OPERATING ROOM MANAGEMNT ATTITUDES AND PATIENT SAFETY PRACTICES AMONG SURGICAL STAFF IN THE UNIVERSITY COLLEGE HOSPITAL IBADAN

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CERTIFICATION

I certify that this research work was duly carried out directly under our supervision and also meets the regulations governing the award of the degree of M.Sc. Epidemiology of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.

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DEDICATION

I dedicate this dissertation to God Almighty, the Lord of Mercy and the Owner of Mercy; He is the Most Wise and the most Knowledgeable. I also dedicate this work to my loving wife and children who have stood by me in all circumstances.

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ABSTRACT

Background: Operating room management attitudes like teamwork, good communication, cooperation, and coordination are vital to effective surgical care. Surgery is associated with a considerable risk of complications majority of which are avoidable. Hence, improving surgical safety has been identified as a public health priority by the World Health Organisation (WHO). Attitudes of members of surgical team about safety and teamwork in the operating theatre may play a role in patient safety. This study was therefore undertaken to investigate attitudes toward safety and teamwork among surgical staff at the University College Hospital, Ibadan.

Methodology: A questionnaire survey was conducted among 321 surgical staff in the University College Hospital, Ibadan. A customised version of the Operating Room Management Attitude Questionnaire (ORMAQ) was used. This measures attitudes to leadership, communication, teamwork, stress and fatigue, work values and organisational climate. Safety practices were assessed using error and procedural compliance thematic structure. The sum of points of the attitudes on a Likert scale was computed to generate attitude score and the mean of the score was used to categorise attitude into poor or good attitude. The thematic structure for safety practices was similarly assessed. Data collected was analysed using descriptive statistics, Kruskal-Wallis analysis for comparison across professional groups and logistic regression to examine predictors of attitude to teamwork at 5% level of statistical significance.

Results: Out of the 321 respondents, 73(22.7%) were surgeons and 111(34.6%) surgical trainees, 107(34.6%) operating room nurses and 30(8.1%) anaesthetists. Respondents generally demonstrated positive attitudes to behaviors associated with effective teamwork and safety. Positive teamwork attitude was more pronounced among the consultants (64%),

half of the trainees displayed good attitude and only 32% of nurses. Safety practices were poor across all the professional groups with 34(58.6%) of consultants, 104(68.4%) of residents and 68(61.3%) of nurses displaying poor safety practices. Eighty percent of nurses displayed poor attitude to stress and fatigue themes. There was a significant difference between consultants, resident doctors and nurses on information sharing, teamwork, work value and organizational climate, and stress and fatigue themes. Nurses were found to be 2.8 times less likely to have good teamwork attitude compared to surgeons (OR = 0.36; CI = 0.194-0.675) and those with 1-5 years of experience were 1.8 times less likely to have good teamwork attitude compared to those with more than 6 years of experience (OR= 0.56; CI = 0.343 – 0.902).

Conclusion: Overall, the surgeons and anaesthetists demonstrated positive attitudes towards teamwork and leadership. On the other hand, poor attitude to teamwork among nurses need to be addressed. Nurses were found to show attitudes suggesting invulnerability to the effects of stress and fatigue to a high degree. The negative attitude of nurses to teamwork which may be due to recurrent disharmony in the health sector in Nigeria needs to be further investigated. Training on teamwork and awareness of limitations when under stress is therefore recommended.

Keywords: Teamwork, Patient safety, ORMAQ questionnaire.

Number of words: 486.

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INTRODUCTION

1.1 BACKGROUND

Medical care is a team effort, especially as more patients with complex conditions are increasingly seen. Operating room management attitudes like teamwork, good communication, cooperation, and coordination are vital to effective care, especially in complex service lines such as the operating room (OR). Surgical care is associated with a considerable risk of complications and death, the majority of which are avoidable (Kable et al., 2002 and de Vries et al., 2008). Hence, improving surgical safety has been identified as a public health priority by the WHO. The patient safety risk associated with surgery is partly due to breakdown in patient safety and teamwork. Past studies have shown that the attitudes of members of surgical team about safety and teamwork in the operating theatre may play a role in patient safety. These include observational studies in the operating theatre which revealed that human failures (e.g., breakdowns in team work, leadership, communication, and poor decision making) are not unusual and can lead to adverse events (Edmondson 2003; Lingard et al., 2004; Helmreich and Mussen 2000; deLeval et al., 2000). Results of a systematic review also showed that 58.4% of adverse events in hospitals are associated with a surgical care provider (de Vries et al., 2008). Anaesthetists have long regarded human error such as communication breakdown as the leading cause of anaesthesia related complications (Nyssen, 2000). It is therefore apparent that nontechnical skills, such as leadership, decision making, assertiveness and team coordination play a major role in error management in the operating theatre (Fletcher et al., 2002; Flin et al., 2003).

It is therefore imperative to investigate the underlying attitudes that determine these behaviours. Although attitudes are not a perfect predictor of future behaviour, they do give a strong indication of expected behaviour patterns and can signify the prevailing culture in a given professional group (Flin et al., 2003). A surgical staff questionnaire survey is one of the most efficient methods to measure these attitudes. The Operating Room Management Attitudes Questionnaire (ORMAQ) is an instrument developed in 1993, building on similar safety research within the aviation industry (Schaefer and Helmreich 1993). The Cockpit and Flight Management Attitudes Questionnaires (CMAQ, FMAQ) (an instrument measuring safety attitudes in aviation) was adapted to produce the Operating Room Management Attitudes Questionnaire (ORMAQ), with the aim of evaluating the attitudes of operating room personnel towards behaviours related to teamwork and safety (Prati 2013). It measures items relevant to understanding error, predictive of performance and sensitive to training interventions (Sexton et al., 2000). The ORMAQ was further modified by Flin et al., (2003) and has been used to successfully evaluate anaesthetists, general surgeons and theatre staff opinions of safety issues (Flin et al., 2003, 2006). Results from ORMAQ surveys conducted in surgical settings in different countries (Sexton et al 2000; Flin et al., 2006 and Helmreich and Davies. 1996) are usually partially aligned with the differences emphasizing the influence of national culture, as well as the particular healthcare system. (Prati, 2013) Hence, as workplace attitudes can be culturally determined, generalization of results to other countries remains to be determined. It is therefore important to examine specifically the prevailing attitudes in Nigerian setting. To my knowledge, no studies have reported the results of the complete administration of ORMAQ in Nigeria. This study will therefore be undertaken to investigate attitudes toward safety and teamwork among surgical staff in Nigeria.

1.2 Problem statement

Patient safety is a central theme in surgery with members of the operating team focused on avoidance of complications of surgical procedures. Improving surgical safety has been identified as a public health priority by the WHO. It is estimated that major complications occur in 3–16% of inpatient surgical procedures in industrialized nations, resulting in permanent disability or death in 0.4–0.8% (WHO 2009). The traditionally held assumption that surgical adverse events are related primarily to poor technical performance has been largely disproved. Recent analysis of surgical malpractice claims suggest technical misadventure played a role in only 41–50% of cases (Griffen et al., 2007 and Rogers et al., 2006), and there is increasing attention on the influence that organizational and environmental factors, personal characteristics and behaviours have on safety in the workplace – the so-called 'human factors'. Human factors have been identified as a contributing cause in 70–80% of surgical adverse events, with situational awareness, decision-making, communication, teamwork, leadership, stress and fatigue all implicated [Catchpole et al., 2006, Arora S 2010 and Hu et al., 2012) It is therefore important to investigate these human factors in the operating team. Surveys using ORMAQ have been conducted in Europe and North American countries to identify these human factors. The results from ORMAQ surveys conducted in surgical settings in different countries (Sexton et al., 2000; Flin et al., and Helmreich R and Davies J. 1996) are usually partially aligned with the differences emphasizing the influence of national culture, as well as the particular healthcare system. (Prati, 2013). Hence, as workplace attitudes can be culturally determined, generalization of results to other countries remains to be determined. It is therefore important to examine specifically the prevailing attitudes in Nigerian setting.

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1.3 Justification

Team work and focus on patient safety are agreed cornerstones for good patient outcome in clinical care. Teamwork in surgical care involves a significant shift from individual provider toward collective responsibility to patient care. This is more important in the intensive multi-professional decision making situations in operating rooms. The attitudes of the operating rooms personnel to team work and patient safety are important elements in these high-pressure situations as it affects team dynamics and patient outcome. Breakdown in teamwork has in fact contributed to complications in patients undergoing surgery at the University College Hospital, Ibadan. These incidents are usually identified at surgical department morbidity and mortality meetings. Identifying the determinants of teamwork and patient safety among surgical staff is therefore germane to understanding factors affecting outcome of surgical care. Interventions specifically targeted at identified gaps in positive teamwork attitude and patient safety will help in planning and executing training needs for surgical staff with a net benefit of improved patient safety and job satisfaction among surgical personnel. Derived diagnostic data collected with the ORMAQ can also help determine the critical issues within an organization. The data can be used to define areas where organizational intervention may be needed (e.g. policy changes designed to improve organizational climate) and areas where training programmes may harmonize and improve attitudes. This study was therefore aimed at finding out attitudes toward safety and teamwork among surgical staff in University College Hospital, Ibadan, Nigeria. The choice of the tertiary health facility was informed by the availability of

surgical, anaesthesia and Nursing departments and other complementary surgical staff. The selected facility also serves as a referral centre and parades surgical specialists in virtually all surgical fields. The current teamwork and patient safety climate will need to be studied and may be indicative of the situation in other teaching hospitals in the country.

1.4 Research Questions

The following study questions serve as the core of my investigation:

1. What are the attitudes of surgical staff to teamwork and patient safety in the operating theatre?
2. What are the determinants of the attitudes of the surgical staff to teamwork and patient safety?
3. Are there differences between operating room nurses and surgeons in attitudes to teamwork and patient safety?

1.5 Broad Objectives

The aim of this study was to determine the attitudes of surgical team members in University College Hospital, Ibadan towards teamwork and patient safety.

1.5.1 Specific Objectives:

1. To determine the attitudes of surgical staff members to teamwork in the operating theatre.
2. To determine factors influencing attitude to teamwork.
3. To determine patient safety practices among surgical staff.
4. To evaluate the perception of teamwork quality among surgical staff in the operating theatre.

5. To find out the opinions of the surgical staff on ways to improve teamwork and patient safety.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A surgical operation is a team endeavour during which anaesthetists, surgeons, nurses, orderlies and technicians must co-ordinate their actions to accomplish required tasks. The operating room is a complex environment that involves interactions between and within teams (i.e. anaesthesia, surgical and nursing). While healthcare workers typically work in teams to coordinate and manage patient care, they are generally not well-trained in the generic or non-technical skills – such as communication, situational awareness, decision making and teamwork – that underpin technical skills (Morey et al., 2002) and form the core of operating room management attitudes. Team cohesiveness can also be challenged by a number of factors including differing educational backgrounds (Baker et al., 2006), the ad hoc forming of teams with changing membership like operating room teams and hierarchical culture inherent to health care (Manser, 2009).The hierarchical and status differences within and between teams along with culture-specific issues sometimes lead to ambiguity about who is in ultimate command of the endeavour. Thus, in the operating room, both interpersonal and technical tasks must be accomplished to achieve desired outcomes.

Poor non-technical skills, including teamwork and communication, may lead to patient safety incidents and medical errors (Greenberg et al., 2007). Extrapolation from reported studies indicates that 40% to 50% of hospital errors occurred in the Operating Room (Cuschierri, 2006). Studies of safety in other high-risk industries show that adverse events are primarily attributed to human failures, rather than technical expertise. It is estimated that major complications occur in 3–16% of

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inpatient surgical procedures in industrialized nations, resulting in permanent disability or death in 0.4–0.8% (WHO 2009). In the UK, adverse events were identified in 16% of surgical patients, with approximately half of these deemed to be preventable (Vincent et al 2001). Human factors have been identified as a contributing cause in 70–80% of surgical adverse events, with situational awareness, decision-making, communication, teamwork, leadership, stress and fatigue all implicated (Rogers et al., 2006; Way et al., 2003; Hu et al., 2012 and Arora et al., 2010).

Heimreich and Davies (1996) reported observing the following during a series of observations in operating rooms: breakdowns in communication that resulted in loss of awareness of the patient's condition, distractions that resulted in failure to note adverse changes in patient status, disputes between members of anaesthesia and surgical teams, failures to give feedback to registrars about their performance, and failures to use checklists. Each of these events falls into the domain of human factors. Human factors as a discipline dealt originally with the interface between the human and the machine with a focus on improving safety and usability through improved design. These human factors belong to the sub-discipline now known as ergonomics which is defined as an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely. High performance practitioners demonstrate non-technical skills as an integral part of their surgical expertise (Cathey et al., 2003). Studying human factors in depth therefore appear to be an important step in achieving increased patient safety.

2.2 Conceptual Model for Operating Room Management Attitudes

Hans-Gerhard, Schaefer and Robert Helmreich developed a conceptual model of operating room performance. The model was adapted from a model of aviation team performance (Helmreich and Foushee, 1993; Helmreich and Schaefer, 1994) and was based on observations of teams in action in the operating room (Figure 1). The input, process and outcome components of the model specify the multiple determinants of performance and reflect the recursive nature of the processes and their outcomes (i.e. processes and outcomes influence subsequent inputs such as attitudes and behaviours, both technical and interpersonal).

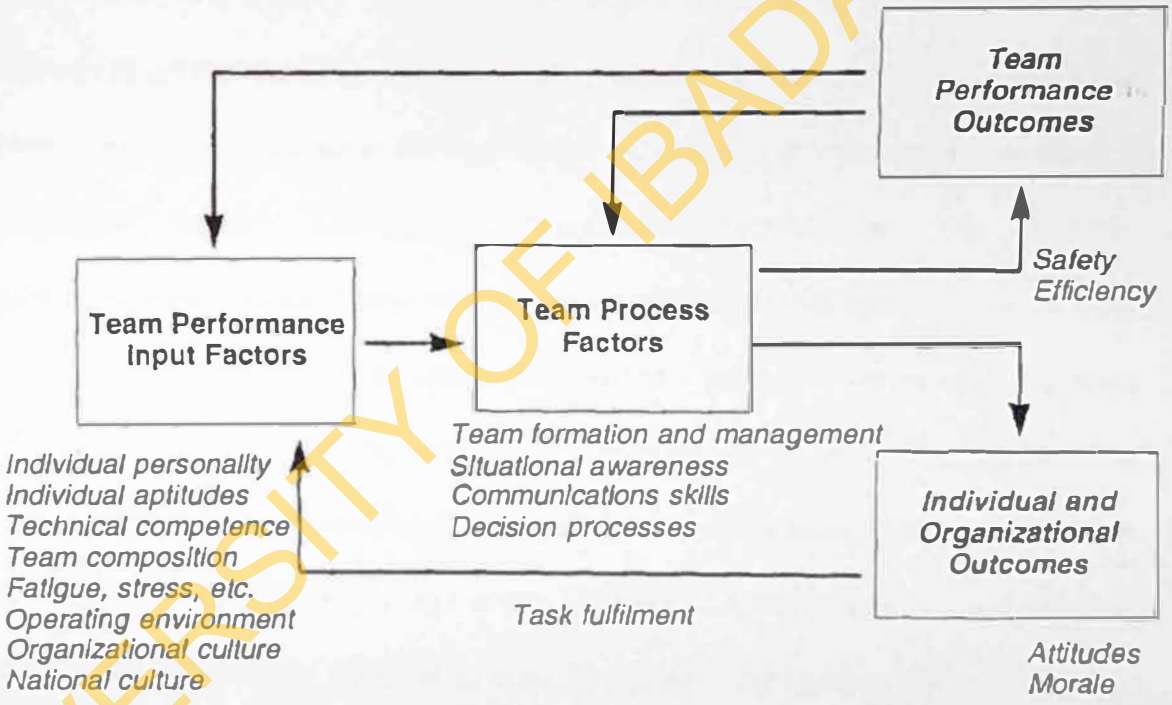

Figure 1: A model of operating room team performance. Reproduced from Helmreich and Schaefer (1994, Human Error in Medicine, pp 225-253: Hillsdale, NJ: Lawrence Erlbaum)

2.2.1 Input factors

Input factors encompass characteristics of team members including abilities, the composition of the group, past experiences, culture and available organisational resources. Some factors, such as aptitude and personality, are highly resistant to change. Personality is clearly a significant determinant of behaviour in the operating room. Researchers in Cardiff have used personality assessment combined with structured interviews to provide a 'blueprint for the effective selection of junior anaesthetists' (Reeve et al., 1993). However, efforts to improve long-term performance through the use of personality measures in selection have not met with much success. The primary reason for this failure is probably the lack of adequate performance criteria against which personality factors can be validated. Certain other factors, such as attitudes about the task and organizational practices, are amenable to modification through training or management interventions. For example, organizational policies determine whether or not an anaesthetist has assistance (in the same way that the scrub nurse assists the surgeon). Indeed, whether or not a team rather than an individual is charged with a particular responsibility has implications for group dynamics and patient safety. Other personal characteristics brought to the operating room, such as fatigue and stress, are powerful forces that can and must be addressed by changing the structure of work (Helmreich and Davies, 1996).

The culture of the organization is also a critical input. Organisational culture involves a "pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems" (Schein, 2005). Organisational culture conveys a sense of identity for members and enhances social system stability

which influences behaviour to help to build organisational commitment, establish a management philosophy and motivate personnel (Lisha Lo, 2011). This perspective assumes that organisational culture can be broken down into smaller components (safety culture, service culture, creativity culture and motivation culture) to be empirically manipulated (Lisha Lo, 2011).

2.2.2 Safety culture

Wiegmann and co-workers (2002) provided a global definition of safety culture as "the enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety, act to preserve, enhance and communicate safety concerns, strive to actively learn, adapt and modify (both individual and organizational) behaviour based on lessons learned from mistakes, and be rewarded in a manner consistent with these values". A positive safety culture is characterised by "communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures" (Health and Safety Commission, 1993). Reason suggests that four aspects promote a positive safety culture; 1) an informed culture, in which those who manage and operate the system have current knowledge about the factors that determine the safety of the system, 2) a reporting culture, in which people are prepared to report their errors, 3) a just culture, in which people are encouraged and/or rewarded for providing safety related information, and 4) a learning culture, in which people are willing and knowledgeable about drawing the correct conclusions from the safety-information to implement reforms (Reason J, 1997).

An effective safety culture eventually leads to the goal of zero accidents, with the attainment process varying from one organisation to another (Roughton and Mercurio, 2002). There are at least five global themes related to safety culture that are measurable: organizational commitment, management involvement, employee empowerment, reward systems, and reporting systems (Flin et al., 2000). These themes can all be assessed qualitatively via employee observations, focus groups and case studies, as well as quantitatively, via standardised structured interviews, surveys and questionnaires.

An important aspect of patient safety is the OR environment (Wahr et al., 2013). Environment is defined as the circumstances, objects, or conditions by which one is surrounded. In the OR, the environment comprises the physical space, the equipment, and the people (staff and patients). Ergonomics has been suboptimal with respect to patient safety in the OR (Wong et al., 2010 and Kavic, 2001). Poor room and equipment ergonomics are noted major factors in the flow disruptions that contribute to technical errors and may be contributory to surgical-site infections (Beyea, 2007 and Wiegmann et al., 2007).

Two studies have linked improvements in the physical environment to (1) reduction in staff stress and fatigue, which increases effectiveness in delivering care; (2) improvement in patient safety; (3) improvement in outcomes; and (4) improvement in overall healthcare quality (Matern et al., 2007 and Saver, 2008). The guiding principles for optimal OR design, as summarized by Killen (2008) are as follows. (1) Standardize the location of the head of the table and the handedness of the room; (2) provide adequate space for staff to move around and for equipment; (3) maintain focus on the patient; (4) ensure that all staff have a line of sight to the patient at all times; and (5) use technology to help workflow. Brogmus et al., (2007) found that

optimal size may reduce adverse patient events and mitigate OR staff injuries and this has led to recommendations that rooms for cardiovascular procedures be ≥600 sqft (American Society for Healthcare Engineering 2010). Novel ideas such as rounded room corners, walls shaped to transition to doors, and floor patterns that provide additional visual guides have been proposed.

Optimal room flow requires avoiding unnecessary congestion, with equipment positioned to maintain open corridors and to keep the floor clear and free of hazards, such as avoiding cords across walking paths. Ceiling-mounted booms can reduce the number of cords and cables across high-traffic areas. Monitors and charting systems should be positioned to allow clinicians to face the sterile field and remain attentive to the surgical procedure. The setup of equipment should be consistent, with dedicated space for the sterile field, OR table, Mayo stands, anesthesia equipment, and perfusion setup (Worley and Hohler, 2008). Sterile core and patient-entry doors should be positioned away from swinging equipment booms and stationary machines. OR doors should be situated to protect the sterile surgical field from work zone traffic. Restricting the number of people in the OR and regulating OR traffic may reduce the movement of airborne contaminants shed by people and objects (Andersson et al., 2012).

2.2.3 Process factors

Process factors comprise the interdependent acts and behaviours that convert inputs to outcomes including team performance, task outcomes and team member satisfaction (Hackman, 1987). For example, behaviours of personnel in the operating room influence technical procedures associated with both anaesthesia and surgery. There are also critical interpersonal activities, including the formation and maintenance of

an effectively functioning team. Such a team is able to sustain an accurate mental model of the status of the anaesthetic, the operation and the patient (situational awareness), make appropriate decisions, manage workload and resolve any differences of opinion that may arise within or among groups (Helmreich and Schaefer, 1994).

2.2.4 Outcome factors

Multiple outcomes are associated with performance in the operating room. Patient safety, and efficiency in completing tasks, which is influenced by the quality of group process are paramount. The third is team morale, which is determined by the quality of group interaction. These in turn influence subsequent input factors (attitudes about the group and the conduct of work) and future group processes. Because of these feedback loops, these outcomes can indirectly influence patient safety (Helmreich and Schaefer, 1994).

2.3 The Salas model

The Salas conceptual framework identifies five core components for effective teamwork (Salas et al., 2005): team leadership, collective orientation, mutual performance, backup behaviour and adaptability. The interplay among the five components suggest that, 1) leadership directly affects collective orientation, performance monitoring and backup behaviour; 2) collective orientation and back up behaviour influence performance monitoring; 3) performance monitoring and backup behaviour generate adaptability. These relationships are promoted through three

coordinating mechanisms, shared mental models, closed loop communication and mutual trust. The core components in conjunction with the three coordinating mechanisms comprise the specific knowledge, skills and abilities (KSAs) team members should possess to promote effective teamwork as identified in Table 1 (Lisha Lo, 2011). The components of this framework could be applied as a foundation for the development and enhancement of effective team processes.

Table 1: Knowledge, skills and abilities (KSAs) team members should possess to promote effective teamwork (Lisha Lo, 2011)

Teamwork	Definition
Team leadership	Ability to direct and coordinate activities of other team members, assess team performance, assign tasks, develop KSAs, motivate team members, plan and organize, and establish positive atmosphere
Mutual performance (or situation) monitoring	Ability to develop common understandings of the team environment and apply appropriate task strategies to accurately monitor teammate performance
Backup behaviour (or mutual support)	Ability to anticipate other team member's needs through accurate knowledge about their responsibilities; ability to shift workload among members to achieve balance during periods of increased workload or pressure
Adaptability	Ability to adjust strategies based on information gathered from environment through using compensatory behaviour and reallocation of intra-team resources; Altering course of action or team repertoire in response to changing conditions
Shared mental models	Knowledge structure of the relationships between task team is engaged in and how team members will interact
Closed loop communication	Sender initiates communication; receiver confirms that the communication has been heard and repeats the content; sender verifies the accuracy of that content
Collective orientation	Propensity to take other's behaviour into account during group interaction; belief in importance of team goals over individual member's goals
Mutual trust	Shared belief that team members will perform their roles and protect interest of their teammates

2.4 The Integrated (Health Care) Team Effectiveness

The heuristic Integrated (Health Care) Team Effectiveness Model (ITEM) (Figure 2), is a synthesis of the work of health care researchers (Fried et al., 1988 and Schweikhart and Smith-Daniels, 1996) and that of organisational studies researchers (Cohen and Bailey, 1997). Team effectiveness involves complex interactions between task design, team processes, team psychosocial traits and team effectiveness. Task design factors are influenced by external environments can be manipulated by managers to improve team effectiveness and can directly influence team outcomes or can influence outcomes via impact on team processes and traits. Team processes are distinguished from embedded team psychosocial traits. These (team processes and traits) interact with one another and are influenced by task design to affect team outcomes. Multiple models of team effectiveness may be necessary, depending on team type, task type, work processes, and the types of outcomes health care organizations pursue (Devine DJ, 2002 and Sundstrom E et al., 2000).

Figure 2: The heuristic Integrated (Health Care) Team Effectiveness Model(Lisha Lo, 2011)

2.4.1 Team

The key features of a team are as follows (Lisha Lo, 2011):

1) Consist of two or more individuals,

2) Each individual has a specific role or task to perform and interacts and/or coordinates with other members to achieve a common goal or outcome,

3) Makes decisions,

4) Embodies specialised knowledge and skills, often functioning with a high workload,

5) Exhibits interdependencies with regards to workflow, collective action and goals,

6) Is a part of a larger organisational system

Teams are usually "organized hierarchically and sometimes dispersed geographically; they must integrate, synthesize, and they need to coordinate and cooperate as task demands shift throughout a performance episode to accomplish their mission" (Salas et al., 2008). Operating team is a typical example of healthcare teams that fit this description. A team could be of three main types. An interdisciplinary team integrates the approaches of different disciplines and relies on communication processes that are collaborative rather than a shared communication model (Garner, 1995 and Hoeman, 1996). A multidisciplinary team utilises the skills and experience from different disciplines without integrating the approaches (Jessup, 2007). A "gatekeeper" member determines how other disciplines will participate in an independent, discipline-specific team that conducts separate assessment, planning and provision of services

with little coordination between the team members (Garner, 1995). Each discipline works within parameters specific to the discipline to achieve goals unique to its profession, which can be directly or indirectly communicated to the rest of the team (Hoeman, 1996). A transdisciplinary team approach values and shares the knowledge and skills of team members and crosses traditional disciplinary boundaries in assessment and service planning (Garner, 1995). There is a necessary devaluing of turf issues to allow for boundary blurring between disciplines, with elements of cross-training and flexibility in accomplishing tasks (Hoeman, 1996). The nature of the team processes (multidisciplinary, interdisciplinary and transdisciplinary) are an important consideration in the implementation and effectiveness of team training programs. Generally, teams in healthcare like operating team are characterised as an "interprofessional collaborative" (D'Amour et al., 2005), with the first term alluding to an integration of two or more professional cultures operating transdisciplinarily (Vyt, 2008) and the second encompassing concepts of sharing, partnership, interdependency, power and process.

2.4.2 Operational definition of a surgical team

All surgical procedures are managed by a multidisciplinary team. A range of Operating Room (OR) professionals must work together to provide safe surgical care – namely, surgeons, anaesthetists/anaesthetic technicians, and nurses (scrub nurses and circulating nurses). This also suggests three subteams; the surgical subteam - surgeon and assistants (residents); the anaesthetic subteam – anaesthetist, anaesthetic residents and anaesthetic technician; and the nursing subteam - scrub nurse and circulating nurses.

2.4.3 Teamwork

Teamwork is the interdependent component of performance necessary to effectively coordinate the performance of multiple team members (Salas et al., 2008). Task work on the other hand is the component of the individual member's performance independent of interaction with other members. Team performance is a multilevel process that develops as members engage in task work and teamwork (Kozlowski and Klein, 2000). Teamwork can be conceptually nested within team performance as a "set of interrelated cognitions, attitudes, and behaviours contributing to the dynamic processes of performance" (Salas et al., 2008). Finally, team effectiveness represents an evaluation of team performance outcomes relative to some criteria set (Hackman, 1987). Thus, the definitions of performance and effectiveness on the team level encompass the activities engaged in while completing a task and an appraisal of the outcomes of that activity. Members of a team must engage in both task work and teamwork processes to achieve their common goal.

2.5 Instruments to Measure Effectiveness of Teamwork in Healthcare (Attitudes and Behaviours)

A number of tools have been developed to assess aspects of team culture as well as structural influences of norms, roles and status, which are directed at measuring team member or whole team behaviours. These include the Operating Room Management Attitudes Questionnaire (ORMAQ) (Schaefer and Helmreich 1993), the Interdisciplinary Collaboration questionnaire (Shortell S et al., 1996) and the Team Climate Assessment Measurement (TCAM) questionnaire (TCAM NHS, 2006). The TeamSTEPPS Teamwork Assessment Questionnaire (TeamSTEPPS AHRQ 2008)

assesses attitudes towards core components of teamwork (e.g. team structure, mutual support). There are also observational tools developed primarily for observation of team member behaviours in the operating room. These tools may assess individuals working in a team setting or rate a team as a whole. The Anaesthetists' Non-Technical Skills (ANTS) (Fletcher et al., 2003) measures individual anaesthetist's non-technical skills, including teamwork, task management, situation awareness and decision-making during the course of an operative procedure. The Non-Technical Skills for Surgeons (NOTSS) system (Yule et al., 2008) measures a surgeon's non-technical skills during surgery through assessment of communication and teamwork, situation awareness, task management and decision-making. The Observational Teamwork Assessment for Surgery (Healey et al., 2004) uses a checklist and five behavioural constructs – communication, leadership, coordination, monitoring and cooperation – to rate teamwork.

2.6 Experiences with ORMAQ

ORMAQ is the most extensively used attitudes questionnaire with surgical teams. It was adapted from an instrument measuring safety attitudes in aviation (the Cockpit and Flight Management Attitudes Questionnaires (CMAQ) (Helmreich and Schaefer 1993). This measures attitudes to leadership, communication, teamwork, stress and fatigue, work values, human error and organisational climate using items that are relevant to understanding error, predictive of performance, and sensitive to training interventions. (Sexton et al., 2000).

2.6.1 Studies Comparing Professionals

Helmreich and Schaefer (1994) analyzed ORMAQ data from 53 surgeons, 45 anaesthetists, and 54 theatre nurses in a European hospital. There was a general agreement that communication and coordination were as important as technical proficiency for safety and efficiency in the operating theatre. Surgeons and nurses were more supportive of a culture in which junior members of staff do not question the decisions made by senior staff members, and surgeons were less accepting than anaesthetists that a preoperative briefing was important for teamworking. Surgeons were also reluctant to recognize personal vulnerability to stress. Similar results are reported by Sexton et al., (2000) who analyzed ORMAQ data from 851 surgical and anaesthetic consultants, nurses, and residents in 12 teaching and nonteaching hospitals in the United States and Europe. Surgeons were more confident about their ability to perform well when fatigued than surgical trainees, anaesthetic consultants, or theatre nurses. These findings are in agreement with that of Helmreich (1993) in aviation industry - pilots' inability to recognise their personal level of vulnerability, especially in relation to the physiological and cognitive impact of fatigue and stress, was revealed in the early attitude studies and treated as a cause for concern to be remedied in training. The authors of these reports noted that such findings are extremely valuable for identifying areas that need to be addressed in training, as well as providing baseline data against which to measure any changes in attitude resulting from safety interventions. In the contrary, nurses in an Italian study showed higher levels of awareness of the limiting effects of fatigue compared to surgeons (Prati and Pietrantoni, 2013).

In relation to leadership structure among surgical staff, an ORMAQ study of theatre staff in 2 hospitals (Helmreich and Davies 1996) found that surgeons generally

advocated a structured hierarchy of authority (anaesthetists and nurses valued a flatter team hierarchy). Sexton et al(2000) also corroborated these findings: consultant surgeons were more in favor of a strict hierarchy in the operating room and less likely to encourage junior team members to question the decisions made by more senior team members (i.e. consultants). These results are in contrast to those presented by Edmondson (2003) who found that the ability to speak up in the operating room was crucial to the successful implementation of new technology in cardiac surgery. She found that the most effective leaders minimized power and status differences rather than endorsed them.

Concerning teamwork, in the study by Sexton et al., (2000) both consultant and trainee surgeons rated the quality of teamworking with anaesthetic staff highly (62%). This was in contrast to the 41% of anaesthetic staff who rated teamworking with their surgical colleagues highly. Corroborating evidence for this mismatch is provided in an ORMAQ study of anaesthetists (n = 222) in Scottish hospitals (Flin et al., 2003) where anaesthetists rated the quality of teamwork with surgeons as lower than that with other theatre personnel. In a survey of anaesthetists, surgeons and nurses at a European teaching hospital (Helmreich and Schaefer 1994), respondents were aware of the importance of team coordination and communication, but group differences were found. For instance, anaesthetists were more accepting than surgeons of the idea that a pre-operative briefing is important for team effectiveness. In related research, cross-department planning and debrief meetings for individual cases were associated with improved team coordination and faster learning rates in an analysis of the implementation of a new cardiac procedure in 16 different hospitals (Pisano et al., 2001). Flin et al., (2006) found significant differences between operating room nurses and surgeons. For example, nurses had more positive views on pre-session briefings

and post-session debriefings than consultant surgeons. Surgeons had more positive attitudes toward the quality of surgical leadership and communication in the operating room than nurses. Surgeons rated the quality of teamwork experienced with other surgeons and nurses equally high. However, nurses rated the quality of teamwork with surgeons significantly lower than teamwork with other nurses. Surgeons had more positive attitudes toward the quality of surgical leadership and communication in theatre compared to nurses.

Prati and Pietrantoni (2013) found similar significant differences between the surgical team members in all eight themes: Leadership-Structure; Confidence-Assertion; Information Sharing; Stress and Fatigue; Team Work; Work Values; Error/Procedural Compliance; Organizational Climate. With regard to organizational climate, results showed clear differences in the responses of nurses and surgeons. More specifically, surgeons reported a slight agreement to the statements concerning the quality of organizational climate, while nurses' responses to these statements were near to the midpoint.

In comparison to surgeons, nurses reported more problems in team working and reported that rules or guidelines for the Operating theatre were more frequently disregarded. More specifically, most surgeons tended to rate team work as adequate, while the opposite was true for operating room nurses. These findings suggest that interventions to improve the dialogue between team members to create a shared mental model would be useful (Prati and Pietrantoni 2013). Operating room nurses were more likely to endorse the importance of regular debriefing and verbalising plans for procedures or actions. They however noted that contrary to previous studies (Flin et al., 2006 and Wauben et al., 2011), both nurses and surgeons thought that pre-

session briefing and reporting incidents were important for safety and that they were provided with adequate training to successfully accomplish their job.

In comparison to nurses, surgeons were prouder to work for the hospital, were provided with more adequate and timely information about events, and were more likely to enjoy working as part of a team and to think that doctor's responsibilities include co-ordination between different teams (Prati and Pietrantoni 2013). Compared to surgeons, nurses were less likely to report that procedures and policies were strictly followed and that mistakes were handled appropriately.

The discrepancies may be attributable, at least in part, to the influence of national culture, as well as the particular healthcare system.

2.6.2 Anaesthetists

Anaesthetists have long regarded human error as the leading cause of anaesthesia related complications (Cooper et al., 1978, Nysen 2000). Gaba et al., (1994) measured 279 Californian anaesthesiologists' attitudes towards work pressure and found that half of the sample admitted having made an error attributable to fatigue or workload, and had witnessed a surgeon or colleague do something unsafe. Some also reported pressures from surgeons to proceed with cases rather than cancel them and to hasten anaesthetic procedures.

Flin et al., (2003) in their reports the findings of the first survey of anaesthetists in the UK using the ORMAQ to collect attitudinal data relating to teamwork and safety found that anaesthetists do not fully appreciate the debilitating effects of stress and fatigue on performance.

2.6.3 Leadership component of ORMAQ

While leadership in other workplace has been extensively studied, there is very little research on the leadership role in the operating theatre (Flin and Yule 2004). Flin et al., (2006) reported that most consultant surgeons (54%) said that they mainly used a consultative style where the leader makes decisions but explains them. Only 8% used autocratic while 1% used delegative styles. In contrast, 58% of trainees said they typically encountered the consultative style while 30% said they encountered autocratic leadership. The trainees will prefer to work with a consultative style. Nurses most commonly reported seeing autocratic style in surgeons (59%) and like trainees, they preferred to work with consultative style. These findings are similar to that of Edmondson(2003) who found that cardiac surgeons leading more effective teams(learning new techniques), engaged in coaching and motivating behaviours and minimised concerns about power and status.

2.6.4 Safety Practices from Error and Procedural Compliance component of ORMAQ

In healthcare, a significant percentage of errors can be attributed to communication breakdowns and lack of effective teamwork (Leonard et al., 2004). Communication failures have been identified by the Canadian Joint Commission as the primary root cause in more than 70% of sentinel events from 1995 to 2003 (Joint Commission, 2004). On the other hand, effective communication and teamwork have been cited as essential for achieving high reliability and creating a culture of safety to support the safe delivery of patient care (Leonard et al., 2004). Flin et al., (2006) reported that almost all surgical staff in their study agreed that errors were not a sign of incompetence and were important irrespective of outcome: 74% of consultants, 68%

of trainees and 44% of nurses admitted to making errors in theatre. Two thirds of all staff said they rarely saw errors where lack of knowledge was the causal factor. Consultant surgeons were also found more likely (85%) than trainees (78%) or nurses (58%), to agree that medical errors were discussed to prevent recurrence. Confidential error reporting system was noted by most staff in the study to be important for safety.

Surgical operations involve interactions between different kinds of healthcare providers, each with separate and important knowledge, technical skills, and perspectives. The flow of information between these surgical staff of different degrees of status (e.g., between surgeons and nurses) is of particular relevance to effective teamwork and patient safety in the theatre. The landmark Institute of Medicine Report on medical error concluded that healthcare organizations need "to promote effective team functioning" as one of five principles for creating safe systems of care delivery (Kohn et al., 1999). Previous studies from other countries have shown those surgical team members' attitudes about safety and teamwork in the operating theatre may play a role in patient safety. In Nigeria, there is little local empirical evidence about surgical team attitudes regarding teamwork and patient safety in theatre. Such evidence can complement existing research on teamwork in other countries and inform team-training programs designed to reduce errors in operating rooms. It is therefore imperative to assess the level of teamwork, safety attitude and factors determining them. This will be germane to creating or improving a safe system in the operating rooms of the University College Hospital, Ibadan. Observational and interview studies play a valuable role in our understanding of surgical teams but a complementary approach is to examine the underlying attitudes that are influencing these behaviours. One of the most efficient methods for collecting such data is a crossectional survey. This study was therefore done to survey surgical staff to

measure their overall assessment of teamwork with each other and to identify the specific attitudes that contribute to the global rating of teamwork and patient safety. Data from such perception surveys can help to pinpoint areas of training need, as well as reveal existing strengths in patient safety management.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study was carried out in the University College Hospital (UCH), Ibadan, Ibadan North Local Government Area of Oyo state.

3.1.1 Description of the Study Area

The UCH is a tertiary hospital in south west Nigeria. The hospital is a major referral centre in the country. It is an 850-bed hospital with surgical, medical, obstetrics, gynaecology, and paediatric wards. There are six adult surgical wards and 1 paediatric surgical ward. Surgical patients are often admitted in other sister wards – most commonly paediatric patients.

3.1.2 Study Setting

The University College Hospital has 15 surgical theatres and 434 surgical staff (See table 2) including Nurses; Surgeons (Consultants and Residents); Anaesthetists (Consultants and Residents). There are on average 400 surgical operations per month.

3.2 Study Design

This was a cross-sectional study involving the use of a questionnaire survey of surgical staff of the University College Hospital, Ibadan. Surgical staff in this study

included surgeons, surgical trainees, Anaesthetists, Operating room nurses, and anaesthetist technicians.

3.3 Study Population

The study population included the surgical staff of the University College Hospital, Ibadan (UCH). Surgical staff cadres to be surveyed include consultant surgeons and anaesthetists, residents in surgical departments, and operating room nurses of the University College Hospital, Ibadan. The surgical departments include Surgery, Ear, Nose and Throat surgery, Ophthalmology and Obstetrics and Gynaecology and Oral and Maxillofacial Surgery.

3.3.1. Inclusion Criteria

1. All surgical staff currently working in the University College Hospital, Ibadan.

2. The departments surveyed are Surgery, Department of Obstetrics and Gynaecology, Department of Anaesthesia, Operating room nurses in the Main theatre, Gynaecology theatre, Accident and Emergency Theatre, Department of Ophthalmology, Department of Ear Nose and Throat (Otorhinolaryngology) and Department of Oral and Maxillofacial Surgery.

3.3.2 Exclusion Criteria

1. Surgical staff who were currently not working in the hospital who are either on leave or on sabbatical during the period of the study.

2. Others personnel excluded due to their usual transient length of stay were:

(i) Surgical interns (House officers)

(ii) Anaesthesia technicians

(ii) Student nurses

(iii) Medical students

(iv) Non-technical support staff like cleaners.

3.4 Sample Size Determination

All surgical staff will be interviewed. The surgical staff strength of the University College Hospital Ibadan is 434.

Based on this population size, the power of the study was calculated as follows to know whether the estimated sample size will be enough to support significance test of inference.

$n = (Z_\alpha + Z\beta)^2 pq/d^2$

Z_β is standard deviate corresponding to power of 1-β

Where n = Sample size for the study = 434

P = 90% or 0.9 Proportion of those who had positive team attitude in a similar study (Geraghty A et al., 2014)

$1 - P = 1 - 0.9 = 0.1$

$d = 0.05$

α = level of significance

$434 = (1.96 + Z\beta)^2 \times 0.9 \times 0.1 / 0.05^2$

$Z\beta = 1.51$ which corresponds to a power of 93%

The minimum sample size calculated to achieve a power of at least 80% is 282 participants. The addition of a non-response rate of 10% gives 313 participants.

Table 2: Distribution of the Surgical Staff by Departments

Department	Total Number
Surgery Consultant staff 37 Residents 65	102
Obstetrics and Gynaecology Consultant staff 33 Residents 38	71
Department of Anaesthesia Consultant staff 11 Residents 33	44
Operating room Nurses Main theatre 103 Gynaecology theatre 21 Accident and Emergency Theatre 21	145
Department of Ophthalmology Consultant staff 11 Residents 27	38
Ear Nose and Throat (Otorhinolaryngology) Consultant staff 6 Residents 12	18
Department of Maxillofacial Surgery Consultant staff 7 Residents 9	16
Total	434

3.5 Selection of Study Participants

All surgical staff of the hospital including surgeons, anaesthetists, surgical residents, anaesthetist residents, Obstetrician and Gynaecologists, Obstetrician and Gynaecology residents, Operating room nurses and Anaesthetist technicians of the University College Hospital, Ibadan who consent to take part in the study will be included.

3.6 Data Collection Instrument

Data was collected using the Operating Room Management Attitudes Questionnaire (ORMAQ) (AppendixI). It is the most extensively used attitudes questionnaire with surgical teams.

The version of the ORMAQ (Flin et al., 2003) used in this study consists of four sections.

1. Sixty Likert scale attitude statements relating to eight themes: leadership–structure; confidence – assertion; information sharing; stress and fatigue; teamwork; work values; error; organisational climate. Respondents indicated the extent to which they agreed with each statement on a 5-point scale consisting of disagree strongly (1), disagree slightly (2), neutral (3), agree slightly (4) and agree strongly (5).

2. Teamwork: the second section asked respondents to rate their perception of the quality of teamwork and cooperation/communication that they have experienced with other professional groups who work in operating theatre (e.g. theatre nurses).

3. Error: the third section contains five statements relating to error management. Respondents indicated degree of agreement as above. Two open questions were asked

about common errors and what strategies respondents had seen to be effective for error management in the operating theatre.

4. A) Leadership: four styles of leadership were listed:

A: Autocratic, B: Consultation, c: Joint or D: Delegation. Consultant surgeons were asked which styles they normally used. Trainee surgeons and nurses were asked which style A) they normally encountered, and b) which style they preferred:

Style A: Leaders makes decisions and communicates them firmly, expects loyalty and obedience.

Style B: Leader makes decisions promptly, but explains them fully, provides reasons, and answers questions.

Style C: Leader normally consults with subordinates when important decisions are to be made, listens to advice, considers it, and then makes decision.

Style D: Leader puts problem before the group and invites discussion before accepting majority viewpoint as decision.

3 B) This section invited suggestions on how to increase the effectiveness of operating theatre teams and improve their job satisfaction.

There are a further seven questions which require a more narrative response; for example, listing the three most common errors seen.

Questions appeared in a random sequence in the questionnaire but were collated into the following related themes for the purpose of analysis: error/procedural compliance; error in medicine; teamwork; information sharing; stress and fatigue; leadership

structure; confidence assertion; work values; and organizational climate (Flin et al., 2003).

Additional sections on demographic variables was added. The questionnaire was completed anonymously, and the only biographical data requested related to the department, grade, gender and experience. Surgical team members were provided with oral and written information on the project. The questionnaire was self-administered after informed consent has been sought.

3.7 Data Analysis

Data collected were entered, cleaned and analysed using the Statistical Package for Social Sciences (SPSS) version 20.0 (Chicago, Illinois, USA). Operating room management attitudes were assessed using the ORMAQ questionnaire. The coding was as follows for positively-worded questions:

Strongly agree – 5, Agree – 4, Neutral – 3, Disagree – 2, Strongly disagree 1

While for negatively worded questions:

Strongly agree – 1, Agree – 2, Neutral – 3, Disagree – 4, Strongly disagree 5

For the attitude questions, for the purpose of our analysis the Likert scale points of disagree strongly/slightly were combined, and agree strongly/slightly combined. Each question was analysed at the preliminary analysis stage using frequency and percentages.

The sum of points was computed to generate attitude score and the mean of the score was used to categorise attitude into poor and good attitude. A score above the mean was taken as good attitude while a score below the mean was taken as poor attitude.

The subthemes questions were categorized under teamwork, patient safety practices (Error/Procedural compliance), organizational climate, leadership structure, confidence assertion, information sharing, stress and fatigue, and work values.

The three categories of surgical staff (consultants, resident doctors and nurses) were compared and significant differences sought using Kruskal-Wallis test since the scores did not follow normal distribution when interrogated. Each theme was used as outcomes and the categories of staff as independent variables.

Logistic regression analysis was performed to identify independent predictors for positive teamwork attitude. The independent factors include the demographic variables like gender, work experience and professional background and position. A p value of 0.05 was considered significant.

Mean ratings of anaesthetists' perception of the quality of teamwork and cooperation/ communication they have experienced with other professional groups they work with in the operating theatre were calculated. (The rating scale points are scored as: 1 = very low, 2 = low, 3 = adequate, 4 = high, 5 = very high).

Logistic regression analysis was performed to identify independent predictors for positive teamwork attitude and positive attitude to patient safety. The independent factors include the demographic variables like gender, professional group and years of experience. A p-value of 0.05 was considered significant.

A pretest was done by administering the ORMAQ questionnaire to surgical staff in Ladoke Akintola University Teaching Hospital and the items on anaesthetic nurses and trusts (hospital authorities in the United Kingdom) were deleted.

3.8 Ethical considerations

Ethical approval was obtained from the joint University of Ibadan/University College Hospital Ethical Review Committee. Informed consent was obtained from each participant before the first questionnaire was administered.

3.8.1 Statement of confidentiality

The filing of the data collection forms was done at the convenience of the participants and was not done in an open space to prevent others from viewing the data. Data was coded into a computer that is password protected and encrypted with McAfee antitheft software program to ensure maximal confidentiality. Access to the data was by the investigator only and the data was anonymised.

CHAPTER FOUR

RESULTS

A total of 321 usable questionnaire (overall response rate of 74%) were collected, 73 from surgeons (response rate: 78%) and 111 from surgical trainees (response rate 74%) 107 from operating room nurses (response rate: 81%) and 30 from Anaesthetists (response rate 68%).

4.1 Socio-demographic characteristics of respondents

Respondents' socio-demographic characteristics are shown on Table 4.1. Overall, 65.4% of respondents were male. The mean years of experience for operating room nurses was 5.59 (SD = 4.21), while the mean years of experience for Consultant surgeons was 13.42 (SD = 6.25), consultant anaesthetist 8.67(SD = 4.37) and residents 2.97(SD = 2.07). Majority (96%) of the studied population have worked for more than 1 year in the hospital.

Table 4.1: Socio- demographic characteristics of the respondents

Characteristics	Frequency	Percentages
Gender (N=321)		
Male	210	65.4
Female	111	34.6
Professional Background (N=321)		
Surgeon	73	22.7
Surgical trainee	111	34.6
Anaesthetist	26	8.1
Operating room nurse	111	34.6
Surgical specialty (N=286)		
General Surgery	44	15.4
Orthopaedic	35	12.2
Plastic Surgery	17	5.9
Obstetrics and Gynaecology	71	24.8
ENT	21	7.3
Urology	10	3.5
Cardiothoracic	11	3.8
Neurosurgery	24	8.4
Paediatric Surgery	11	3.8
Ophthalmology	26	9.1
Oral and Maxillofacial Surgery	16	5.6
Specialty Experience (N=321)		
Less than 1year	13	4.0
1-5years	199	62.0
6-10years	71	22.1
10^{+}	38	11.8
Position (N=321)		
Consultants	58	18.1
Resident Doctors	152	47.4
Operating room Nurses	111	34.6

4.2a Respondents Attitude towards information sharing, teamwork, work value, organizational climate and stress and fatigue themes

The results of attitude to information sharing, teamwork, work value and organizational climate, error and procedural compliance and stress and fatigue themes are shown in Table 2(See the raw scores in appendix III). Concerning the information sharing theme, a higher proportion 83(74.8%) of nurses share information with their colleagues compared to 20 (35%) of consultant staff and resident doctors working in the operating rooms. In the contrary, positive teamwork attitude which cuts across professional leanings was more pronounced among the consultants (64%), half of the trainees displayed good attitude and only 32% of nurses. Majority 80(72%) of operating room nurses place more value on their work compared to 60 (40%) of residents.

With regard to organizational climate, results showed clear differences in the responses of nurses and surgeons. Majority of consultants 38(65%) reported experiencing a good organization climate compared to below 47(42%) nurses and 53(34.9%) resident doctors.

The responses to stress and fatigue themes was strikingly poor among operating room nurses with 89(80%) displaying poor attitude. In the contrary, 48.3% and 54.6% of consultants and resident doctors displayed good attitude.

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The responses to stress and fatigue themes was strikingly poor among operating room nurses with 89(80%) displaying poor attitude. In the contrary, 48.3% and 54.6% of consultants and resident doctors displayed good attitude.

Table 4.2a: Attitude of respondents to information sharing, teamwork, work value and organizational climate and stress and fatigue themes (N=321)

Position		Consultants N = 58	Resident doctors N = 152	Nurses N = 111	Total N = 321
Information Sharing	Good	20(34.5%)	54(35.5%)	83(74.8%)	157(48.9%)
	Poor	38(65.5%)	98(64.5%)	28(25.2%)	164(51.1%)
Teamwork	Good	37(63.8%)	75(49.3%)	35(31.5%)	147(45.8%)
	Poor	21(36.2%)	77(50.7%)	76(68.5%)	174(54.2%)
Work value	Good	31(53.4%)	60(39.5%)	80(72.1%)	171(53.3%)
	Poor	27(46.6%)	92(60.5%)	31(27.9%)	150(46.7%)
Organizational Climate	Good	38(65.6%)	53(34.9%)	47(42.3%)	138(43.0%)
	Poor	20(34.5%)	99(65.1%)	64(57.7%)	183(57.0%)
Stress and fatigue	Good	28(48.3%)	3(54.6%)	22(19.8%)	133(41.4%)
	Poor	30(51.7%)	69(45.4%)	89(80.2%)	188(58.6%)

Table 4.2b: Patient safety practices as assessed using error and procedural compliance themes

Patient safety practices were assessed based on the thematic issues concerning error and procedural compliance. Safety practices were poor across all the professional groups with 34(58.6%) of consultants, 104(68.4%) of residents and 68(61.3%) of nurses displaying poor safety practices.

Table 4.2b: Patient safety practices as assessed using error and procedural compliance themes (N=321)

Position		Consultants N = 58	Resident doctors N = 152	Nurses N = 111	Total N = 321
Error and Procedural Compliance	Good	24(41.4%)	48(31.6%)	43(38.7%)	115(35.8%)
	Poor	34(58.6%)	104(68.4%)	68(61.3%)	206(64.2%)

4.3 Other attitude questions relating to confidence assertion and leadership structure (See Table 4.3.1 and 4.3.2)

Table 3 shows the respondents' response to questions relating to confidence assertion and leadership structure other important questions. The participants slightly disagree with the question 'I do my best work better when people leave me alone'. Majority of participants 208(64.8%) agreed with the question that 'Team members should feel obligated to mention their own psychological stress or physical problems to other operating theatre personnel before or during a shift or assignment'. Majority 240(74%) of the participants agreed with the question that 'Leadership of the operating theatre team should rest with the medical staff' and the majority 228(70%) agreed with the assertion that 'the senior person, if available should take over and make all decisions in life threatening emergencies'.

On the question whether 'junior operating theatre team members should not question the decisions made by senior personnel', majority of participants 257 (80.3%) agreed with this. Majority of participants 248(77.3%) agreed with the assertion that 'if I perceive a problem with the management of a patient, I will speak up regardless of who might be affected'.

Table 4.3.1: Respondents' responses to attitude questions relating to leadership structure (N = 321)

Leadership structure	Disagree strongly	Disagree Slightly	Neutral	Agree slightly	Agree strongly
I do my best work when people leave alone	18(5.6%)	41(12.8%)	97(30.2%)	106(33.0%)	59(18.4%)
I am ashamed when I make a mistake in front of other team members	50(15.6%)	64(19.9%)	46(14.3%)	112(34.9%)	49(15.3%)
In critical situations, I rely on my superiors to tell me what to do	37(11.5%)	48(15.0%)	32(10.0%)	109(34.0%)	95(29.6%)
It is an insult to be forced to wait unnecessarily for other members of operating theatre team	37(11.5%)	39(12.1%)	57(17.8%)	120(37.4%)	68(21.2%)
Team members should feel obligated to mention their own psychological stress or physical problems to other operating theatre personnel before or during a shift or assignment	14(4.4%)	48(15.0%)	51(15.9%)	104(32.4%)	104(32.4%)
I rarely witness an error where one or more team members lack the knowledge to perform the needed action	71(22.1%)	146(45.5%)	45(14.0%)	37(11.5%)	22(6.9%)

Table 4.3.2: Respondents' responses to attitude questions relating to confidence assertion (N = 321)

Confidence assertion	Disagree strongly	Disagree Slightly	Neutral	Agree slightly	Agree strongly
Successful operating theatre management is primarily a function of the doctor's medical and technical proficiency	101(31.5%)	60(18.7%)	36(11.2%)	67(20.9%)	57(17.8%)
Leadership of the operating theatre team should rest with the medical staff	26(8.1%)	21(6.5%)	34(10.6%)	111(34.6%)	129(40.2%)
The senior person, if available should take over & make all decisions in life threatening emergencies	23(7.2%)	65(20.2%)	5(1.6%)	56(17.4%)	172(53.6%)
Junior operating theatre team members should not question the decisions made by senior personnel	172(53.6%)	85(26.5%)	21(6.5%)	23(7.2%)	20(6.2%)
If I perceive a problem with the management of a patient, I will speak up regardless of who might be affected	4(1.2%)	20(6.2%)	49(15.3%)	146(45.5%)	102(31.8%)
I sometimes feel uncomfortable telling operating theatre members from other discipline that they need to take some action	66(20.6%)	70(21.8%)	43(13.4%)	87(27.1%)	55(17.1%)
I always ask questions when I feel there is something I don't understand	3(0.9%)	18(5.6%)	25(7.8%)	120(37.4%)	155(48.3%)

4.4 Respondents' perception of teamwork quality of theatre personnel

Table 4 shows perception of teamwork quality among theatre personnel. Majority of the participants (90%) rated the consultants' teamwork quality as adequate to very high. The same high ratings were recorded by the respondents for senior registrars and registrars at 93.5% and 92.9% respectively. The teamwork quality of the operating room nurses was rated as adequate to very high by 80% of respondents while the anaesthesia technicians' teamwork quality received a rating of adequate to high from 71.3% of participants.

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Table 4.4: Perception of teamwork quality of theatre personnel (N = 321)

Position	Very low	Low	Adequate	High	Very high
Consultant surgeons	12(3.7%)	20(6.2%)	82(25.5%)	144(44.9%)	63(19.6%)
Senior registrars	2(0.6%)	19(5.9%)	81(25.2%)	109(34.0%)	[illegible]
Registrar	4(1.2%)	19(5.9%)	144(44.9%)	[illegible]	[illegible]
Operating room nurses	16(5.0%)	46(14.3%)	102(31.8%)	[illegible]	88(27.4%)
Anaesthesia technicians	22(6.9%)	70(21.8%)	[illegible]	46(14.3%)	16(5.0%)

4.5 Mean score for respondents' perception of teamwork quality

Mean ratings of operating room personnel's' perception of the quality of teamwork they have experienced with other professional groups they work with within the operating theatre were calculated. (The rating scale points are scored as: 1 = very low, 2 = low, 3 = adequate, 4 = high, 5 = very high). The total group results are shown (Table 4.5).

As can be seen from Table 4.5, the quality of teamwork was rated fairly high, although at a lower level with anaesthesia technicians than with other groups.

Table 4.5: Mean perception ratings of quality of teamwork of operating room staff

Position	Mean perception rating	Standard Deviation
Consultant surgeons	3.70	0.98
Senior registrars	3.95	0.94
Registrar	3.56	0.88
Operating room nurses	3.52	1.18
Anaesthesia technicians	2.89	0.91

4.6 Leadership style of Consultants in the Operating Theatre

On leadership style (Table 4.6) in the operating theatre, 41% of consultants reported that they usually use style C (Leader normally consults with subordinates when important decisions are to be made, listens to advice, considers it, and then makes decision) which is preferred by only 6% of other theatre personnel. The majority of participants actually encounter style B (leader makes decisions promptly, but explains them fully, provides reasons, and answers questions) or style C at 39.3% and 28.6% respectively.

Table 4.6: Distribution of leadership styles in the operating theatre

Leadership style	Style A	Style B	Style C	Style D
Consultants style used (N=46)	13(28.2%)	13(28.2%)	19(41.3%)	1(2.2%)
Other theatre personnel preferred style (N=234)	174(74.4%)	45(19.1%)	14(6.0%)	1(0.4%)
Style encountered by other theatre personnel (N=234)	24(10.3%)	92(39.3%)	67(28.6%)	51(21.8%)

4.7 Strategies suggested by respondents to improve effectiveness of Operating Theatre teams

Table 4.7 shows the strategies suggested by 170 operating theatre team members towards improving effectiveness. Participants suggested training and retraining of operating team members, improving teamwork spirit and communication among staff. Other suggestions provision of adequate materials and equipment and practice of good professionalism.

Table 4.7: Suggested strategies to improve effectiveness of Operating Theatre Teams

Strategy to improve efficiency of OT team	Frequency	Percentage
Training/re-training of OT members	32	18.8
Improved team work spirit /Cooperation among OT members	43	24.6
Adequate/open communication	24	14.1
Adequate job description	17	0.1
Professionalism/best practices	13	7.6
Provision of adequate materials and equipment	12	7.1
Mutual respect	11	6.5
Use of sanction system	9	5.3
Improved inter-personal relationship	9	5.3
Total	**170**	**100**

4.7.1 Strategies suggested towards improving job satisfaction

On strategies to improve job satisfaction, 190 participants responded to this question overall. Many participants 55(29%) suggested provision of adequate equipment and staff while 44(24%) suggested motivation with incentives and improved reward system. Improved working condition and environment was suggested by 23(12.1%) of respondents. Other suggested strategies include better remuneration and teamwork by 17(9%) and 15(8%) of respondents respectively (Table 4.7.1).

Table 4.7.1: Distribution of strategies suggested towards improving job satisfaction

Strategy to improve job satisfaction	Frequency	Percentages
Provision of adequate equipment/ staff	55	28.9
Motivation with incentives/reward	44	24.3
Improved working condition/environment	23	12.1
Remuneration	17	8.9
More team work	15	7.9
Regular training/re-training	11	5.8
Effective performance of duty	11	5.8
Improved interpersonal relationship	9	4.7
Reduce time wastage/delay	5	2.6
Total	**190**	**100**

4.7.2 Frequently observed errors by the respondents in the operating theatre

Table 4.7.2 shows the frequently observed errors in the operating theatre with 59 (55.7%) of respondents citing human errors(including bringing wrong patients for surgery, forgetting equipment inside patient and operating on wrong site) while others mention technical errors occurring in 14.2%. Transfusion of incompatible blood and poor administration of anaesthesia was cited by 7 (6.6%) and 10 (9.4%) respectively.

Table 4.7.2: Distribution of frequently observed errors in the theatre

Frequent errors occurring in theatre	Frequency	Percentages
Human error (Bringing wrong patients for surgery, forgetting equipment inside patient and operating on wrong site)	59	55.7
Technical error	15	14.2
Poor administration of anaesthesia	10	9.4
Transfusing incompatible blood to patients	7	6.6
Lack of professionalism	6	5.7
Use of expired drugs	5	4.7
Structural injuries	4	3.8
Total	**106**	**100**

4.7.3 Suggested strategies for management of errors in the operating room

Table 4.7.3 shows the suggested strategies for management of errors in the theatre. Strict adherence to surgical checklist and improved teamwork topped the list as suggested by 20.3% and 14.1% of respondents respectively. Other suggested strategies include adequate pre-operative management 30(12.4%), better communication 25(10.4%), use of safety checklist 21(8.7%), proper orientation for operating team members 20 (8.3%), provision of necessary equipment and materials 19 (7.9%) and adherence to definite protocols 18(7.5%).

Table 4.7.3: Suggested strategies for management of errors in the theatre

Strategy effective for management for theatre errors	Frequency	Percentages
Strict adherence to surgical checklist	49	20.3
Improved teamwork	34	14.1
Adequate pre-operative management	30	12.4
Effective communication	25	10.4
Use of safety checklist	21	8.7
Education/orientation for operating team members	20	8.3
Provision of necessary equipment/materials	19	7.9
Definite protocol	18	7.5
Regular discussion	15	6.2
Training and counselling	10	4.1
Total	**241**	**100**

4.8 Comparison of the six thematic structures between three professional groups

Kruskal-Wallis analysis of the six thematic structures showed a significant difference between the three groups (consultants, resident doctors and nurses) across five of the six themes in Table 4.8 namely information sharing, teamwork, work value and organizational climate, and stress and fatigue themes (see Table 4.8).

Table 4.8: Kruskal-Wallis analysis showing the comparison of the six thematic structures between three professional groups

	Consultants Median(IQ range)	Resident doctors Median(IQ range)	Nurses Median(IQ range)	p-value
Information sharing	18(10)	18(12)	20(12)	0.000
Teamwork	34.5(14)	33(20)	31(12)	0.000
Work value	36(17)	35(26)	38(21)	0.000
Safety Practices (Error compliance)	30(13)	29(18)	30(16)	0.180
Organizational climate	24(15)	21(23)	22(13)	0.000
Stress and fatigue	37(25)	39(21)	37(17)	0.000

4.9 Bivariate analysis of factors associated with teamwork

Test of association between teamwork and professional groups (Consultant surgeons, surgical senior registrar, surgical registrar, anaesthetist and nurses) showed statistical significance (χ^2 = 17.437, p value <0.001). Association between teamwork and years of experience was also statistically significant (χ^2 = 9.239, p value = 0.026).

Table 4.9: Chi square analysis of factors associated with teamwork

	Good Teamwork	Poor Teamwork	χ^2	P value
Profession				
Consultant surgeons	33(66%)	17(34%)	17.437	0.000
Senior registrar	30(53.6%)	26(46.4%)		
Registrar	34(43.6%)	44(56.4%)		
Anaesthetist	15(57.7%)	11(43.3%)		
Nurses	35(31.5%)	76(68.5%)		
Year of Experience				
<1	9(69.2%)	4(30.8%)		
1-5	79(39.7%)	120(60.3%)	9.239	0.026
6-10	37(52.1%)	34(47.9%)		
>10	22(57.9%)	16(42.1%)		
Gender				
Male	101(68.7%)	109(62.6%)	1.295	0.154
Female	46(31.3%)	65(37.4%)		

4.9.1 Logistic regression analysis to examine the predictors of attitude to teamwork

Logistic regression analysis was done to examine the predictors of teamwork attitude exploring gender, professional categories (Surgeons, Anaesthetists, Nurses) and years of experience as independent predictors. Nursing and participants who had 1-5 years of experience were found to be independent predictors of good teamwork attitude. Nurses were found to be 2.8 times less likely to have good teamwork attitude compared to surgeons(OR = 0.36; CI = 0.194-0.675) and those with 1-5 years of experience were 1.8 times less likely to have good teamwork attitude compared to those with more than 6 years of experience(OR= 0.56; CI = 0.343 – 0.902) Table 13

Table 4.9.1: Binary logistic regression of factors associated with teamwork

Variables	Standard Error	Odds ratio	95%CI Lower	Upper	P-value
Gender					
Male*					
Female	0.306	1.314	0.721	2.396	0.373
Professional Background					
Surgeons*					
Anaesthetists	0.432	1.222	0.524	2.850	0.643
Nurses	0.319	0.361	0.194	0.675	0.001**
Experience in specialty					
6 years and above*					
1-5years	0.247	0.556	0.343	0.902	0.017**
Less than 1 year	0.645	1.475	0.417	5.217	0.546

*Reference category, **significant variables at p<0.05

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

This is a first attempt to systematically survey the attitudes of operating room personnel in Nigeria in relation to operating theatre teamwork and safety. The purposes of this study were to measure the attitudes of surgical team members in the University College Hospital, Ibadan towards human and organisational factors related to teamwork and patient safety and to analyse any differences in response between operating room nurses and surgeons. Previous studies have shown that surgical team members' attitudes about safety and teamwork in the operating theatre may play a role in patient safety (Christian, et al., 2006 and Edmonson, 2003). Overall, this study showed significant differences between the surgical team members in all seven themes: Information Sharing; Team Work; Work Values; Organizational Climate; Error/Procedural Compliance; Stress and Fatigue, Leadership-Structure. These are discussed below in relation to the eight thematic areas.

5.1.1 Socio-demographic characteristics of respondents

With a total of 321 usable questionnaire collected, the overall response rate was 81% which is comparable to that of Prati and Pietrantoni who recorded 77% response rate in a smaller sample of 103 participants. The mean years of experience for operating room nurses was 5.59 (SD = 4.21) and for Consultant surgeons 13.42 (SD = 6.25) compared to 10.56(SD = 8.68) and 15.48 (SD = 11.46) for operating room nurses and consultant surgeons respectively in a similar Italian study (Prati and Pietrantoni, 2013).

5.1.2 Attitude to information sharing

Nurses displayed better attitude to information sharing compared to surgeons and anaesthetists in this study. This finding is similar to that of Flin et al., (2006) who also found significant differences between operating room nurses and surgeons. In their study nurses had more positive views on pre-session briefings and post-session debriefings than consultant surgeons. Prati and Pietrantoni (2013) similarly found that nurses favoured regular debriefings and teamwork behaviours such as verbalising plans and actions more than surgeons. Again, the attitudes toward pre-session team briefing were different between surgeons and nurses. Information sharing has been noted to be an important component of operating room management attitudes as human failures in communication breakdown can lead to adverse events (Edmonson, 2003). Furthermore, an observational study of complex general surgery cases has shown that problems in communication and information flow during the operation have detrimental effects on team performance and patient safety (Christian, et al., 2006).

5.1.3 Attitude to teamwork

Consultant surgeons and anaesthetists had a significantly better attitude towards teamwork compared to trainees and operating room nurses. Majority of the nurses in fact showed poor attitude towards teamwork. This may be related to the current rivalry within the health care system in the country. This finding is similar to earlier studies where it was noted that in comparison to surgeons, nurses reported more problems in team working and that rules or guidelines for the operating theatre were more frequently disregarded by surgical staff (Prati and Pietrantoni 2013). Similar to the current study, most surgeons tended to rate team work as adequate, while the

opposite was true for operating room nurses. These findings suggest that interventions to improve the dialogue between team members to create a shared mental model would be useful (Prati and Pietrantoni 2013). Lingard et al., (2004) and Greenberg et al., (2007) stressed the importance of maintaining a high level of good attitude to teamwork as a preventive measure for adverse events in the operating theatre.

5.1.4 Attitude to work value

Nurses had a high positive work value along with consultants with residents displaying below average positive work value. This is in contradistinction to the Italian study where it was found that in comparison to nurses, surgeons were more satisfied to work for the hospital, were provided with more adequate and timely information about events, and were more likely to enjoy working as part of a team and to think that doctor's responsibilities include co-ordination between different teams (Prati and Pietrantoni 2013).

5.1.5 Organizational climate

There were significant differences between the consultants and the other two groups of the operating team, residents and nurses, on the items related to organizational climate. The consultants were more favourably disposed to their working environment. This is similar to the finding in the Scottish study (Flin et al., 2006) where consultants also reported better satisfaction with their job and their work environment. Improvement in organisational climate has been noted to enhance social system stability which influences behaviour that help to build organisational commitment, establish a management philosophy and motivate personnel (Lisha Lo 2011).

5.1.6 Patient safety practices

More than 50% of team members across all groups showed poor safety practice as assessed under error and compliance to hospital procedures theme. On the specific question of whether errors were a sign of incompetence, majority of the surgeons and anaesthetists disagreed with this assertion. This finding is similar to that of Flin et al., (2006) who reported that almost all surgical staff in their study agreed that errors were not a sign of incompetence and were important irrespective of outcome. This is a reflection of change in attitude to adverse events from the defensive "blame and shame culture" to an open and transparent healthcare delivery system (Cuschieri, 2006). Majority of the surgical staff in this study therefore demonstrated openness in admitting to having made errors in the theatre which is similar to the finding by Flin et al (2003) where 84% of the participants admitted having made errors. A significant percentage of surgical staff (73% of Nurses, 36.2% of residents and 32.8% of consultants) indicated that team members frequently disregard rules or guidelines (e.g. handwashing, treatment, protocols/clinical pathways, sterile field) developed for the operating theatre and this is similar to findings from Prati and Pietrantoni (2013) who found that their results indicate several areas of weakness in hospital safety management systems, because participants reported that procedures, rules, guidelines, and policies were not strictly followed. Confidential error reporting system was noted by most staff in the study to be important for safety.

5.1.7 Stress and Fatigue

Awareness of personal limitations appears to be very poor across the surgical team studied. This is more pronounced among nurses with 89% demonstrating poor attitude to limitations posed by stress and fatigue. This picture though less than encouraging is

similar to earlier studies. Flin et al., (2003) reported that significant numbers of anaesthetists (30–40%) reported that they were unaffected by stress and fatigue (Flin et al., 2003). Similar invulnerability attitudes were shown by anaesthetists and even more so by surgeons in previous surveys using the ORMAQ (Sexton et al., 2000; Helmreich and Davies 1996; and Helmreich R and Schaefer HG 1994).

5.1.8 Leadership structure

On the items relating to leadership structure, participants' attitudes are, in general, positive and non-hierarchical. Majority of the participants agreed that leadership should rest with the medical staff. There was a lot of disparity between the leadership style consultants said they use and the style preferred or encountered by other theatre personnel. Most consultants reported that they never used delegative style, however a large number of other theatre personnel reported seeing this being used. However, unlike previous studies majority of the theatre personnel preferred autocratic style of decision making and leadership in the operating theatre. Helmreich and Schaefer (1994) reported that anaesthetists preferred consultative leadership styles, whereas many surgeons endorsed the mild autocratic style. It is accepted that leadership at all levels in the healthcare system influences patient safety (Carroll and Edmondson 2001), therefore determining those leadership behaviours which generate high performance in operating theatre teams would be a worthwhile exercise.

5.1.9 Suggestions by surgical staff

5.1.9a Suggested strategies to improve effectiveness of Operating Theatre teams

The suggested strategies were informative and of direct relevance to the observed gaps in attitude to teamwork among the surgical staff. Many participants recognised the need for improved teamwork spirit among the staff. They also suggested training and retraining of staff and improved communication. Greenberg et al., (2007) have indeed noted that poor non-technical skills, including teamwork and communication, may lead to patient safety incidents and medical errors. Another observational study of complex general surgery cases showed that problems in communication and information flow during the operation have detrimental effects on team performance and patient safety (Christian et al., 2006).

5.1.9b Strategies to improve job satisfaction

Similar to previous studies (Flin et al., 2003), participants in this study rated improved remuneration and provision of incentives and reward high in their suggestions.

5.1.9c Frequently observed occurring errors in the theatre

The most commonly cited errors are said to be human by participants while the occurrence of bringing wrong patients to the operating theatre was commonly cited also. Operating on the wrong site is an error which was also mentioned and in fact formed the basis of incorporation of use of checklists in the operating theatre worldwide.

5..1.9d Strategies for management of errors in the theatre

The most commonly cited strategy for prevention of errors in the theatre was strict adherence to surgical checklist which should indeed reduce the occurrence of errors like wrong site surgery. Improved teamwork and communication and adequate preoperative management was also noted as important strategies effective for management of errors in the operating theatre. Flin et al., (2006) also reported similar suggestions: although the most common responses from respondents related to debriefing, other suggested preventive measures were team involvement and consultation during the operation, as well as improved communication and training.

Limitations

The length of the questionnaire was reported to be too long by most of the participants and likely influence the completion and response rate. Many participants also chose not to make suggestions to the open-ended questions on strategies to improve effectiveness and job satisfaction.

5.2 Conclusion

This study represents an initial attempt to measure the attitudes of surgical staff in the University College Hospital, Ibadan, towards teamwork and patient safety. Overall, the surgeons and anaesthetists demonstrated positive attitudes towards teamwork and leadership. On the other hand, nurses were found to demonstrate poor attitude to teamwork and a training gap is indeed observed in that aspect. Consultant surgeons and anaesthetists had a significantly better attitude towards teamwork compared to trainees and operating room nurses. Nurses were found to show attitudes suggesting invulnerability to the effects of stress and fatigue to a higher degree than found in the earlier studies. Perception of teamwork quality among theatre personnel was very

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high. Year of experience was found to significantly affect good attitude to teamwork with those who have stayed for longer time demonstrating better teamwork attitude. The findings are only partially aligned with previous ORMAQ surveys of surgical teams in other countries. Surveys like this can indeed be used as part of the periodic data collection for a hospital's quality assurance programme specifically for operating teams. Evidence gathered from this study can complement existing research on teamwork in other countries and inform team-training programs designed to reduce errors in operating rooms.

5.3 Recommendations

The findings from this study support the following recommendations:

1. Surgical staff may benefit from additional training in human performance limitations under stress conditions. This can be in form of continuous development programmes.
2. There is also a need to encourage and acknowledge the importance of teamwork in the operating theatre. This again should be in form of training programmes on the dynamics of effective teamwork and the participants can then be followed up in future surveys to note improvement in attitude to teamwork.
3. It is also important to examine organisational climate in more detail, especially in regard to factors known to influence safety, such as perceived management commitment to safety and provision of adequate training and equipment.
4. Furthermore, incentives or reward should be extended to operating team members to encourage teamwork.

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APPENDIX I

ANONYMOUS AND CONFIDENTIAL

UNIVERSITY OF IBADAN

Operating Room Management Attitudes and Patient Safety Practices among Surgical Staff in the University College Hospital Ibadan

Questionnaire

INSTRUCTIONS FOR RESPONDENTS

PLEASE READ THIS BEFORE YOU FILL IN THE QUESTIONNAIRE

This is the Survey on Determinants of Teamwork and Patient Safety Perception among Surgical Staff in the University College Hospital Ibadan and is being run as a MSc Clinical Epidemiology Research project at the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan. **I will be very grateful if you can please take this opportunity to express your opinion.**

1. **Your name is not required.**
2. Answer all items on the answer sheet. Leave the answer blank if an item is irrelevant or you are unsure.
3. Your questionnaire will not be seen by anybody other than the researchers.
4. Please be frank and honest in your responses.
5. No individuals will be identifiable in subsequent research reports.
6. Thank you for taking part in this survey

Please return the questionnaire to:

Dr M.A. Salami, Department of Surgery, University College Hospital and College of Medicine, University of Ibadan, Ibadan.

INSTRUCTIONS FOR RESPONDENTS

PLEASE READ THIS BEFORE YOU FILL IN THE QUESTIONNAIRE

This is the Survey on Determinants of Teamwork and Patient Safety Perception among Surgical Staff in the University College Hospital Ibadan and is being run as a MSc Clinical Epidemiology Research project at the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan. **I will be very grateful if you can please take this opportunity to express your opinion.**

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Please return the questionnaire to:

Dr M.A. Salami, Department of Surgery, University College Hospital and College of Medicine, University of Ibadan, Ibadan.

Section 1: Operating Theatre Management Attitudes

Please answer the following questions by circling one response only, using the scale below.

1	2	3	4	5
Disagree strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly

1	The senior person, if available, should take over and make all decisions in life threatening emergencies	1	2	3	4	5
2	The department provides adequate, timely information about events in the hospital which might affect my work	1	2	3	4	5
3	Senior staff should encourage questions from junior medical and nursing staff during operations if appropriate	1	2	3	4	5
4	Even when tired, I perform effectively during critical phases of operations	1	2	3	4	5
5	We should be aware of, and sensitive to, the personal problems of other team members	1	2	3	4	5
6	Senior staff deserve extra benefits and privileges	1	2	3	4	5
7	I do my best work when people leave me alone	1	2	3	4	5
8	I let other team members know when my workload is becoming (or is about to become) excessive	1	2	3	4	5
9	It bothers me when others do not respect my professional capabilities	1	2	3	4	5
10	Doctors who encourage suggestions from Operating Theatre team members are weak leaders	1	2	3	4	5
11	My decision making ability is as good in emergencies as it is in routine situations	1	2	3	4	5
12	A regular debriefing of procedures and decisions after an Operating Theatre session or shift is an important part of developing and maintaining effective team co-ordination	1	2	3	4	5
13	Team members in charge should verbalise plans for procedures or actions and should be sure that the information is understood and acknowledged by others	1	2	3	4	5
14	Junior Operating Theatre team members should not question the decisions made by senior personnel	1	2	3	4	5
15	I try to be a person that others will enjoy working with	1	2	3	4	5
16	I am encouraged by my leaders and co-workers to report any incidents I may observe	1	2	3	4	5
17	The only people qualified to give me feedback are members of my own profession	1	2	3	4	5
18	It is better to agree with other Operating Theatre team members than to voice a different opinion	1	2	3	4	5
19	The pre-session team briefing Is important for safety and for effective team management	1	2	3	4	5
20	It is important that my competence be acknowledged by others	1	2	3	4	5
21	I am more likely to make errors in tense or hostile situations	1	2	3	4	5
22	The doctor's responsibilities include co-ordination between his or her work team and other support teams	1	2	3	4	5

1	2	3	4	5
Disagree strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly

23	I value compliments about my work	1	2	3	4	5
24	Working in this hospital is like being part of a large family	1	2	3	4	5
25	Operating Theatre team members share responsibilities for prioritising activities in high workload situations	1	2	3	4	5
26	As long as the work gets done, I don't care what others think of me	1	2	3	4	5
27	Successful Operating Theatre management is primarily a function of the doctor's medical and technical proficiency	1	2	3	4	5
28	A good reputation in the Operating Theatre is important to me	1	2	3	4	5
29	Errors are a sign of incompetence	1	2	3	4	5
30	Departmental leadership listens to staff and cares about our concerns	1	2	3	4	5
31	I enjoy working as part of a team	1	2	3	4	5
32	If I perceive a problem with the management of a patient, I will speak up, regardless of who might be affected	1	2	3	4	5
33	I am ashamed when I make a mistake in front of other team members	1	2	3	4	5
34	In critical situations, I rely on my superiors to tell me what to do	1	2	3	4	5
35	I value the goodwill of my fellow workers -I care that others see me as friendly and co-operative	1	2	3	4	5
36	I sometimes feel uncomfortable telling Operating Theatre members from other disciplines that they need to take some action	1	2	3	4	5
37	Procedures and policies are strictly followed in our Operating Theatre	1	2	3	4	5
38	Team members should not question the decisions or actions of senior staff except when they threaten the safety of the operation	1	2	3	4	5
39	I am less effective when stressed or tired	1	2	3	4	5
40	It is an insult to be forced to wait unnecessarily for other members of the Operating Theatre team	1	2	3	4	5
41	Mistakes are handled appropriately in this hospital	1	2	3	4	5
42	Leadership of the Operating Theatre team should rest with the medical staff	1	2	3	4	5
43	My performance is not adversely affected by working with an inexperienced or less capable team member	1	2	3	4	5
44	To resolve conflicts, team members should openly discuss their differences with each other	1	2	3	4	5
45	Team members should monitor each other for signs of stress or tiredness	1	2	3	4	5

1	2	3	4	5
Disagree strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly

46	I become irritated when I have to work with inexperienced medical staff	1	2	3	4	5
47	I am proud to work for this hospital	1	2	3	4	5
48	All members of the Operating Theatre team are qualified to give me feedback	1	2	3	4	5
49	A truly professional team member can leave personal problems behind when working in the Operating Theatre	1	2	3	4	5
50	There are no circumstances where a junior team member should assume control of patient management	1	2	3	4	5
51	Team members should feel obligated to mention their own psychological stress or physical problems to other Operating Theatre personnel before or during a shift or assignment	1	2	3	4	5
52	In the Operating Theatre, I get the respect that a person of my profession deserves	1	2	3	4	5
53	Human error is inevitable	1	2	3	4	5
54	The concept of all Operating Theatre personnel working as a team does not work at this hospital	1	2	3	4	5
55	Personal problems can adversely affect my performance	1	2	3	4	5
56	Effective Operating Theatre team co-ordination requires members to take into account the personalities of other team members	1	2	3	4	5
57	I like my job	1	2	3	4	5
58	I am provided with adequate training to successfully accomplish my job	1	2	3	4	5
59	Team members frequently disregard rules or guidelines (e.g. hand washing, treatment protocols/clinical pathways, sterile field) developed for our Operating Theatre	1	2	3	4	5
60	I always ask questions when I feel there is something I don't understand	1	2	3	4	5

Section 2: Teamwork

Please describe your perception of the quality of teamwork you have experienced with the following theatre personnel using the scale below:

1	2	3	4	5
Very low	Low	Adequate	High	Very High

61	Consultant Surgeon	1	2	3	4	5
62	Senior Registrars	1	2	3	4	5
63	Registrar	1	2	3	4	5
64	Operating room nurses	1	2	3	4	5
65	Anaesthesia technicians	1	2	3	4	5

Section 3: Error in Medicine

Please answer the following questions using the scale below:

1	2	3	4	5
Disagree strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly

66	I rarely witness an error where one or more team members lack the knowledge to perform the needed action	1	2	3	4	5
67	Errors committed during patient management are not important, as long as the patient improves	1	2	3	4	5
68	I make errors in theatre	1	2	3	4	5
69	Medical errors are discussed to prevent recurrence	1	2	3	4	5
70	A confidential reporting system that documents medical errors is important for safety	1	2	3	4	5

Q71. How can the effectiveness of Operating Theatre teams be increased?

Q72. How can the job satisfaction of Operating Theatre teams be increased?

Section 4: Leadership and prioritising

Please answer the following questions

Q73. If I were to fail in one of the following areas, which would concern me most? Please rank 1, 2, 3, 4 (do not use tied ranks, 1 is most concern)

Reducing waiting lists	Patient safety	Saving costs	The Hospital's reputation

Q74. If I were to fail in one of the following areas, which would concern this Hospital's management most? Please rank 1, 2, 3, 4 (do not use tied ranks, 1 is most concern)

Reducing waiting lists	Patient safety	Saving costs	The Hospital's reputation

Q75. Consider the following four leadership styles and answer the questions below.

Style A: Leader makes decisions and communicates them firmly, expects loyalty and obedience.

Style B: Leader makes decisions promptly, but explains them fully, provides reasons, and answers questions.

Style C: Leader normally consults with subordinates when important decisions are to be made, listens to advice, considers it, and then makes decision.

Style D: Leader puts problem before the group and invites discussion before accepting majority viewpoint as decision.

Please answer the questions below by writing A, B, C, or D

COSULTANT SURGEONS ONLY ANSWER

I) Which style do you **normally use** in the operating theatre?_____

EVERYONE ELSE ANSWER

II) Which style do you **normally encounter from surgeons** in the Operating Theatre?

III) Which style do you **prefer** in the Operating Theatre? _____

Q76. What are the three most frequently occurring errors that you have observed in Theatre?
1.
2.
3.

Q77. In your experience, what strategies have you seen to be effective for managing error in the Operating Theatre?
1.
2.
3.

Please write any further comments about teamwork, safety, decision-making, leadership, or any other issue in the Operating Theatre below.

BACKGROUND INFORMATION

1. Name of Department_____

2. Theatre name (Nurses only)_____

3. Gender (please circle) M / F

4. Professional Background:

□ Surgeon □ Surgical Trainee

□ Anesthesia Professional □ Anesthesia Trainee

□ Operating room nurse

□ Other: (please describe) _____

Surgical specialty (please tick)

General Surgery		Cardiothoracic	
Orthopaedic		Neurosurgery	
Plastic Surgery		Paediatric Surgery	
Obstetrics and Gynaecology		Ophthalmology	
ENT		Oral and Maxillofacial surgery	
Urology			

5. How much experience do you have in this specialty? _____ years

6. Experience in Health Care :

□ <1 Year

□ 1-2 Years

□ 2-5 Years

□ 5-10 Years

□ >10 Years

7. Experience in Current Job:

□ <1 Year

□ 1-2 Years

□ 2-5 Years

□ 5-10 Years

□ >10 Years

8. Position (please tick appropriate box):

☐ Consultant Surgeon

☐ Senior Registrar

☐ Registrar

☐ Operating room Nurse/Cadre_____

☐ Anaesthetist technician

APPENDIX II

Informed Consent Form

I am Dr. Mudasiru Adebayo Salami, a Cardiothoracic Surgeon and Consultant in the Department of Surgery, University College Hospital, Ibadan. I am conducting a study on **Determinants of Teamwork and Patient Safety Perception among Surgical Staff in the University College Hospital Ibadan.** We are collecting data from all surgical staff of which you are one of those selected. We will collect data including demographic details and we will ask you to complete an Operating Room Management Attitudes Questionnaire (ORMAQ). This is the most extensively used attitudes questionnaire with surgical teams. It was adapted from an instrument measuring safety attitudes in aviation (the Cockpit and Flight Management Attitudes Questionnaires (CMAQ) (Helmreich and Schaefer 1993). This measures attitudes to leadership, communication, teamwork, stress and fatigue, work values, human error and organisational climate using items that are relevant to understanding error, predictive of performance, and sensitive to training interventions. (Sexton B et al 2000). We may also ask you some questions to complement the data concerning the recently introduced WHO Checklist in our surgical theatre. Please note that your answers will be kept strictly confidential. The information that we obtain from you will be used to help document the attitudes to teamwork and patient Safety among Surgical Staff in the University College Hospital Ibadan. The findings of this study will help the surgical staff, the hospital management and policy makers to detect any gaps and design strategies to ensure training towards achieving an ideal team surgical care.

Statement of confidentiality

The questionnaires will be self-administered at your convenience. The data will be coded into a computer that is password protected and encrypted with McAfee antitheft software program

to ensure maximal confidentiality. Access to the data will be by the investigator only and the data will be anonymised as soon as you complete the study.

Beneficence to participants

You will have the benefit of knowing the final outcome of the research and possible implications for training.

Right to decline or withdraw

You are free to refuse to participate in this study. You also have the right to decline continuation or withdraw your consent to participate at any stage. You will not suffer any discrimination.

Non maleficence

The study will not cause you any harm besides the time it will take you to complete the questionnaires.

We appreciate your acceptance to participate in the study.

Consent: Now that the study has been well explained to me and I fully understand the content of the study process, I am willing to take part in the study.

....

Signature of Participant/Date Signature of Interviewer/Date

APPENDIX III

Raw Scores for Thematic Structures

Stress and fatigue	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Even when tired I perform effective during critical phases of operation.	22 (37.9%)	7 (12.1%)	29 (50.0%)	90 (59.2%)	19 (12.5%)	43 (28.3%)	73 (65.8%)	2 (1.8%)	36 (32.4%)
We should be aware of, and sensitive to, the personal problems of others team members.	2 (3.4%)	2 (3.4%)	54 (93.1%)	7 (4.6%)	14 (9.2%)	131 (86.2%)	3 (2.7%)	0 (0.0%)	108 (97.3%)
I let other team members know when my workload is becoming (or is about to become) excessive.	5 (8.6%)	18 (31.0%)	35 (60.3%)	19 (12.5%)	37 (24.3%)	96 (63.2%)	3 (2.7%)	8 (7.2%)	100 (90.1%)
My decision making is as good in emergencies as it is in routine situation.	10 (17.2%)	4 (6.9%)	44 (75.9%)	34 (22.4%)	15 (9.9%)	103 (67.8%)	8 (7.2%)	3 (2.7%)	100 (90.1%)
I am more likely to make errors tense or hostile situations.	10 (17.2%)	7 (12.1%)	41 (70.7%)	14 (9.2%)	14 (9.2%)	124 (81.6%)	56 (50.5%)	12 (10.8%)	43 (38.7%)
I am less effective when stressed or tired.	14 (24.1%)	2 (3.4%)	42 (72.4%)	24 (15.8%)	11 (7.2%)	117 (77.0%)	33 (29.7%)	6 (5.4%)	72 (64.9%)
My performance is not adversely affected by working with an inexperienced or less capable team members.	39 (67.2%)	3 (5.2%)	16 (27.6%)	89 (58.6%)	18 (11.8%)	45 (29.6%)	81 (73.0%)	6 (5.4%)	24 (21.6%)
Team members should monitor each other for signs of stress or tiredness.	3 (5.2%)	10 (17.2%)	45 (77.6%)	12 (7.9%)	22 (14.5%)	118 (77.6%)	3 (2.7%)	4 (3.6%)	104 (93.7%)

I become irritated when I have to work with inexperienced medical staff.	20 (34.5%)	14 (24.1%)	24 (41.4%)	78 (51.3%)	36 (23.7%)	38 (25.0%)	29 (26.1%)	8 (7.2%)	74 (66.7%)
A truly professional team member can leave personal problem behind when working in the operating theatre.	7 (12.1%)	9 (15.5%)	42 (72.4%)	21 (13.8%)	32 (21.1%)	99 (65.1%)	34 (30.6%)	10 (9.0%)	67 (60.4%)
Team members should feel obligation to mention their own psychological stress or physical problems to other operating theatre personnel before or during a shift or assignment.	8 (13.8%)	9 (15.5%)	41 (70.7%)	19 (12.5%)	26 (17.1%)	107 (70.4%)	17 (15.3%)	2 (1.8%)	92 (82.9%)
Personal problems can adversely affect my performance	8 (13.8%)	9 (70.7%)	41 (70.7%)	19 (12.5%)	26 (17.1%)	107 (70.4%)	17 (15.3%)	2 (1.8%)	92 (82.9%)

Teamwork	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
The only people qualified to give me feedback are members of my own profession	48 (82.8%)	1 (1.7%)	9 (15.5%)	91 (59.9%)	20 (13.2%)	41 (27.0%)	29 (26.1%)	8 (7.2%)	74 (66.7%)
It is better to agree with operating theatre team members than to voice a different opinion	1 (1.7%)	1 (1.7%)	56 (96.6%)	2 (1.3%)	5 (3.3%)	145 (95.4%)	8 (7.2%)	7 (6.3%)	96 (86.5%)
The doctors responsibilities include coordination between his or her work team and other support team	10 (17.2%)	7 (12.1%)	41 (70.7%)	31 (20.5%)	21 (13.9%)	99 (65.6%)	0 (0.0%)	3 (2.7%)	108 (97.7%)
Operating theatre team share responsibilities for prioritising activities in high workload situations	0 (0.0%)	1 (1.7%)	57 (77.6%)	6 (3.9%)	7 (4.6%)	139 (91.4%)	1 (0.9%)	1 (0.9%)	109 (98.2%)
I enjoy my work as part of a team	3 (5.2%)	7 (12.1%)	48 (82.8%)	19 (12.5%)	24 (15.8%)	109 (71.7%)	56 (50.5%)	3 (2.7%)	52 (46.8%)
To resolve conflicts team members should openly discuss their differences with each other	6 (10.3%)	3 (5.2%)	49 (84.5%)	13 (8.6%)	21 (13.8%)	118 (77.6%)	2 (1.8%)	4 (3.6%)	105 (94.6%)
All members of the operating theatre team are qualified to give me feedback	24 (41.4%)	7 (12.1%)	27 (46.6%)	56 (36.8%)	30 (19.7%)	66 (43.4%)	31 (27.9%)	10 (9.0%)	70 (63.1%)
The concept of all operating theatre personnel working	3 (5.2%)	5 (86.2%)	50 (82.8%)	9 (5.9%)	19 (12.5%)	124 (81.6%)	6 (5.4%)	3 (2.7%)	102 (91.9%)

Teamwork	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
The only people qualified to give me feedback are members of my own profession	48 (82.8%)	1 (1.7%)	9 (15.5%)	91 (59.9%)	20 (13.2%)	41 (27.0%)	29 (26.1%)	8 (7.2%)	74 (66.7%)
It is better to agree with operating theatre team members than to voice a different opinion	1 (1.7%)	1 (1.7%)	56 (96.6%)	2 (1.3%)	5 (3.3%)	145 (95.4%)	8 (7.2%)	7 (6.3%)	96 (86.5%)
The doctors responsibilities include coordination between his or her work team and other support team	10 (17.2%)	7 (12.1%)	41 (70.7%)	31 (20.5%)	21 (13.9%)	99 (65.6%)	0 (0.0%)	3 (2.7%)	108 (97.7%)
Operating theatre team share responsibilities for prioritising activities in high workload situations	0 (0.0%)	1 (1.7%)	57 (77.6%)	6 (3.9%)	7 (4.6%)	139 (91.4%)	1 (0.9%)	1 (0.9%)	109 (98.2%)
I enjoy my work as part of a team	3 (5.2%)	7 (12.1%)	48 (82.8%)	19 (12.5%)	24 (15.8%)	109 (71.7%)	56 (50.5%)	3 (2.7%)	52 (46.8%)
To resolve conflicts team members should openly discuss their differences with each other	6 (10.3%)	3 (5.2%)	49 (84.5%)	13 (8.6%)	21 (13.8%)	118 (77.6%)	2 (1.8%)	4 (3.6%)	105 (94.6%)
All members of the operating theatre team are qualified to give me feedback	24 (41.4%)	7 (12.1%)	27 (46.6%)	56 (36.8%)	30 (19.7%)	66 (43.4%)	31 (27.9%)	10 (9.0%)	70 (63.1%)
The concept of all operating theatre personnel working	3 (5.2%)	5 (86.2%)	50 (82.8%)	9 (5.9%)	19 (12.5%)	124 (81.6%)	6 (5.4%)	3 (2.7%)	102 (91.9%)

as a team does not work at hospital									
Effective operating theatre team coordination requires members to take into account the personalities of other team members	48 (82.8%)	5 (8.6%)	5 (8.6%)	134 (88.2%)	5 (3.3%)	13 (8.6%)	99 (89.2%)	5 (4.5%)	7 (6.3%)

Work value	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Senior staff deserves benefits and privileges	3 (5.2%)	11 (19.0%)	44 (75.9%)	17 (20.4%)	27 (17.8%)	108 (71.1%)	5 (4.5%)	8 (7.2%)	98 (88.3%)
I do my best work when people leave me alone	21 (36.2%)	13 223.4%)	24 (41.4%)	31 (20.4%)	31 (20.4%)	90 (59.2%)	7 (6.3%)	53 (47.7%)	51 (45.9%)
It bothers me when others do not respect my professional capabilities	4 (6.9%)	14 (24.1%)	40 (69.0%)	10 (6.6%)	16 (10.5%)	126 (82.9%)	4 (3.6%)	3 (2.7%)	104 (93.7%)
I try to be a person that my competence be acknowledged by others	0 (0.0%)	1 (1.7%)	57 (77.6%)	4 (2.6%)	10 (6.6%)	138 (90.8%)	2 (1.8%)	1 (0.9%)	108 (97.3%)
It is important that my competence be acknowledged by others	7 (12.1%)	17 (29.3%)	34 (58.6%)	12 (7.9%)	34 (22.4%)	106 (69.7%)	2 (1.8%)	2 (1.8%)	107 (96.4%)
I value compliments about my work	1 (1.7%)	17 (29.3%)	40 (69.0%)	4 (2.6%)	32 (21.2%)	116 (76.3%)	20 (18.0%)	5 (4.5%)	86 (77.5%)
As long as the work gets done, I don't care what others think of me	28 (48.3%)	9 (15.5%)	21 (36.2%)	75 (49.3%)	31 (20.4%)	46 (30.3%)	41 (36.9%)	4 (3.6%)	66 (59.5%)
A good reputation in the operating theatre is important to me	5 (8.6%)	10 (17.2%)	43 (74.1%)	11 (7.2%)	27 (17.8%)	114 (75.0)	5 (4.5%)	0 (0.0%)	106 (95.5%)
I value the goodwill of my fellow workers-I care that others see me as friendly and cooperative	2 (3.4%)	6 (10.3%)	50 (86.2%)	12 (7.9%)	25 (16.4%)	115 (75.7%)	23 (20.7%)	1 (0.9%)	87 (78.4%)
It is an insult to be	15	10	33	33	40	79	28	7	76

forced to wait unnecessarily for other members of the operating theatre team	(25.9%)	(17.2%)	(56.9%)	(56.9%)	(26.3%)	(50.0%)	(25.2%)	(6.3%)	(68.5%)
In operating theatre, I get the respect that a person of my profession deserves	7 (12.1%)	12 (20.7%)	39 (67.2%)	55 (36.2%)	53 (34.9%)	44 (28.9%)	57 (51.4%)	15 (13.5%)	39 (35.1%)

Organizational Climate	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
The department provides adequate timely information about events in the hospital which might affect my work	17 (29.3%)	8 (13.8%)	33 (56.9%)	61 (40.1%)	23 (15.1%)	68 (44.7%)	65 (58.6%)	12 (10.8%)	34 (30.6%)
Working in this hospital is like being part of a large family	5 (8.6%)	15 (25.9%)	38 (65.5%)	37 (24.3%)	39 (25.7%)	76 (50.0%)	22 (19.8%)	2 (1.8%)	87 (78.4%)
Departmental leadership listens to staff and cares about our concerns.	6 (10.3%)	12 (20.7%)	40 (69.0%)	48 (31.6%)	33 (21.7%)	71 (46.7%)	17 (15.3%)	8 (7.2%)	86 (77.5%)
I am proud to work for this hospital	0 (0.0%)	11 (19.0%)	47 (81.0%)	19 (12.5%)	36 (23.7%)	97 (63.8%)	4 (3.6%)	6 (5.4%)	101 (91.0%)
I like my job	0 (0.0%)	0 (0.0%)	58 (100%)	6 (3.9%)	14 (9.2%)	132 (86.8%)	14 (12.6%)	0 (0.0%)	97 (87.4%)
I am provided with adequate training to successfully accomplish my job	14 (24.1%)	4 (6.9%)	40 (69.0%)	48 (31.6%)	26 (17.1%)	78 (51.3%)	53 (47.7%)	4 (3.6%)	54 (48.6%)

Error/procedural compliance	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Errors are a sign of incompetence	45 (77.6%)	8 (13.8%)	5 (8.6%)	103 (67.8%)	22 (14.5%)	27 (17.8%)	41 (36.9%)	49 (44.1%)	21 (18.9%)
I am ashamed when I make mistake in front of other team members	31 (53.4%)	12 (20.7%)	15 (25.9%)	56 (36.8%)	32 (21.1%)	64 (42.1%)	27 (24.3%)	2 (1.8%)	82 (73.9%)
Procedures and policies are strictly followed in our operating theatre	30 (51.7%)	11 (19.0%)	17 (29.3%)	75 (49.3%)	28 (18.4%)	49 (32.2%)	19 (17.1%)	16 (14.4%)	76 (68.5%)
Mistakes are handled appropriately in this hospital	35 (60.3%)	12 (20.7%)	11 (19.0%)	87 (57.2%)	30 (19.7%)	35 (23.0%)	20 (18.0%)	53 (47.7%)	38 (34.2%)
Human error is inevitable	13 (22.4%)	3 (5.2%)	42 (72.4%)	30 (19.7%)	19 (12.5%)	103 (67.8%)	7 (6.3%)	4 (3.6%)	100 (90.1%)
Team members frequently disregard rules or guidelines(e.g. handwashing, treatment, protocols/clinical pathways, sterile field) developed for our operating theatre.	34 (58.6%)	5 (8.6%)	19 (32.8%)	72 (47.4%)	25 (16.4%)	55 (36.2%)	25 (22.5%)	5 (4.5%)	81 (73.0%)
I make errors in theatre	13 (22.4%)	14 (24.1%)	31 (53.4%)	37 (24.3%)	45 (29.6%)	70 (65.8%)	15 (13.5%)	4 (3.6%)	23 (20.7%)

Error/procedural compliance	CONSULTANTS			RESIDENT DOCTORS			NURSES		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
Errors are a sign of incompetence	45 (77.6%)	8 (13.8%)	5 (8.6%)	103 (67.8%)	22 (14.5%)	27 (17.8%)	41 (36.9%)	49 (44.1%)	21 (18.9%)
I am ashamed when I make mistake in front of other team members	31 (53.4%)	12 (20.7%)	15 (25.9%)	56 (36.8%)	32 (21.1%)	64 (42.1%)	27 (24.3%)	2 (1.8%)	82 (73.9%)
Procedures and policies are strictly followed in our operating theatre	30 (51.7%)	11 (19.0%)	17 (29.3%)	75 (49.3%)	28 (18.4%)	49 (32.2%)	19 (17.1%)	16 (14.4%)	76 (68.5%)
Mistakes are handled appropriately in this hospital	35 (60.3%)	12 (20.7%)	11 (19.0%)	87 (57.2%)	30 (19.7%)	35 (23.0%)	20 (18.0%)	53 (47.7%)	38 (34.2%)
Human error is inevitable	13 (22.4%)	3 (5.2%)	42 (72.4%)	30 (19.7%)	19 (12.5%)	103 (67.8%)	7 (6.3%)	4 (3.6%)	100 (90.1%)
Team members frequently disregard rules or guidelines(e.g. handwashing, treatment, protocols/clinical pathways, sterile field) developed for our operating theatre.	34 (58.6%)	5 (8.6%)	19 (32.8%)	72 (47.4%)	25 (16.4%)	55 (36.2%)	25 (22.5%)	5 (4.5%)	81 (73.0%)
I make errors in theatre	13 (22.4%)	14 (24.1%)	31 (53.4%)	37 (24.3%)	45 (29.6%)	70 (65.8%)	15 (13.5%)	4 (3.6%)	23 (20.7%)

Medical errors are discussed to prevent	3 (5.2%)	2 (3.4%)	53 (91.4%)	18 (11.8%)	5 (5.9%)	125 (82.2%)	21 (18.9%)	2 (1.8%)	88 (79.3%)
A confidential reporting system that documents medical errors is important for safety	2 (3.4%)	1 (1.7%)	55 (94.8%)	4 (2.6%)	10 (6.6%)	138 (90.8%)	1 (0.9%)	1 (0.9%)	109 (98.2%)

Medical errors are discussed to prevent	3 (5.2%)	2 (3.4%)	53 (91.4%)	18 (11.8%)	5 (5.9%)	125 (82.2%)	21 (18.9%)	2 (1.8%)	88 (79.3%)
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A confidential reporting system that documents medical errors is important for safety	2 (3.4%)	1 (1.7%)	55 (94.8%)	4 (2.6%)	10 (6.6%)	138 (90.8%)	1 (0.9%)	1 (0.9%)	109 (98.2%)