Letter to the Editor

Non-technical Skills: Building Safer and Healthier Workplaces

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In this letter to the editor, we explain how human error and non-technical skills influence patient safety and overall performance in healthcare. We argue that your technical expertise is not a guarantee to patient safety; alongside you must have competence in non-technical skills to have good clinical outcomes. Finally, we invite you to reflect on the culture around human error within your workplace, and to reflect on your own personal responsibilities as academics, clinicians, and policy makers in Sri Lanka.

Adverse events in health systems are a major threat to patient safety and quality of care globally, including in Sri Lanka (Kohn et al., 2000; Mallawarachchi & Dharmarathna, 2022; Reason, 2017). Despite medical and technological advancements, one in ten patients experiences an adverse event while in hospital, which means that the safety of the patients is challenged (Amarapathy et al., 2013; De Vries et al., 2008; Mallawarachchi & Dharmarathna, 2022). Healthcare is inherently complex, where major accidents are only the 'tip of the iceberg' and accident trajectory is multifactorial (Reason, 2017). There is increasing data to support the view that nearly half of all adverse events result from human factors, external to the clinicians' professional and technical skills (Kohn et al., 2000; World Health Organization, 2009). This is not unique to one particular healthcare system, rather a global concern as illustrated by parallel reports of fatal medical accidents from the United States, the UK, Asia, Europe, Middle East, and Australasian countries (Ameratunga et al., 2019; Anderson & Abrahamson, 2017; Bogner, 2018; Elliott et al., 2021; Thomas et al., 2019; Woods et al., 2017). Prevention of errors and adverse events should therefore be a top priority in any healthcare setting, and this requires a broader understanding of human errors, near misses, and adverse events (Reason, 2017).

Safety-associated high-performance behaviours of health professionals should be a part of routine clinical care to prevent or mitigate adverse events. However, human performance itself is complex. Errors are inevitable because people can be fallible, leading to slips, lapses, mistakes, and violations.

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In contrast, humans can also be the strength of a complex healthcare system, providing the intel lectual ability and flexibility to make adjustments, compensations, recoveries, and improvisations in any healthcare setting. For example, extensive communication between multidisciplinary team members and coordi nation of multiple parallel activities with high levels of situational awareness can prevent or mitigate adverse events. Such skills are known as non-technical skills. Non-technical skills are the cognitive, social, and personal resource skills (such as situational awareness, decision making, communication, teamwork, and lead ership), that complement technical skills and contribute to safe and efficient task performance (Flin & O'Connor, 2017). The concept of the importance of non-technical skills to safe professional practice began in the aviation industry. Greater emphasis has more recent ly placed on the application of non-technical skills to prevent human error and improve the quality of care in nursing and medicine (Bogner, 2018; Briggs et al., 2015; Brogaard et al., 2019; Buljac-Samardic et al., 2020; Helo & Moulton, 2017).

How can non-technical skills help?

Technical skills or competencies alone are not enough to ensure safe and effective professional practice; they need to be complemented by the exercise of high-quality non-technical skills (De Vries et al., 2008; Gordon et al., 2019). In a number of healthcare settings effective application of non-technical skills has been shown to be a useful defence against human error (White, 2012). In contrast, poor execution of non-technical skills such as communication, teamwork, situational awareness, and decision making accounts for up to 70-80% of medical errors in healthcare (Kohn et al., 2000).

While non-technical skills are a vital aspect of managing a critical situation or an emergency, they are also important in routine working environments (Flin & O'Connor, 2017; Reason, 2017). If healthcare workers are routinely attentive,

making sound decisions, sharing information, and cooperating with fellow workers, errors and accidents are less likely to occur (Prineas et al., 2021). Multidisciplinary teams need the whole team to support the building of 'situational awareness' to create the 'big picture' by absorbing cues in the clinical setting to think ahead, and subsequently to make sound decisions. Clear and succinct communication is another integral non-technical aspect of practice and it requires the ability to speak up unequivocally or assertively as well as the ability to listen and accept help. Team members helping one another to detect errors is also an important non-technical skill. As health professionals we should all consider whether we would 'speak up' when it appears things may be about to go wrong, or whether we would listen if someone said 'you have got it wrong'. It is also important to consider the culture of our services and whether junior workers would feel it is 'not their place' to speak up when they suspect an error is about to be made, or whether senior nurses and doctors create an atmosphere where junior staff feel safe to speak up (Etchegaray et al., 2020; Jayasuriya et al., 2016). Related to this is considering how we would react personally and whether we would listen and address the issue being raised or simply overrule the junior staff member. It may be we are failing to respond to the issue being raised because of unconscious denial and fixation as a result of stress in that emergency situation. But, the person who is 'speaking up' may be doing so simply to prevent an error that is about to occur (Bromiley, 2015).

The way towards a safer healthcare system

A changing and challenging healthcare landscape in Sri Lanka requires nurses and other health professionals to care for more patients during their shifts than ever before. To cope with the risks and demands of their work, efforts should be made to minimise, catch, and mitigate errors by ensuring that healthcare workers not only have the specific non-technical skills required but also an appropriate organisational

culture within which they can apply these skills. Evidence suggests that junior clinicians are more likely to focus on technical skills, where as they might struggle with non-technical skills like decision-making and situational awareness skills compared to experienced clinicians (Myers et. al., 2016). However, while experienced health care workers would perhaps recognise effective error avoidance or crisis management behaviours if they saw them, such behaviours can be difficult to conceptualise unless it is formally addressed in training (Flin & O'Connor, 2017).

Non-technical skills and their effective use requires formal training and practice (Gordon et al., 2017). Behavioural frameworks are now increasingly being used in healthcare to teach and objectively evaluate the non-technical skills of health professionals (Perera et al., 2022). Therefore, to build healthier and safer workplaces, health education in Sri Lanka must begin to embrace human factors and non-technical skills training at undergraduate and postgraduate level, and throughout interprofessional training. It is also recommended that non-technical skills education should occur at the earliest possible stage of professional education before professional attitudes are fully formed (preferably at undergraduate level) (Gordon et al., 2017). Using a non-technical skills measurement framework as part of this training can provide a useful basis for evaluating whether the skills are being transferred to an actual clinical setting (Flin et al., 2011).

Non-technical skills measurement frameworks provide a common language and structure for discussing non-technical skills in teaching, training, and debriefing; and some are being used in medical and nursing curricula (Gordon et al., 2019). For example, there are validated non-technical skill assessment frameworks for individual professionals such as Nontechnical Skills for Surgeons (NOTSS) (Yule et al., 2006), Scrub Practitioners List of Intraoperative Non-Technical Skills (SPLINTS) (Mitchell et al., 2013) for theatre nurses, and Ward Round

Non-technical Skills of final year nursing students (Murray et al., 2016). There are also assessment frameworks for multidisciplinary teams in different clinical settings such as Team Emergency Assessment Measure (TEAM) (Cooper et al., 2016) and Non-technical skills in Obstetrics Aeromedical Transfers (NOAT) (Perera, 2022). Such frameworks provide a method for comprehensively and consistently measuring non-technical skills specific to the clinical setting in which they are applied, through assessing observable behaviours. Once appropriately adapted and validated to health professionals and teams in Sri Lankan health settings, these frameworks could be used as a reference point to discuss and debrief non-technical skills, to scaffold structured teaching and training, and for policy developers to make evidenced-based decisions (Kondate et al., 2012).

Regardless of teaching and training of non-technical skills, clinicians' ability to effectively apply those skills in a real clinical setting is influenced by the organisational culture (Abahuje et al., 2021; Perera, 2022). In other countries ineffective methods of communication, lack of fatigue management systems, lack of policies and protocols, inadequate joint training, lack of risk assessment processes, work overload, inadequate leadership, and issues in hierarchical structure have all been shown to be significant barriers to execution of good non-technical skills and provision of safe patient care (Abahuje et al., 2021; Andersen et al., 2011; Perera, 2022).

Shortage of the nursing workforce is a concerning issue globally, and in Sri Lanka that significantly increases the workload and fatigue of the existing workforce. When health professionals are fatigued, their complex cognitive non-technical skills like decision making and situational awareness, as well as their interpersonal non-technical skills such as communication and teamwork performance, deteriorate (Lockley et al., 2007; Myers et al., 2017). Therefore, recommended

fatigue management mechanisms such as the Fatigue Audit InterDyne (FAID) could be useful in ensuring safe staffing and scheduling (Roach et al., 2004). Although Sri Lanka has an established system to report near misses and adverse events; Directorate of Healthcare Quality and Safety (DHQS), incidents are often under reported due to fear of blame and a lengthy paper-based reporting process (Amarapathy et al., 2013; Mallawarachchi & Dharmarathna, 2022). The facts and statistics are therefore seldom given the attention they deserve. To create a *robust* safety culture, healthcare systems must move away from blame and shame for personal failures, instead identifying system failures that contribute to those human failures (Reason, 2017).

Arguably, healthcare staffing in Sri Lanka does have a hierarchical structure (De Silva & Rolls, 2010; Jayasuriya-Illesinghe et al., 2016). When parallel lines of professional authority are added to the number of hierarchies within the hospital, health professionals perceive that they are not empowered in their role affecting the implementation of non-technical skills like teamwork, communication and decision making (Pullon et al., 2009). We also challenge the belief that good teamwork in healthcare only occurs with familiar people. Rather, we believe safety at the highest possible level can be achieved through maintaining a clear focus on joint team training, to enhance quality collaboration based on mutual understanding between professionals. A particularly important aspect to address during the training would be raising awareness about how human factors and non-technical skills can affect overall performance (Dyer, 2022). In this way team members have a good anticipation of how other professionals are likely to work, think, and react regardless of whether they have worked with one another or not (Flin & O'Connor, 2017).

In summary, non-technical skills comprise the glue that holds together the health professionals' technical skills, therefore the standard of non-technical skills should take on a new importance. By developing and allowing healthcare workers to apply non-technical skills at the same high level as their technical skills, we can take a significant leap towards a proactive building of a safer healthcare system.

References

Abahuje, E., Bartuska, A., Koch, R., Youngson, G., Ntakiyiruta, G., Williams, W., Dias, R. D., Rosu, C., & Riviello, R. (2021). Understanding barriers and facilitators to behaviour change after implementation of an interdisciplinary surgical non-technical skills training program in Ruwanda. *Journal of Surgical Education, 78*(5), 1618-1628. https://doi.org/10.1016/j.jsurg.2021.01.011

Amarapathy, M., Sridharan, S., Perera, R., & Handa, Y. (2013). Factors affecting patient safety culture in a tertiary care hospital in Sri Lanka. *International Journal of Scientific & Technology Research, 2*(3), 173-180.

Ameratunga, R., Klonin, H., Vaughan, J., Merry, A., & Cusack, J. (2019). Criminalisation of unintentional error in healthcare in the UK: a perspective from New Zealand. *BMJ, 364.* https://doi.org/10.1136/bmj.l706

Andersen, R. S., Vedsted, P., Olesen, F., Bro, F., & Søndergaard, J. (2011). Does the organizational structure of health care systems influence care-seeking decisions? A qualitative analysis of Danish cancer patients' reflections on care-seeking. *Scandinavian Journal of Primary Health Care, 29*(3), 144-149. https://doi.org/10.3109/02813432.2011.585799

Anderson, J. G., & Abrahamson, K. (2017). Your health care may kill you: Medical errors. In Lau, F., Bartle-Clar, J. A., Bliss, G., Borycki, E., Courtney, K. L., & Kuo, A. M. H. (Eds.), *Building Capacity for Health Informatics in the Future* (13-17). IOS Press. https://doi.org/10.3233/978-1-61499-742-9-13

Bagner, M. S. (2018) Human Error in Medicine. CRC Press.

Briggs, A., Raja, A. S., Joyce, M. F., Yule, S. J., Jiang, W., Lipsitz, S. R., & Havens, J. M. (2015). The role of nontechnical skills in simulated trauma resuscitation. *Journal of Surgical Education, 72*(4), 732-739. https://doi.org/10.1016/j.jsurg.2015.01.020

Brogaard, L., Kierkegaard, O., Hvidman, L., Jensen, K. R., Musaeus, P., Uldbjerg, N., & Manser, T. (2019). The importance of non-technical performance for teams managing postpartum haemorrhage: Video review of 99 obstetric teams. *British Journal of Obstetrics & Gynaecology. 126*(8), 1015-1023. https://doi.org/10.1111/1471-0528.15655

Bromiley, M. (2015). The husband's story: from tragedy to learning and action. *BMJ Quality & Safety, 24*(7), 425-427. http://dx.doi.org/10.1136/bmjqs-2015-004129

Buljac-Samardzic, M., Doekhie, K. D., & van Wijngaarden, J. D. (2020). Interventions to improve team effectiveness within health care: a systematic review of the past decade. *Human Resources for Health, 18*(1), 1-42. https://doi.org/10.1186/s12960-019-0411-3

Cooper, S., Cant, R., Connell, C., Sims, L., Porter, J. E., Symmons, M., Nestel, D., & Liaw, S. Y. (2016). Measuring teamwork performance: Validity testing of the Team Emergency Assessment Measure (TEAM) with clinical resuscitation teams. *Resuscitation, 101, 97*-101. https://doi.org/10.1016/j.resuscitation.2016.01.026

De Silva, B. S. S., & Rolls, C. (2010). Health-care system and nursing in Sri Lanka: An ethnography study. *Nursing & Health Sciences, 12*(1), 33-38. https://doi.org/10.1111/j.1442-2018.2009.00482.x

De Vries, E. N., Ramrattan, M. A., Smorenburg, S. M., Gouma, D. J., & Boermeester, M. A. (2008). The incidence and nature of in-hospital adverse events: a systematic review. *BMJ Quality & Safety, 17*(3), 216-223. http://dx.doi.org/10.1136/qshc.2007.023622

Dyer, C. (2022). Failure to work collaboratively and learn from incidents led to deaths of babies and mothers at Shrewsbury and Telford trust, review finds. *BMJ, 376.* https://doi.org/10.1136/bmj.o858

Elliott, R. A., Camacho, E., Jankovic, D., Sculpher, M. J., & Faria, R. (2021). Economic analysis of the prevalence and clinical and economic burden of medication error in England. *BMJ Quality & Safety, 30*(2), 96-105. http://dx.doi.org/10.1136/bmjqs-2019-010206

Etchegaray, J. M., Ottosen, M. J., Dancsak, T., & Thomas, E. J. (2020). Barriers to speaking up about patient safety concerns. *Journal of Patient Safety, 16*(4), e230-e234. https://doi.org/10.1097/pts.0000000000000334

Flin, R., & O'Connor, P. (2017). *Safety at the sharp end: a guide to non-technical skills.* CRC Press. https://doi.org/10.1201/9781315607467

Flin, R., & Patey, R. (2011). Non-technical skills for anaesthetists: developing and applying ANTS. *Best Practice & Research Clinical Anaesthesiology, 25*(2), 215-227. https://doi.org/10.1016/j.bpa.2011.02.005

Gordon, M., Farnan, J., Grafton-Clarke, C., Ahmed, R., Gurbutt, D., McLachlan, J., & Daniel, M. (2019). Non-technical skills assessments in undergraduate medical education: A focused BEME systematic review: BEME Guide No. 54. *Medical Teacher, 41*(7), 732-745. https://doi.org/10.1080/0142159X.2018.1562166

Gordon, M., Fell, C. W., Box, H., Farrell, M., & Stewart, A. (2017). Learning health 'safety' within non-technical skills interprofessional simulation education: a qualitative study. *Medical Education Online, 22*(1). https://doi.org/10.1080/10872981.2017.1272838

Helo, S., & Moulton, C.-A. E. (2017). Complications: acknowledging, managing, and coping with human error. *Translational Andrology and Urology, 6*(4), 773- 782. https://dx.doi.org/10.21037%2Ftau.2017.06.28

Jayasuriya-Illesinghe, V., Guruge, S., Gamage, B., & Espin, S. (2016). Interprofessional work in operating rooms: a qualitative study from Sri Lanka. *BMC Surgery, 16*(1), 61. https://doi.org/10.1186/s12893-016-0177-7

Kohn, L., & Corrigan, J., & Donaldson, M.E. (2000).

To err is human: building a safer health system. Institute of Medicine (US) Committee on Quality of Health Care in America. National Academy Press. https://doi.org/10.17226/9728

Lockley, S. W., Barger, L. K., Ayas, N. T., Rothschild, J. M., Czeisler, C. A., & Landrigan, C. P. (2007). Effects of health care provider work hours and sleep deprivation on safety and performance. *The Joint Commission Journal on Quality and Patient Safety, 33*(11), 7-18. https://doi.org/10.1016/S1553-7250(07)33109-7

Mallawarachchi, S.M.N.S.M., & Dharmarathna, G.S.K. (2022). A systematic assessment of adverse event reporting in selected state hospitals in *Sri Lanka. Journal of Surgery and Medicine, 6*(4),494-497.https://doi.org/10.28982/josam.897752

Mitchell, L., Flin, R., Yule, S., Mitchell, J., Coutts, K., & Youngson, G. (2013). Development of a behavioural marker system for scrub practitioners' non-technical skills (SPLINTS system). *Journal of Evaluation in Clinical Practice, 19*(2), 317-323.https://doi.org/10.1111/j.1365-2753.2012.01825.x

Myers, J. A., Powell, D. M., Psirides, A., Hathaway, K., Aldington, S., & Haney, M. F. (2016). Non-technical skills evaluation in the critical care air ambulance environment: introduction of an adapted rating instrument--an observational study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 24,* 24. https://doi.org/10.1186/s13049-016-0216-5

Myers, J. A., Powell, D. M. C., Aldington, S., Sim, D., Psirides, A., Hathaway, K., & Haney, M. F. (2017). The impact of fatigue on the non-technical skills performance of critical care air ambulance clinicians. *Acta Anaesthesiologica Scandinavica, 61*(10), 1305-1313. https://doi.org/10.1111/aas.12994

Murray, K., McKenzie, K., Kelleher, M. (2016). The evaluation of a framework for measuring the non-technical ward round skills of final year nursing students: An observational study. *Nurse Education Today, 45,* 87-90. https://doi.org/10.1016/j.nedt.2016.06.024

Perera, A., Griffiths, R., & Myers, J. (2022). Integrative review of non-technical skills frameworks to apply for air- medical transfer of pregnant women. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 51*(3), 257-277. https://doi.org/10.1016/j.jogn.2022.01.006

Perera, P. A. D. (2022). *Non-technical skills of health professionals and teams in the high-acuity maternity aeromedical transport setting* (Thesis, Doctor of Philosophy). University of Otago. http://hdl.handle.net/10523/14129

Prineas, S., Mosier, K., Mirko, C., & Guicciardi, S. (2021). Non-technical skills in healthcare. In Donaldson, L., Ricciardi, W., Sheridan, S., & Tartaglia, R. (Eds), Textbook of patient safety and clinical risk management (413-434). Springer Nature.https://doi.org/10.1007/978-3-030-59403-9

Pullon, S., McKinlay, E., & Dew, K. (2009). Primary health care in New Zealand: the impact of organisational factors on teamwork. *British Journal of General Practice, 59(560),* 191-197. https://doi.org/10.3399/bjgp09X395003

Roach, G. D., Fletcher, A., & Dawson, D. (2004). A model to predict work-related fatigue based on hours of work. *Aviation, Pace, and Environmental Medicine, 75*(3), A61-A69.

Reason, J. (2017). The human contribution: unsafe acts, accidents and heroic recoveries (1st Ed.). CRC Press. https://doi.org/10.1201/9781315239125

Thomas, B., Paudyal, V., MacLure, K., Pallivalapila, A., McLay, J., El Kassem, W., Al Hail, M., & Stewart, D. (2019). Medication errors in hospitals in the Middle East: a systematic review of prevalence, nature, severity and contributory factors. *European Journal of Clinical Pharmacology, 75*(9), 1269-1282.https://doi.org/10.1007/s00228-019-02689-y

Yule, S., Flin, R., Paterson-Brown, S., Maran, N., & Rowley, D. (2006). Development of a rating system for surgeons' non-technical skills (NOTSS). *Medical*

Education, 40(11), 1098-1104. https://doi.org/10.1111/ j.1365-2929.2006.02610.x

White, N. (2012). Understanding the role of non-technical skills in patient safety. *Nursing Standard,* 26(26):43-8 https://doi.org/10.7748/ns2012.02.26.26.43.c8972

World Health Organization (2009). *Human factors in patient safety: review of topics and tools.* Report for methods and measures working group of WHO patient safety (Report No WHO/IER/PSP/2009.05). http://www.who.int/patientsafety/research/ methods_measures/human_factors/human_factors _review.pdf

Woods, D. D., Dekker, S., Cook, R., Johannesen, L., & Sarter, N. (2017). *Behind human error* (2nd ed.). CRC Press. https://doi.org/10.1201/9781315568935