Practice of Surgery—Decision, Precision, Incision

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“Happy is he who has no serious consequences of his erroneous diagnosis to regret”

Fredrick H Marsh

Safe practice of surgery and safety in surgery have always been the priority in any scientific discourse. Practice of surgery is married to the word “precision” [1]. In fact, whenever precision in any social conduct is called for, we name it “clinical precision.” When extreme precision is attributable, we term that “surgical precision” or even “surgical strike”. Even with the best of surgical precision, safety in surgery remains an ever-evolving goal of practice in surgery. Our operating rooms (ORs) are reported to be the common places of preventable and inadvertent errors [2]. These preventable steps can bring about consequential or inconsequential harm to our patient. Surgical checklists have become a mandatory norm in our ORs to help prevent these potential unwanted events. Decision-making in surgery is the foundation of the entire surgical safety paradigm. The process of a decision to ensure best possible safety starts with adherence to the basics of initial clinical approach. Irrespective of the availability of a complete clinical record, when called for, we as surgeons should revise afresh, the seven-step surgical crescendo. The surgical crescendo includes:

1. Good history and good observation of the patient.
2. Complete clinical examination.

3. Correlation of the first two steps with application of the knowledge of anatomy, physiology, and possible pathologies.
4. Differential diagnosis - a differential diagnosis is entertained and a mental process of exclusion or reinforcement sets in motion.
5. Filtration of the differentials with aid of biochemical, bacteriological, or imaging investigations.
6. Less invasive interventions, e.g., upper/lower GI endoscopy, colonoscopy, bronchoscope etc.
7. Diagnostic intervention/laparoscopy/biopsy etc.

While this crescendo is playing in our mentation, there are two simultaneous processing systems helping us in surgical decision making, i.e., pattern recognition process and the analytical process, as shown in Table 1 [3]. The pattern recognition is a subconscious, intuitive process based upon heuristic/belief-based, and is contextual. It is automatic and frugal. The analytical process is conscious, thoughtful, logical, and reasoning-based. It includes conceptualizing and is deductive. This process is slow and consumes mental capacity. Our aim is to respect the dictum of “*primum non nocere*.” To achieve this goal of not doing any harm to our patient, these processes are supported by some well-structured guidelines. These include informed consent, systems approach, and checklists. The mentation processes and these guidelines are further supported by the emerging realization of some basic tenets of safe surgical practice such as the belief in surgery being a team-based endeavor, the surgeon believing in sharing information and continuous communication with her team members, the surgeon respecting the principle of evidence-based medicine, the surgeon being conscious of outcome-based appraisal, the surgeon being accountable to self as well as institutional audit, and finally the surgeon appreciating patient reported outcomes as being the ultimate goal. We are diligent about

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Table 1 Pattern recognition process and the analytical process

Pattern recognition	Analytical
Subconscious, intuitive	Conscious, thoughtful
Belief-based, heuristic	Logic and reasoning
Contextual	Conceptual
Automatic	Deductive
Fast, frugal	Slow, consumes mental capacity

Fig. 1 Reason's model of error

these, yet there are unintentional errors during our practice. Our surgery involves continuum of innumerable steps. Each step is akin to a slice of cheese. All the steps make up for many such cheese slices. During the process of surgery, these slices are rotating independently. Consequential harm comes only when there is an alignment of the cheese slice holes leading to an error step gaining a straight trajectory through them as shown in Fig. 1. This error model was described by reason, as akin to “Shooting an arrow through rotating slices of Swiss cheese” [4, 5].

Surgical precision and incision decision involve culmination of a complex decision-making process. In addition to the known processes, much of this involves many unknowns, like intuition etc. Intuition in itself is a play of cognitive and psycho-heuristics [6, 7]. The unknowns including intuition are developed by, clinical experience, constant observation of different surgeons performing same procedures, and preceptorship with a mentor [8]. A safe decision will take into account all these processes and error models. Developments in technologies, media informed patient, continuing innovations, emergence of smart tech savvy systems, and heightened social expectations about faster recovery are adding to the complexity of surgical decision-making [9–11]. The surgeon of tomorrow will have to respect the “TEAM and POEM” philosophy. The TEAM stands for “Technology challenge management, Evidence based practice, Auditing & accountability, and multidisciplinary involvement” and POEM stands for “patient-oriented evidence that matters.” The process will be further helped by integration of the wisdom gained from innovations, molecular basis of disease, anatomical navigation, genetic understanding, information technology, nanotechnology, robotics, and imagination. The surgeon will have to integrate these into practice of surgery and engineer a safe pathway, i.e., imagineering [12].

Decision, precision, and incision will continue to be a debate and dilemma in best of clinical minds capable of integrating best of processes as well as intuition. In this era of evidence-based medicine, the clinical decisions pursuing safety in surgery will continue to be determined by many unknowns and therein lies the opportunity to study this subject further. The tech savvy surgeon of future will continue to be challenged by various other tangibles and intangibles, so lucidly described in literature as shown in Table 2 [13].

Table 2 Clinical decisions to be challenged by various other tangibles and intangibles

Basis for clinical decisions	Marker	Measuring device	Unit of measurement
Evidence	Randomized controlled trial	Meta-analysis	Odds ratio
Eminence	Radiance of white hair	Luminometer	Optical density
Vehemence	Level of stridency	Audiometer	Decibels
Eloquence (or elegance)	Smoothness of tongue or nap of suit	Teflometer	Adhesion score
Providence	Level of religious fervor	Sextant to measure angle of genuflexion	International units of piety
Diffidence	Litigation phobia level	Every conceivable test	Bank balance
Confidence	Bravado	Sweat test	No sweat
Applies only to surgeons			

References

1. Agarwal BB (2009) Tattoo-a navigational tool, a lighthouse for biomolecular level precision in surgical endoscopy – Newton's apple or Eve's. *Surg Endosc* 23(5):1166–1167. <https://doi.org/10.1007/s00464-009-0441-3>
2. Agency for Healthcare Research and Quality. Medical errors: the scope of the problem. Fact sheet. [Accessed November 20, 2017]. Publication No. AHRQ 00-P037. Available at: <http://www.ahrq.gov/qual/errback.htm>
3. Campbell G, Watters DAK (2013) Making decisions in emergency surgery. *ANZ J Surg* 83(6):429–433. <https://doi.org/10.1111/ans.12193>
4. Reason J (2000) Human error: models and management. *BMJ* 320(7237):768–770. <https://doi.org/10.1136/bmj.320.7237.768>
5. Agarwal BB, Chintamani AK, Goyal K, Mahajan KC (2012) Innovations in endosurgery-journey into the past of the future. To Ride the SILS Bandwagon or Not? *Indian J Surg* 74(3):234–241. <https://doi.org/10.1007/s12262-012-0583-8>
6. Agarwal BB (2009) Patient safety in laparoscopic cholecystectomy. *Arch Surg* 144(10):979. <https://doi.org/10.1001/archsurg.2009.180>
7. Francis DMA (2009) Surgical decision making. *ANZ J Surg* 79(12):886–889. <https://doi.org/10.1111/j.1445-2197.2009.05139.x>
8. Agarwal BB, Agarwal N, Dhamija N, Chintamani (2017) Mentoring in surgery-mentor, Parshuram, Dronacharya, Krishan. *Indian J Surg* 79(1):58–61. <https://doi.org/10.1007/s12262-017-1689-9>
9. Agarwal N, Chintamani (2016) Cashless, tech-savvy future surgeon. *Indian J Surg* 78(3):171–172. <https://doi.org/10.1007/s12262-016-1513-y>
10. Agarwal N (2016) Even handed future of surgery-ambidextrous, serious gamers with innate left hand laterality. *Indian J Surg* 78(6):509–510. <https://doi.org/10.1007/s12262-016-1514-x>
11. Agarwal BB, Nanavati JD, Agarwal N, Sharma N, Agarwal KA, Manish K, Saluja S, Agarwal S (2016) Biomolecular inflammatory response to surgical energy usage in laparoscopic surgery: results of a randomized study. *Surg Endosc* 30(5):1733–1741. <https://doi.org/10.1007/s00464-015-4408-2>
12. Agarwal BB (2008) Journey of carbon literate and climate conscious endosurgeon having head, heart, hands & holistic sense of responsibility. *Surg Endosc* 22(12):2539–2540. <https://doi.org/10.1007/s00464-008-0213-5>
13. Issacs D, Fitzgerald D (1999) Seven alternatives to evidence based medicine. *BMJ* 319:1618