



ISSN: 2091-2749 (Print)
2091-2757 (Online)

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How to cite this article

Jay N Shah. Non-technical skills
for surgeons, the NOTSS.
Journal of Patan Academy of
Health Sciences.
2018Dec;5(2):1-3.

Non-technical skills for surgeons, the NOTSS

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The cognitive and social skills are important categories of 'non-technical skills (NTS)' for surgeons' performance and is increasingly being appreciated and accepted widely.¹ Adverse events during hospital stay occur in up to 10-17% patients, half of which can be prevented because they occur not for the lack of knowledge, technical skills or equipment but simply due to failure of NTS.¹⁻⁴ Surgery (39.6%) and medication (15.1%) related events accounts for majority of these adverse events.² Errors in nonoperative management are responsible and causes more adverse events than surgical technique.³

In a review of fatal medical accidents by the Japan Medical Safety Research Organization categorized the events into technical skills, NTS and inevitable progress of disease. It revealed that the causes of deaths were NTS in 34 (46.6%), disease progression in 33 (45.2%) and only in 2 (5.5%) due to technical skills and 2 (5.5%) undetermined.⁴ Further analysis of NTS revealed that the causes of deaths in 33 (97.1%) cases were due to errors in three areas- situation awareness 14 (41.2%), team work 8 (23.5%) and decision making 3 (8.8%). Thus, training in certain specific subcategories of NTS may effectively reduce adverse events.⁴

The NTS behavior includes 'cognitive, social and personal skills' that complement technical skills for safe and efficient task performance of individual and team in care of patients.^{5,6} The surgical NOTECHS behavioral marker includes four categories- 'leadership and management, teamwork and cooperation, problem solving and decision making, situation awareness among sub-team (of nurses, surgeons and anesthetists)' and are important part of surgical skills necessary for surgeons and the team to become aware to manage their situation appropriately.⁶

The reduction in adverse events after the introduction of 'surgical safety checklist' advocated by WHO, did not prevent the errors to occur as thought, because 'ticking off' the checklist is not sufficient to prevent failure of NTS of surgeons (NOTSS) as shown in six years analysis (2002-2008) of 27370 physician self-reported adverse occurrence, with 25 wrong-patient and 107 wrong-site procedures and death due to wrong-site procedure.⁷ The wrong-patient procedures were mainly due to errors in communication (100%), and wrong-site occurrences were due to errors in judgment (85.0%). Interestingly, the study found that 'nonsurgical specialties' contributed equally to the adverse outcome related to wrong-site occurrences and wrong-patient procedures.⁷ Thus, NOTSS has wider implications beyond surgical discipline, and NTS system is now widely recognized, incorporated in trainings and practices of all medical specialties; for examples, Anesthetists Non-Technical Skills (ANTS)⁸, surgeons OR NOTSS⁹, circulating nurse¹⁰, scrub nurse¹¹, ward rounds¹², GI Endoscopy¹³, medical students 'Medi-StuNTS'¹⁴, foundation doctors NTS (FoNTS)¹⁵ etc.

Surgical NOTECHS for rating surgical teams has been amended from aviation tool to assess 4-domains of 'situational awareness, communication, teamwork, and decision making' developed upon the basis of aviation pilots NOTECHS.¹⁶ The gradual evolution and adaption of behavioral rating tools in surgery from various observational systems, like OTAS (Objective Teamwork Assessment System)¹⁷, Oxford NOTECHS¹⁸, has led to the development of NOTSS (Non-Technical Skills for Surgeons)¹⁹ by the subject experts (surgeons) to observe and rate surgeons.

The behavioral NTS training is a valuable lifelong learning and essential for a competent surgeon. It is already a part of 'surgical education and training (SET)' curriculum of Royal Australasian College of Surgeons for the continuous professional development (CPD) because the experienced surgeons may become deficient in NTS over the time.²⁰ The

comparative study reveals surgeons with >20 years of experience did not perform as well in comparison to the trainees in all 12 elements, and performance worsened over time in 6-elements- 'considering options, implementing and reviewing decisions, establishing shared understanding, setting and maintaining standards, supporting others, and coping with pressure'. This shows the importance of training to optimize surgeons daily life to overcome personal and environmental factors.²¹⁻²² The availability of resources may influence safe surgery and for such a modified version 'NOTSS-vrc' is now available for variable resource counties of LMIC (low-and middle income countries).²³

In conclusion, awareness of NOTSS system and its importance should be an integral part of life-long learning and continued education for professional development for surgeons. The NTS in surgery and medicine by large should be included in formal curriculum for teaching learning and assessments in medical schools and allied health sciences

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