of MDTs in high risk surgery and although encouraging, there is still more need for evidence as it relates to specific compositions of MDTs as the results may differ based on the specialists involved in the planning of these cases.

Some professionals are of the belief that a multidisciplinary team should be available for all surgical cases in order to improve the outcomes of all surgical patients who seek tertiary care. It is important to note that this may not always be an efficient use of resources. For instance, in 2015, Chien-Chou Pan et al. explored the survival rates of patients treated by an MDT for stage III and IV non-small cell lung cancer had statistically significantly higher survival rates than those not treated by an MDT. For those with stages I and II, the survival rates did not differ significantly [50]. This is an example that supports the use of multidisciplinary teams for high risk cases as the benefits may only be worth the risk in these cases.

Although the little evidence emerging thus far is in support of the implementation of MDTs, the favorable results may be partly due to flaws in study design, various biases in enrollment of participants for these studies and other factors associated with the presence of the MDT itself. For example, because this is a relatively newly explored concept, there is a lack of randomized controlled trials. Doing such studies would also raise ethical concerns especially as the MDT is already viewed by many as a higher standard of patient care and denying a patient this resource when available may be seen as questionable morally. Patients enrolled for studies for MDTs may be dependent on the referring physician and it may be reasonable to assume persons who are more likely to survive from further intervention would be in the majority of those referred to an MDT. It is also important not to forget that when a patient is referred to an MDT, they may have several investigations

Targets/goals	Suggested intervention
Establish baseline practice at the local institution	Audit of current practice
Identify barriers to implementation	Interviews & surveys: surgeons, nurse anesthetists, residents, physicians
Identify relevant interventions	Systematic review of the literature
Develop guidelines and protocols based on evidence and consensus	Modified Delphi method, both evidence & expert opinion incorporated

Table 1.
Implementation of guidelines/checklist/protocols.

expedited that would have otherwise not have been done or would have taken longer to be completed. These factors are all important to consider in interpretation of increased survival rates seen in the existing literature.

Overall, it is evident that the presence of the multidisciplinary team has been beneficial for specific patient populations. Whether this benefit is directly as a result of the team itself or the associated factors such as decreased time to investigations or other similar factors may not necessarily be of significant concern. As this topic continues to be explored in the literature and is also being applied in increasing numbers of patient care institutions, we will continue to learn about the utility of these teams both in a general sense and as it relates to more specific patient populations (**Table 1**).

4.1 What are the barriers to implementation?

Providing optimal care to patients based on the best evidence is difficult as the half-life of knowledge is estimated to be approximately 3–5 years therefore it is very difficult for physicians to keep up with the medical literature. Multiple strategies are often required to make changes and provide optimal care. Knowledge translation is a dynamic and iterative process that includes synthesis and dissemination of the best available evidence in an ethically sound manner to improve health, provide more effective health services and products and strengthen the healthcare system. It requires collaboration between multiple stakeholders and multifaceted interventions such as audits and feedback, reminders, educational strategies, decision aids and standardized orders. Physicians usually play a leading role in implementation as they are usually opinion leaders. Additionally they are well respected and trusted by all members of the health care team. Especially in developing countries where there is a lot to be gained some answers may lie outside the physician or hospital. Measures such as legislation, public education and advocacy, revision of the medical curriculum, patient handbooks and other health promotional material may all have a role in eliciting change in behavior. Varying committed members of the health care team may have to assume the role of the opinion leader or 'champion'. Recommendations are more likely to be followed if they are simple, inclusive, with a high level of evidence but are more likely to succeed with an evaluative component and with rewards and disincentives.

5. Conclusions

The modern surgical environment is complex with multiple components perhaps too much to be considered for any one individual. The dynamic nature of medical knowledge in an environment of an informed patient dictates that consumers

of health care in a globalized world expect the best outcome. A multidisciplinary approach using the best available evidence is just the first step in knowledge translation. The entire health system may need to change. This is the active process of implementation among the multiple stakeholders that will be necessary to effect change. The combination of a multidisciplinary team using guidelines or protocols aided by checklists is one way of ensuring quality in the surgical health care system. Consideration can also be given to a rewards and disincentives packages as we seek to change behavior. Of course, once implemented and with appropriate audits, we should see positive results, that is, improved quality care. We recognize that this is a dynamic process, with active monitoring of the literature for emerging/changing evidence, and revisions at designated intervals as necessary.

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