

Non-technical skills and the future of teamwork in healthcare settings

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Acknowledgments

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Introduction: A team of experts is not an expert team

Safe and effective delivery of care relies very heavily on teamworking. Teamwork can be defined as a '*set of interrelated behaviours, actions, cognitions and attitudes that facilitate the required task work that must be completed*'.¹ Healthcare teams are required to look after patients when they are transferred between primary and secondary or tertiary care settings, or within a single setting when patients require review and input by multiple specialists. Handovers between teams or, increasingly in the present era of working time restrictions, between shifts are thus ubiquitous and they need to be carried out effectively to ensure safety and quality in care.^{2,3} Even within a single healthcare environment, however, such as an operating theatre, an intensive care unit or a hospital ward, the assembly of expert doctors or nurses typically involved in looking after a patient does not necessarily make up an 'expert team'.⁴ To add to the challenge, team membership can be transient and inconsistent – which makes the creation of cohesive teams with a shared vision even more problematic. Psychological science has long shown that team performance and effectiveness cannot be taken for granted but need to be measured, analysed and improved.⁵⁻⁷

Why is effective teamworking so challenging to achieve within hospitals? Multiple interrelated factors are likely to contribute to this. The nature of healthcare is changing rapidly – biomedical advances require increasing subspecialisation, whereas novel technologies (e.g. laparoscopic, endoscopic or robotic procedures) have significant learning curves, thereby requiring practitioners to devote lengthy periods of time to training in order to achieve proficiency so that the benefits of such techniques can be realised. Medical and nursing schools, on the other hand, have traditionally focused on uni-specialty training – systematic interprofessional training is only recently emerging in medical and nursing education. These developments mean increased training in professional and specialty 'silos'. It is thus not surprising that doctors and nurses who train in this individualistic manner cannot 'automatically' perform well as a team when brought together.^{8,9} Effective teamworking, non-confrontational team leadership, and clear communication such that all communicating parties have the same perception of what is meant to happen in a patients' care plan, cannot simply be assumed – just as they cannot simply be assumed in other industries outside healthcare or indeed within the context of daily life.

In the remaining sections of this article, we provide a brief overview of teamworking, team skills and team training within healthcare; we highlight barriers to effective team training within healthcare organisations; and we conclude with some directions for the future.

Teamwork, non-technical skills and team training as emerging concepts in healthcare

Compared to other industries which rely on experts to deliver safe and effective operations in a reliable and predictable manner, such as commercial aviation,¹⁰ and the oil industry¹¹ to name but a few, healthcare came to the realisation that team performance and team skills matter rather recently (about 15-20 years ago).¹² This realisation came mainly as a result of major reports that highlighted the contribution that lack of team skills made to error and patient harm.^{13,14}

Anaesthesia was the first speciality that embarked upon analysing and improving team skills and performance in the early to mid-1990s.^{15,16} The approach taken was borrowed from commercial aviation, where aeroplane crews are routinely trained in a range of skills that are deemed critical for safe flight

operation, yet go beyond pilots' technical ability to fly a plane.¹⁰ These skills, widely defined as 'non-technical' skills, include cognitive (i.e., thought processes, including decision-making and situation awareness), social (i.e., behaviours, including leadership and communication) and personal resource (i.e., managing stress and fatigue) skills required for safe and effective operations.^{1,10} To train flight crews in these skills, commercial airlines devised 'Crew Resource Management' (CRM) training modules^{10,17} – which evolved over years to become standardised training modules covering high-risk, crisis scenarios, typically involving simulators, trained instructors¹⁸ and assessment/feedback methods.^{19,20} Following the aviation approach, anaesthetists came up with similar in style 'Anaesthesia Crisis Resource Management' (ACRM) training programmes.^{15,16} Subsequently, CRM-inspired training has been applied to surgery,²¹⁻²⁴ emergency medicine^{25,26} and other specialties.²⁷

Table 1: Selection of non-technical skills and teamwork assessment instruments with validation evidence (adapted from Sevdalis, Hull and Birnbach 2012)

Tool	Skills assessed	Reliability evidence	Validity evidence	Clinical application
Observational Teamwork Assessment for Surgery (OTAS) ⁴¹	Global operating theatre team performance: Communication Cooperation/back up behaviour Coordination Leadership Team monitoring/Situation awareness	Inter-rater reliability	Content, Concurrent and Construct validity	Applicable to Surgical, Anaesthetic and Nursing personnel in the operating theatre It can be used by both clinical and non-clinical assessors Validated training programmes for novice users are available
Revised Non-Technical Skills (Revised NOTECHS) ⁴²	Non-technical skills: Communication/interaction Situation awareness Cooperation/team skills Leadership/managerial skills Decision-making	Internal consistency	Construct validity	Applicable to Surgical, Anaesthetic and Nursing personnel in the operating theatre It can be used by both clinical and non-clinical assessors It captures performance in routine and crisis situations
Oxford Non-Technical Skills (Oxford NOTECHS) ⁴³	Non-technical skills: Communication/interaction Situation awareness Cooperation/team skills Leadership/managerial skills Decision-making	Inter-rater reliability	Predictive, Concurrent and Convergent validity	Applicable to Surgical, Anaesthetic and Nursing personnel It can be used by both clinical and non-clinical assessors It captures performance in routine and crisis situations
Trauma Non-Technical Skills (T-NOTECHS) ⁴⁴	Non-technical skills during trauma calls: Communication/interaction Situation awareness/coping with stress Cooperation/resource management Leadership Assessment/decision-making Assessed skills based on OTAS and Revised NOTECHS	Inter-rater reliability Internal consistency	Construct validity	Applicable to any speciality attending a trauma call It can be used by both clinical and non-clinical assessors
Non-Technical Skills for Surgeons (NOTSS) ⁴⁴	Non-technical skills: Communication/teamwork Leadership Situation awareness Decision-making	Inter-rater reliability	Convergent validity	Applicable to surgical personnel only It is designed for use by senior surgeons A 2-day training programme for novice users is available
Anesthesiologists' Non-Technical Skills (ANTS) ⁴⁶	Non-technical skills: Teamworking Task management Situation awareness Decision-making	Inter-rater reliability	Content validity	Applicable to anaesthetic personnel only It is designed for use by senior anaesthetists
Scrub Practitioners' List of Intra-operative Non-Technical Skills (SPLINTS) ⁴⁷	Non-technical skills: Communication/teamwork Task management Situation awareness	Inter-rater reliability	Content validity	Applicable to operating theatre scrub nurses/practitioners It is designed for use by senior scrub nurses/practitioners
Ottawa Crisis Resource Management Global Rating Scale (Ottawa GRS) ⁴⁸	Non technical skills and global CRM performance: Problem solving Situational awareness Leadership Resource utilisation Communication	Inter-rater reliability Internal consistency	Construct validity	It is broadly applicable to health care teams in acute settings (has been tested in resuscitation and management of critically ill patients) It is aimed at assessing the effect of simulation-based training modules on participants' relevant skills

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<p>Mayo High Performance Teamwork Scale (MHPTS)⁴⁹</p>	<p>8 compulsory and 8 elective items that reflect CRM-related non-technical skills</p> <p>Compulsory items: A leader is clearly recognised by all team members. The team leader assures maintenance of an appropriate balance between command authority and team member participation. Each team member demonstrates a clear understanding of his or her role. The team prompts each other to attend to all significant clinical indicators throughout the procedure/intervention. When team members are actively involved with the patient, they verbalise their activities aloud. Team members repeat back or paraphrase instructions and clarifications to indicate that they heard them correctly. Team members refer to established protocols and checklists for the procedure/intervention. All members of the team are appropriately involved and participate in the activity</p>	<p>Inter-rater reliability Internal consistency</p>	<p>Construct validity</p>	<p>It is broadly applicable to health care teams in acute settings (has been tested in the context of CRM training) It is aimed at assessing the effect of CRM training modules on participants' relevant skills</p>
<p>Observational Skill-based Clinical Assessment tool for Resuscitation (OSCAR)⁵⁰</p>	<p>Non-technical skills and global performance of a resuscitation team: Communication Cooperation/back up behaviour Coordination Leadership Team monitoring/Situation awareness Decision-making Assessed skills based on OTAS, ANTS and Revised NOTECHS</p>	<p>Inter-rater reliability</p>	<p>Content and Convergent validity</p>	<p>Applicable to Anaesthetic, Medical and Nursing personnel attending a resuscitation It can be used by doctor and resuscitation officer assessors</p>

Barriers to team training in healthcare environments

The aviation and healthcare approaches to teaching and training non-technical skills and effective teamworking have similarities and differences.²⁸ Similarities include the heavy reliance on simulators, the progressive quest for linking training to some sort of objectively or at least systematically assessed team processes and/or outcomes, and an ever increasing sophistication in the assessment of team performance and individual operators' non-technical skills (Table 1). Significant differences, however, are also evident: within healthcare, CRM-style training is yet to be standardised – including the faculty who deliver it, the process of

assessing and debriefing individuals' or teams' performance, and also the regularity of the training.^{29,30} Simulation-based modules, especially those that involve high-fidelity simulated environments (such as simulated wards or operating theatres for full team simulation exercises: see Figure 1), remain largely beyond the financial, technical and human resources of the majority of hospitals.^{31,32} Further, reliance on enthusiastic faculty to design and deliver training modules means that these modules often lack standardisation and also sustainability,²⁹ whereas the overall culture (including the medico-legal framework) within healthcare remains less focused on teams and more focused on individuals.

Figure 1: High fidelity simulated ward (top) and operating theatre (bottom) environments



Looking into the future: Improving teamworking in healthcare environments

The need for systematic training in team and non-technical skills is not really a novel idea. More than 10 years ago in the USA, the Institute of Medicine report *'To Err is Human'* recommended CRM-style training within healthcare to improve patient safety¹³ – and the same recommendation was reiterated in its follow-up report *'Crossing the Quality Chasm'*.³³ In the UK, in 2000, the Department of Health's *'An Organisation with a Memory'* also explicitly acknowledged the role of teams in the delivery of safe care to patients.¹⁴ An ever expanding evidence base, now beginning to appear in systematic reviews, is establishing the correlation between good team and non-technical skills and high-level clinical performance,^{34,35} as well as the effectiveness of team training in improving healthcare providers' skills and attitudes and also patient outcomes.^{32,36-38} In the light of these developments, improving team and non-technical skills is becoming a strategic priority within healthcare institutions and also within medical and nursing schools internationally. At a national level in the UK, groups of experts have been set up and have been specifically requested to explore the role of non-technical and team skills within the NHS, including the Department of Health Human Factors Reference Group (<http://www.chfg.org>) and the National Never Events Taskforce, to give just two examples. Implementation, however, has often proved to be problematic, as discussed above.

We take the view that provision of systematic team training is a key part of the change required in the immediate future.²⁹ Adequate evidence supports the concept that standardisation of the

overall approach to team training is now due – in terms of a defined 'package' to be offered, assessment instruments with validation evidence to support them, and trained faculty who are able to deliver consistently high-quality assessment and feedback.^{29,30} Strategically, not all hospitals will require large and expensive simulation 'centres' to achieve these goals – whereas the 'kit' has often monopolised attention within healthcare, simpler simulators can provide valuable solutions to practising a team crisis scenario if used effectively by high-quality faculty. A pool of faculty should thus be developed and periodically revalidated – the specifications of how this should be done have been derived from healthcare team experts, and their major focus is on people, not equipment.³⁰

Eventually, performance benchmarks will be required and will need to be developed – a process that is still in its infancy but has started within the context of technical/procedural skills.³⁹ These will allow trainees to evaluate where they are in relation to their peers, using large databases of nationally collected performance samples. These can subsequently be used formatively (to guide further training) and also summatively (for 'pass/fail' assessments).⁴⁰ The process will be considerably more difficult for team skills, as these are harder to measure objectively; however, the current evidence base (Table 1) suggests that the foundations for this process have been laid. Integration of such assessments into trainees' portfolios and also into senior healthcare providers' (consultant/attending level or equivalent) annual appraisals will also be required, such that the acquisition and maintenance of these skills become an integral part of career progression and continuing professional development.

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