ABSTRACT

Background: The complement technical skills, contributes to efficient task performance and improve 'safe practice' by health professionals. Success with non-technical skills training in other industries is achieved has led to widespread permutation to healthcare education, with non-technical skills. We explore the junior doctor’s awareness and application of nontechnical skills needed to work in hospitals. The cognitive, social and personal resource skill that complements technical skill, and contributes to safe and efficient task performance is called nontechnical skill. There is growing awareness that non-technical skills are essential for competent practice and non-technical skills are the integral part of many training programs.

Aim: To rank the importance and determine the awareness of non-technical skills by the junior doctors essential to work efficiently and safely at hospitals.

Methods: A cross-sectional study was conducted among the post graduate trainee doctors and house officers at department of medicine services hospital Lahore. Two hundred doctors participated in the study.

Data collection technique: Two questionnaires were distributed simultaneously to each participant. First one was structured to inquire about the ranking of ten nontechnical skills in the terms of importance from one to ten. The other questionnaire indirectly assessed these skills by scenario based questions taken from text book of medicines.

Results: In the study ‘Analysis of situation’ was ranked as the most important non-technical skill and dealing with the patients in clinical isolation as least important. Significant difference was observed among non-technical skills mean rank score (p < 0.001). Analysis of situation was most important followed by fatigue management and task prioritization. Stage of medical training was associated with differences in ranking patterns for analysis of situation (p<0.001), decision making (p=0.046), communication skills (p<0.001), team working (p<0.001), leadership (p<0.001), fatigue management (p<0.001), task prioritization (p<0.001), and planning of work at call (p=0.001). 52% doctors were aware of proper use of non-technical skills (p-0.476).

Conclusion: It is observed that there is a discrepancy between the awareness and experience of junior doctor about non-technical skills. This suggests a training gap. There is a need for to update the medical education at undergraduate and postgraduate levels to adequately train the doctors in all the non-technical skills for further improvement in health care. These skills can be improved at institutional levels by simulation based training or by direct observation at workplace. These skills need to be integrated in medical curricula as a countermeasure for human error. Poor nontechnical skills are a significant cause of adverse medical events in patients presenting with accidents and other emergencies.

Keywords: Nontechnical skills, analysis of situation, teamwork, Leadership, communication.
medical curriculum is important as it promotes safe practice and minimize human error (Glavin & Maran, 2003). Surgeons have to work in teams to perform surgical procedures. Optimum outcome for surgical patients is dependent both on technical and non-technical skills of operating team (McClelland, 2018). Inter professional simulation based education improved the 2nd year postgraduate residents training communication, confidence and leadership (Nicksa, Anderson, Fidler, & Stewart, 2015). Taxonomy of nontechnical skills was developed to minimize the prescribing errors in part of doctors which can lead to the increased mortality and hospital admissions (Dearden, Melanby, Cameron, & Harden, 2015).

Hospitals are overcrowded with patients. This increased number of hospital admission has increased the demand of improving patient care with the existing treatment resources which at times gets exhausted. Hospital care in emergency and OPD is largely provided by house officers, junior doctors and staff nurses. They need to be trained in the medical as well the non-technical skills to cope with this overcrowded situation. The unpleasant incidences at work place resulting from the emotional reactions of relatives or patients are also common and countermeasures are also required to avoid these problems. The media attention has highlighted the importance of improved training of clinical personal while dealing with patients.

Emergency patients are unknown to the doctor and most of the times they are not having the record of their previous illness or medication. Communication with them is difficult due to many reasons including dementia, unconsciousness and language barrier etc. Some patients are uncooperative and illusory. Many patients are homeless, victims of homicidal poisoning or with substance abuse (L. Flowerdew, Brown, Vincent, & Woloshynowycz, 2012). These patients are brought by rescue department. Some patients of road traffic accidents domestic or public violence are the medico legal cases requiring the help or are accompanied by police. Doctor in emergency is working under high degree of skepticism and apprehension. To deal with these difficult situations doctors need to have both technical skills for better patient management and non-technical skills for the better understanding of different situations, management of stress and improvement of communication with patients paramedical staff and nurses (L. A. Flowerdew, 2011).

The doctors working in OPD needs to have leadership skills as the OPDS are full of patients referred from rural health centers and tehsil headquarter hospitals. Most of these patients are seen by the trainee doctors and only the difficult cases are seen by the specialist doctors and consultants. Healthcare system must adapt major changes for optimum the use of limited resources (Perez et al., 2016).

To blame an Individuals is more easy and is always done. Institutions never take the responsibility (Reason, 2000). The doctor dealing with the patient is responsible if something goes wrong.

We do not teach non-technical skills in medical colleges and neither are they the part of curriculum. Adverse medical outcomes are significantly attributed to NTS failures (Cooper, Endacott, & Cant, 2010). Low and middle income countries are actually facing the health challenge and there is very little awareness about NTS in these countries (Scott et al., 2016). Team Objective structured Clinical Examination improves inter-professional teamwork among the students (Keshmiri, Najarkolai, Motlagh, & Saljoughi). Training skills of mentor and the mentor trainee interaction is very important in transferring self-directed learning skills in medical students (Heeneman & de Grave, 2017).

Considering the above mentioned facts, we conducted a study to see our experience of these skills in health professional education as no such studies are available in our system.

**Research Question:** Is there any training gap in our health care system regarding the training of health professionals about non-technical skills?

**OBJECTIVES:**
1. To determine the importance of non-technical skills in terms of its rank required to work efficiently and safely at hospitals.
2. To explore the junior doctor’s awareness and experience of the non-technical Skills

**Methodology:**

**Study Design:** Cross sectional study.

**Study center:** Department of medicine services hospital Lahore.

**Sample size:** The sample size for the present study was...
calculated by taking most probable prevalence of ranking the non-technical skill 50% and permissible error as 7% with 95% confidence interval.

\[(1.96)^2 \times (p)(1-p)\]

\[n= \frac{1}{(0.07)^2}\]

**Sampling technique:** Purposive sampling was done.

**Inclusion criteria:** All the house officers and postgraduate trainee doctors working at department of medicine services hospital Lahore was included in the study.

**Exclusion criteria:**
Non-responders were excluded from the study.

**Study duration:**
One month from 18th June 2018 to 18th July 2018.

**Ethical approval:** Approval of the study was obtained from the Institutional Review Board. The study was carried out in accordance with the Declaration of Helsinki and informed consent was taken from all the participants.

**Definition used:** Non-technical skills: The cognitive, social and personal resource skills that complement technical skills, and contribute to safe and efficient task performance.

**Abbreviations used:**
NTS: Non-technical skills
OPD: outpatient department

**Data collection technique:** After an informed consent and appropriate briefing, two questionnaires were distributed simultaneously to each participant. First one was structured to inquire about the ranking of ten nontechnical skills shown in Figure-1 in the terms of importance from one to ten. One signify the most important skill and two signify the next important skill and so on. The other questionnaire indirectly assessed these skills by scenario based questions taken from text book of medicines. They participants were asked to rank the importance of each non-technical skill as per their knowledge experience.

**Data processing:** The data was analyzed by using SPSS version 20. Non-technical Skills were ranked in terms of their importance to house officers and PG trainees on 1 to 10 score. 1 indicates the most important option, 2 indicate the next most important option, and so on. One way ANOVA was used for comparison of mean rank score among stage of training and to investigate the effect of stage in clinical education on the ranking of skills. To make multiple comparisons post hoc tukey test was used.

**Results:** A total of ten non-technical skills found to be important from literature review were ranked in the order of importance. A difference in ranking of skills was observed. In the study ‘Analysis of situation’ (mean rank 2.2) was ranked as the most important and dealing with the patients in clinical isolation the least important skill Figure: 2. Significant difference was observed among non-technical skills mean rank score \((p < 0.001)\). Analysis of situation was most important followed by fatigue management and task prioritization \((p =\)
0.999). Decision making and communication skills were also ranked equally (p = 0.778).
Stage of medical training was associated with differences in ranking patterns for, analysis of situation (p<0.001), decision making (p=0.046), communication skills (p<0.001), team working (p<0.001), leadership (p<0.001), fatigue management (p<0.001), task prioritization (p<0.001), and planning of work at call (p=0.001) Figure: 3.
House officers and Post graduate trainee doctors of first year ranked the analysis of situation as most important skill (p<0.001), whereas communication skills (p<0.001), team work (p<0.001), and leadership (p<0.001) was ranked most important by second year third year and fourth year trainee doctors respectively. These differences are illustrated in Fig: 4.
On an average 52% doctors participating in the study were properly aware of use non-technical skills with better scores as the stage of training goes up (p=0.476) Figure: 5.

**Discussion:** Workplace behavior is important in safety training and thinking as both of these concepts are very much integrated. In this study significant difference was observed among non-technical skills mean rank score (p < 0.001). Analysis of situation was followed by fatigue management and Task prioritization in ranking the skills (p = 0.999). Decision making and communication skills were also ranked equally (p = 0.778). In a previous study done task prioritization was ranked as most important skill followed by communication skills, managing sleep and personal needs (Brown et al., 2015). Another important factor is observed that duration of medical training was associated with differences in ranking patterns of non-technical skills. It is observed that there is a discrepancy between the awareness and experience of junior doctor about non-technical skills. This suggests a training gap. Approximately half of the participants were not aware proper use of these skills especially at the start of work in hospitals. Junior doctor’s experience about the nontechnical skills can be a part of both the training and assessment programs as adopted in other safety sectors such as acute medicine (Flin, 2018). In a previous study training of nontechnical skills in anesthesia and emergency medicine, the most common areas identified for improvement were communication and team working after training and assessment (Flin & Maran, 2004). In our study communication skills were ranked as most important non-technical clinical skill(p<0.001) by the second
Figure: Axial description of Nontechnical skills with respect to stage of training

House Officer:
- Analysis of situation
- Task prioritization
- Fatigue management
- Decision making
- Communication skills
- Team working
- Leadership
- Stress management
- Planning of work at call/duty
- Dealing with the patients in clinical isolation

PG Trainee 1st Year:
- Analysis of situation
- Fatigue management
- Task prioritization
- Communication skills
- Team working
- Leadership
- Stress management
- Planning of work at call/duty
- Dealing with the patients in clinical isolation

PG Trainee 2nd Year:
- Task prioritization
- Fatigue management
- Communication skills
- Decision making
- Team working
- Leadership
- Stress management
- Planning of work at call/duty
- Dealing with the patients in clinical isolation

PG Trainee 3rd Year:
- Communication skills
- Team working
- Leadership
- Fatigue management
- Decision making
- Team working
- Leadership
- Stress management
- Dealing with the patients in clinical isolation

PG Trainee 4th Year:
- Team working
- Leadership
- Decision making
- Leadership
- Fatigue management
- Task prioritization
- Leadership
- Stress management
- Dealing with the patients in clinical isolation

Planning of work at call/duty
Dealing with the patients in clinical isolation
year trainee doctors. A previous study done showed that situation awareness and teamwork improved in students after attending NTS simulation seminar (Hagemann et al., 2017). In our study situation analysis was ranked as most important non-technical skills while working in OPD and emergency. Another study emphasized the dissipation of intergroup contact anxiety and teamwork as important NTS (Gordon, Fell, Box, Farrell, & Stewart, 2017).

It is seen in the previous studies that there is 37% increase in number of hospital admissions which requires advance medical care and multidisciplinary management (Brown et al., 2015). Sleep deprivation is frequent among the trainee doctors due to long working hours. The working hours for healthcare professionals are more than the other professions (Gaba & Howard, 2002). In our study fatigue management was not ranked as important compared to other NTS. It has been shown in a previous study that job performance is related more with team work skills and situation judgment has lowest criterion validity for job performance (Pollard & Cooper-Thomas, 2015). Few NTS are used in emergency setting and focused assessment of teamwork skills enhance patient safety in emergency situation (Cooper et al., 2010). In our study second year trainee doctors ranked team work as important NTS. Nontechnical skills do have an impact on health care outcomes and improve patient safety (Cooper et al., 2014). It was identified that technical and nontechnical skills training, effectiveness, assessment, and system probing improves patient safety in health care (Pollard et al., n.d.). In a previous study it has been observed that poor nontechnical skills is a significant cause of adverse medical events in patients presenting with accidents (Uramatsu et al., 2017). Another study showed the significant correlation between technical and non-technical skills ranging from 0.31 to 0.45 measured by checklist and technical performance (Almutairi, 2017). Team emergency assessment measures were developed to standardize the performance of health professionals. This was done by improving relationship between Teamwork and Leadership and between Teamwork and Task Management \( p < 0.001 \) (Cooper et al., 2014). Patient safety is in an important concern now days in in patient management.

**Conclusion:** It is observed that there is a discrepancy between the awareness and experience of junior doctor about non-technical skills. This suggests a training gap. There is a need for to update the medical education at undergraduate and postgraduate levels to adequately train the doctors in all the non-technical skills for further improvement in health care. These skills can be improved at institutional levels by simulation based training or by direct observation at workplace. These skills need to be integrated in medical curricula as a countermeasure for human error. Poor
nontechnical skills are a significant cause of adverse medical events in patients presenting with accidents and other emergencies.

In our health system nontechnical skills are learned by as a part of peer assisted leaning or by mentoring and apprenticeship. Only communications skills are taught to some extent. We strongly recommend for include these skills in teaching programs of doctors and medical students.

Limitations: Simulation based assessment of non-technical skills can judge the students awareness in a better way.

Way Forward: More studies are required to find out a way towards improvement these skills in medical students as they are future doctors.

References: