



Faculty of Medicine and Health Science

**Patient Safety Culture and Its Associated Factors Among Perioperative
Staff in the Operating Theater at Sarawak General Hospital**

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Patient Safety Culture and Its Associated Factors Among Perioperative Staff
in the Operating Theater at Sarawak General Hospital

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



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ABSTRACT

Patient safety is a fundamental concern in healthcare, especially in high-risk settings such as operating theaters, where there is an increased likelihood of adverse events. Nonetheless, local studies within the operating theater setting remain limited, particularly those addressing the complex interplay between active and latent failures. This study examined the influence of organizational and individual factors, and the moderating effects of job position, gender, and years of experience toward patient safety culture among perioperative staff at Sarawak General Hospital (SGH) in Malaysia. A cross-sectional study was employed, involving 137 perioperative staff members, including both doctors and nurses, selected through convenience sampling. The Safety Attitude Questionnaire-Operating Room (SAQ-OR) and Hospital Survey on Patient Safety Culture (HSOPSC) was adapted in this study. The responses were analyzed via descriptive analysis and partial least square-structural equation modeling (PLS-SEM). Most respondents (67.2%) were registered nurses. The stress recognition dimension had the highest mean positive response rate at 73.0%, whereas the perceptions of management dimension had the lowest at 22.6%. The study findings revealed a significant positive relationship between individual factors and the perception of patient safety culture. In contrast, the association between organizational factors and the perception of patient safety culture was positive but not significant. The moderating effects of position, gender, and years of experience in a specialty were also non-significant. Overall, the perception of patient safety culture in the Sarawak General Hospital (SGH) operating theater was rated as good. The lowest positive response rate in the management dimension implies the need for the organization to address staffing shortage issues and improve workplace support to increase patient safety. Individual factors, such as job satisfaction and stress recognition, significantly influence these perceptions. Improving these aspects through

supportive policies and management interventions is necessary to enhance safety culture. With a coefficient of determination (R^2) value of 42.6% in this structural model, additional influencing factors may be relevant. Future studies should explore influences such as government policies, budget allocation, and technological advancements to further enhance patient safety culture in operating theaters.

Keywords: Patient safety culture, individual factors, organizational factors, perioperative staff, Safety Attitude Questionnaire-Operating Room (SAQ-OR)

***Budaya Keselamatan Pesakit dan Faktor-Faktor Dalam Kalangan Kakitangan
Perioperatif di Dewan Pembedahan di Hospital Umum Sarawak***

ABSTRAK

Keselamatan pesakit adalah kebimbangan utama dalam penjagaan kesihatan, terutamanya bagi persekitaran berisiko tinggi seperti dewan bedah, di mana kemungkinan berlaku kejadian buruk adalah tinggi. Sehingga kini, kajian tempatan dalam persekitaran dewan bedah masih terhad. Kajian ini mengkaji pengaruh faktor organisasi dan individu, dan kesan penyederhanaan jawatan kerja, jantina, dan tahun pengalaman terhadap budaya keselamatan pesakit dalam kalangan kakitangan perioperatif di Hospital Umum Sarawak (SGH) di Malaysia. Kajian keratan rentas telah dijalankan, dengan melibatkan 137 orang kakitangan perioperatif termasuk doktor dan jururawat, dipilih melalui kaedah pensampelan kemudahan. Borang soal selidik Sikap Keselamatan-Bilik Pembedahan (SAQ-OR) dan Tinjauan Hospital mengenai Budaya Keselamatan Pesakit (HSOPSC) telah disesuaikan dalam kajian ini. Respons dianalisis melalui analisis deskriptif dan model persamaan struktur-kuasa dua terkecil separa (PLS-SEM). Kebanyakan responden (67.2%) adalah jururawat berdaftar. Dari segi aspek pengecaman tekanan memperoleh purata kadar tindak balas positif tertinggi iaitu 73.0%, manakala persepsi aspek pengurusan mempunyai purata kadar terendah iaitu 22.6%. Hasil kajian ini menunjukkan hubungan positif yang ketara antara faktor individu dan persepsi budaya keselamatan pesakit. Sebaliknya, hubungan antara faktor organisasi dan persepsi budaya keselamatan pesakit adalah positif tetapi tidak ketara. Kesan penyederhanaan jawatan kerja, jantina, dan tahun kepakaran juga tidak ketara. Secara keseluruhannya, nilai persepsi keseluruhan budaya keselamatan pesakit di dewan bedah Hospital Umum Sarawak (SGH) adalah baik. Kadar tindak balas positif terendah dalam persepsi aspek pengurusan menunjukkan keperluan untuk organisasi

menangani isu-isu kekurangan kakitangan dan meningkatkan sokongan tempat kerja untuk meningkatkan keselamatan pesakit. Faktor individu, seperti kepuasan kerja dan pengiktirafan tekanan, mempengaruhi persepsi ini dengan ketara. Penambahbaikan aspek ini melalui dasar sokongan dan pengurusan adalah perlu untuk meningkatkan budaya keselamatan. Dengan nilai pekali penentuan (R^2) sebanyak 42.6% dalam model struktur ini, faktor pengaruh tambahan mungkin relevan. Kajian masa depan harus meneroka pengaruh seperti dasar kerajaan, peruntukan belanjawan, dan kemajuan teknologi untuk meningkatkan lagi budaya keselamatan pesakit semasa dalam dewan bedah.

Kata kunci: *Budaya keselamatan pesakit, faktor-faktor individu, faktor-faktor organisasi, kakitangan perioperatif, Borang soal selidik Sikap Keselamatan-Bilik Pembedahan (SAQ-OR)*

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LIST OF ABBREVIATIONS

AHRQ	Agency for Healthcare Research and Quality
AORN	Association of periOperative Registered Nurse
AVE	Average Variance Extracted
BM	Bahasa Malaysia
CFA	Confirmatory Factor Analysis
CGS	Centre for Graduate Studies
CMV	Common Method Variance
CR	Composite Reliability
CRICO	Controlled Risk Insurance Company
CRM	Crew Resource Management
EHR	Electronic Health Record
FRE	Frequency of Reporting Event
HRO	Highly Reliable Organization
HSOPSC	Hospital Survey on Patient Safety Culture
ICU	Intensive Care Unit
JS	Job Satisfaction
MER-S	Medication Error Reporting System
MOH	Ministry of Health
MREC	Medical Research and Ethics Committee
NMRR	National Medical Research Register
OECD	Organization for Economic Co-operation and Development
PDI	Power Distance Index

PIS	Patient Information Sheet
PLS-SEM	Partial Least Square-Structural Equation Modeling
PM	Perception of Management
SAQ	Safety Attitude Questionnaire
SAQ-OR	Safety Attitude Questionnaire-Operating Room
SBAR	Situation background Assessment Recommendation
SC	Safety Climate
SGH	Sarawak General Hospital
SOP	Standard Operation Procedures
SPSS	Statistical Package for the Social Sciences
SR	Stress Recognition
SSSL	Safe Surgery Saves Lives
TC	Teamwork Climate
TeamSTEPPS	Team Strategies and Tools to Enhance Performance and Patient Safety
UKMMC	Universiti Kebangsaan Malaysia Medical Centre
UNIMAS	Universiti Malaysia Sarawak
UP	Universal Protocol
U.S.	United States
VIF	Variance Inflation Factor
WC	Working Conditions
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Study Background

Patient safety is an essential component of healthcare quality. It can be defined as the state of a patient being free from any preventable harm during medical treatment (Ministry of Health, 2013). This global spotlight on patient safety is further intensified following the publications of the reports “To Err is Human: Building a Safer Health System” by the Institute of Medicine in the United States (U.S.) (Kohn et al., 2000) and “An Organisation with a Memory” in the United Kingdom (Department of Health, 2000). These reports revealed an approximate 10% error rate in hospital admissions. One of the primary causes of mortality and injury in the United States was preventable adverse events (Kohn et al., 2000).

In Malaysia, patient safety incidents remain a challenge. The data from the Ministry of Health (MOH) reported an increase in cases of wrong-site surgeries from 6 to 11 and the unintended retention of foreign objects in patients’ bodies from 27 to 32 between 2016 and 2018 highlight ongoing risks (Alifah, 2019). Adverse events can prolong hospitalization stays, incur legal costs, and undermine the reputation of healthcare institutions (Perjit, 2021). In the report ‘What You Do & What You Don’t on Medical Negligence, Trends & Challenges to the Medical Profession’, 113 medicolegal cases in Malaysia from 2005 to 2009 led to a total of RM6,664,248 in compensation (Puteri, 2015). In the Organization for Economic Co-operation and Development (OECD) countries, approximately 15% of hospital activities and expenditures are dedicated to addressing these adverse events (World

Health Organization, 2019). Hence, healthcare institutions must recognize the importance of error reporting and learning from adverse events to enhance patient safety.

Promoting a strong patient safety culture is essential, particularly in high-risk environments like operating theaters. Operating theaters are inherently high-risk environments that can present significant threats to patient safety due to their complex nature as well as human resource challenges (Association of periOperative Registered Nurses, 2017; WHO, 2019). Factors such as poor communication, unfavorable work conditions, and understaffing can threaten patient safety (Seyman and Ayaz, 2016). The Joint Commission Sentinel Event Data 2022 Annual Review, for example, revealed that unintended retention of foreign objects and wrong-site surgeries each contributed to approximately 6% of the reported sentinel events, often due to multiple factors including failures to follow standardized procedures, communication breakdowns and poor teamwork (The Joint Commission, 2023).

In the year 2004, the Joint Commission mandated the Universal Protocol (UP) to reduce surgical mistakes through guidelines that ensure correct patient identification and operative site verification (The Joint Commission, 2022). Through the World Alliance for Patient Safety and then the Global Patient Safety Collaborative, the WHO has ensured that the drive for delivering safe and quality health services is a global concern. These initiatives aim to provide practical tools and guidelines to support the development of national safety programs (Paisley, 2021). Essential endeavors include the Global Patient Safety Challenges, Global Patient Safety Summit Series, and World Patient Safety Day. The “Safe Surgery Saves Lives” (SSSL), introduced in the year 2008, is a global patient safety challenge, along with the WHO Surgical Safety Checklist (WHO, 2009).

In the ‘Guidelines on Safe Surgery Saves Lives Programme’, the SSSL program has been implemented in Malaysia since 2009, and the Safe Surgery Checklist was introduced to enhance surgical safety, with a focus on communication, informed consent, and ethical surgery (MOH, 2018a).

Despite these safety measures, patient safety incidents continue to occur, often arise from miscommunication, failure to follow hospital policies, and a lack of standardization procedures (Hempel et al., 2013). Fajemilehin et al. (2016) found that Nigerian nurses generally had good knowledge of safety practices but failed to comply with the surgical safety checklist. However, the reasons for non-compliance were not clearly identified, probably due to the influence of hospital management policies. In addition, the study discovered that age, years of experience, and seniority ranking were predictors of success in incorporating safety practices in the operating theater.

Pavlova et al. (2019) found that operating theater managers in the Czech Republic perceived surgical safety checklists as essential during perioperative procedures, but the implementation rate was low in the daily workflow process. However, the study did not delve into the associated factors, underlining the need for research on checklist implementation challenges and solutions across perioperative teams.

A number of past studies had explored the perceptions and attitudes toward patient safety among different categories of Malaysian healthcare staff in various settings (Nuaim et al., 2018; Mohd Said Nurumal et al., 2020; Salizar & Nur Ainun, 2020; Perjit, 2021). Findings from the studies showed that most healthcare staff had a positive perception and attitude toward the patient safety culture in their organizations (Mohd Said Nurumal et al., 2020; Salizar & Nur Ainun, 2020; Perjit, 2021).

Salizar and Nur Ainun (2020) found a significant association between the cultural dimensions of patient safety and specific working units within the Intensive Care Unit (ICU) in Pahang Hospital. However, the study did not examine the safety perceptions of nurses in other departments. Similarly, Nuaim et al. (2018) revealed differences in safety culture perceptions among different categories of healthcare staff, underscoring the necessity for nuanced safety attitude assessments. Specifically, different healthcare staff perceived certain domains like job satisfaction, working conditions, and safety climate differently, concluding that healthcare professions can be a factor affecting the Safety Attitude Questionnaire (SAQ) score. Importantly, Leong et al. (2022) contributed further insights by highlighting doctors' favorable attitudes toward stress recognition and nurses' higher positive attitudes regarding job satisfaction. Both professional groups exhibited comparatively lower scores in the perception of the management domain.

Notably, the first patient safety culture study conducted by Kim et al. (2019) at Sarawak General Hospital (SGH) identified that the level of patient safety culture was rated as acceptable across hospital staff. The study highlighted the need for further exploration into the risk factors contributing to medical errors, pointing to the evolving complexity of healthcare systems in ensuring patient safety.

Hence, this study emphasizes the roles of perioperative staff to ensure patient safety in the operating theater, a high-risk area for surgical mistakes. This study aims to determine both organizational and individual factors associated with patient safety culture among perioperative staff members. The study also aims to determine how job position, gender, and experience moderate the relationship between individual factors and the perception of patient safety culture among perioperative staff.

1.2 Problem Statement

WHO (2009) revealed that approximately 42.7 million adverse events are reported annually worldwide. Out of these cases, post-operative complications were a major contributing factor, accounting for 3 to 22% of the cases with a mortality rate of 0.4% to 0.8 %. Notably, up to half of these cases may be preventable (2009). Despite efforts to enhance patient safety, patient harm still ranks as the 14th leading cause of mortality and morbidity globally (WHO, 2019).

Locally, there are limited studies conducted in Malaysia to address these critical aspects of patient safety. Concerns about adverse events in the healthcare system, strategies to rectify these events, as well as the influence of the work environment leading to unfavorable occurrences are among the significant issues. A recent study by Aniza and Siti (2022) using SAQ at a cluster hospital in Kedah, for example, revealed that only 23.9% of healthcare staff expressed positive perceptions of patient safety culture. In another study by Kim et al. (2019) conducted in SGH, although it was found that the overall patient safety culture was deemed acceptable, most of the assessed dimensions of patient safety culture in this study fell short compared to established international benchmarks.

Whilst past studies have examined the perceptions and attitudes toward patient safety among different categories of healthcare staff in various settings (Srima et al., 2015; Nuaim et al., 2018; Kim et al., 2019; Mohd Said Nurumal et al., 2020; Salizar & Nur Ainun, 2020; Perjit, 2021; Aniza & Siti, 2022); to date however, limited studies have been conducted within the operating theaters setting in Malaysia to address these critical aspects of patient safety. This highlights the need to determine how perioperative staff perceive patient safety culture in hospitals. Operating theaters, indeed, are highly intricate environments that depend

on multiple defense layers, including organizational structures, policies, staff training, and the working environment.

Furthermore, although recent studies demonstrated positive attitudes toward patient safety culture among healthcare staff, substantial improvement are still needed in several areas (Mohd Said Nurumal et al., 2020; Salizar & Nur Ainun, 2020; Perjit, 2021). For example, the study by Perjit (2021) shown that millennial healthcare professionals often face challenges in critical dimensions from an organizational perspective, including handoff and transition procedures, staffing levels, error reporting processes, and teamwork dynamics. Inevitably, human errors can rarely be attributable to a single root cause. Instead, they typically result from a complex interplay of active failures and latent failures within an organization. The Swiss Cheese Model explains how medical errors can occur when the layers of defenses or barriers are breached, forming a linear trajectory of error opportunity (Reason, 2000).

Given these findings, there is a compelling need for a comprehensive study of patient safety culture, focusing on both organizational and individual factors within the specific context of perioperative staff.

1.3 Research Questions

- i. What is the level of perception of patient safety culture among perioperative staff?
- ii. What is the relationship between organizational factors and the perception of patient safety culture among perioperative staff?

- iii. What is the relationship between individual factors and the perception of patient safety culture among perioperative staff?
- iv. What is the moderating effect of job position, gender, and experience on the relationship between individual factors and perception of patient safety culture among perioperative staff?

1.4 Research Objectives

- i. To determine the level of perception of patient safety culture among perioperative staff.
- ii. To determine the relationship between organizational factors and the perception of patient safety culture among perioperative staff.
- iii. To determine the relationship between individual factors and perception of patient safety culture among perioperative staff.
- iv. To determine the moderating effect of job position, gender, and experience on the relationship between individual factors and the perception of patient safety culture among perioperative staff.

1.5 Research Hypothesis

H1: There are significant relationships between organizational factors and the perception of patient safety culture among perioperative staff.

H2: There are significant relationships between individual factors and the perception of patient safety culture among perioperative staff.

H3: Job position, gender, and experience moderate the relationship between individual factors and the perception of patient safety culture among perioperative staff.

1.6 Significance of the Study

This study aimed to explore the perception of patient safety culture among perioperative staff. The findings of this research inform perioperative staff and hospital management about individual and organizational factors influencing patient safety culture in operating theaters.

The findings can inform hospital management about the need to provide adequate support, necessitating the implementation of policies and guidelines to enhance work processes. Establishing a conducive working environment is crucial for perioperative staff in addressing issues such as understaffing and insufficient training for novice staff.

Furthermore, the results can offer valuable feedback to healthcare systems, facilitating the implementation of necessary changes. A blame-free culture is needed to encourage perioperative staff to report adverse events. Reporting adverse events promotes learning from errors and fosters a culture of continuous improvement.

Additionally, this study enables perioperative staff to understand their roles in promoting patient safety practices within their workplace. In this regard, perioperative staff must strictly adhere to the established standards of practice in the operating theater to provide safe patient care. Hospital management should actively provide perioperative staff with relevant training courses to acquire up-to-date knowledge and skills about various dimensions of patient safety culture.

1.7 Definition of Terms

There are several fundamental terms essential for understanding the framework and concepts in this study. The key terms are defined below.

A *patient*, as defined, is an individual receiving medical care or treatment within a healthcare institution. *Patient safety*, a core concept, refers to the state where a patient remains free from preventable injury during medical treatment (MOH, 2013).

Patient safety culture refers to the values, behaviors and perceptions of organizational members toward healthcare risk management and safety (Amarapathy et al., 2013; Sorra et al., 2016). It examines how perioperative staff prioritize patient safety, communicate safety concerns, and learn from errors, using measurement tools such as the Safety Attitude Questionnaire (SAQ) and Hospital Survey on Patient Safety Culture (HSOPSC).

Perioperative care is a critical phase that begins when the patient is admitted for surgery until the patient is discharged home. The perioperative period encompasses three stages: preoperative, intraoperative, and postoperative.

Perioperative staff refers to the team involved in the patient care throughout the entire surgical experience, covering the preoperative, intraoperative, and postoperative phases (Phillips, 2017). The preoperative phase begins with the decision for surgery and ends when the patient is transferred to the operating room (OR) table (Phillips, 2017). The intraoperative phase covers the time on the OR table until transfer to the Post Anesthesia Care Unit (PACU), followed by the postoperative phase, which continues from PACU admission until recovery from surgery (Phillips, 2017). The key stakeholders in the

perioperative team include surgery, anesthesia, senior administration, and nursing (Sieber & Luedi, 2022). In this study, the targeted population included perioperative staff working in the operating theater at SGH. This group consisted of surgeons, anesthesiologists, medical officers (including postgraduate students), medical assistants, nurse practitioners, clinical nurse specialists, and registered nurses, all involved in patient care throughout the perioperative phases.

An *adverse event* refers to an injury caused by treatment and complication rather than the underlying condition that prolongs hospital stay or causes physical impairment (MOH, 2017). Examples include surgery complications, delayed diagnosis, medication errors, nosocomial infection, patient falls, and pressure ulcers (Paisley, 2021). Only preventable adverse events are linked to medical error, as not all adverse outcomes result from mistakes (Rodziewicz et al., 2022).

An *error* occurs when a planned activity is not carried out as anticipated or when an incorrect strategy is used to accomplish a goal (MOH, 2017). On the other hand, near misses are unplanned events that could have had negative implications on the patient but did not result in medical injury because someone or something intervened (MOH, 2017). Therefore, near misses should be given the same attention as adverse events as they provide opportunities to create preventative strategies (Rodziewicz et al., 2022).

Individual factors refer to the personal attributes, attitudes, and behaviors of perioperative staff that influence their performance and decision-making in ensuring patient safety (Reason, 2000). The factors include their knowledge, skills, experience, and perceptions of safety practices, which are assessed using the SAQ, evaluating job satisfaction and stress recognition.

Organizational factors encompass the structural, cultural, and procedural aspects of a healthcare setting that impact patient safety, such as management, communication, and resource availability (Perjit, 2021). The SAQ and HSOPSC can be used to assess these areas, evaluating management practices, working conditions, safety and teamwork climate, and error reporting.

1.8 Chapter Summary

The researcher has discussed the introduction, study background, problem statement, research objectives, research questions, research hypotheses, the significance of the study, and definitions of terms in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Sarawak General Hospital (SGH) serves as a state tertiary referral hospital in promoting patient safety culture in Sarawak. The study conducted at SGH in 2018 among healthcare staff using the HSOPSC revealed that patient safety culture was rated as acceptable. The highest positive response was seen in the dimension of “Organizational Learning-Continuous Improvement”, signaling a strong commitment to ongoing improvements in safety practices (Kim et al., 2019). However, the findings also found a need for improvement in fostering a non-punitive response to errors, highlighting the importance of encouraging error reporting without fear of blame (Kim et al., 2019).

The guidelines such as the WHO Surgical Safety Checklist are essential to improving patient safety, especially given challenges such as staffing shortages and high workloads in perioperative settings. This aligns with the national standards including the Malaysian Patient Safety Goals and the Safe Surgery Saves Lives programme, which include promoting surgical safety and learning from incidents. As part of adhering to the General Surgical Services Operational Policy by the Ministry of Health Malaysia, SGH implements strategies and enforces safety protocols to strengthen its safety culture (MOHb, 2018).

Factors influencing patient safety culture can be broadly analyzed from two aspects, which are individual and organizational. The individual factors influencing patient safety culture include job satisfaction and stress. On the other hand, organizational or latent factors can be analyzed at the hospital and department levels. Hospital-level factors include

three dimensions: working conditions, hospital management support, and the frequency of event reporting. At the department level, considerations include safety climate and teamwork climate.

A systemic review of the published articles from 2017 to 2023 was conducted using PubMed, Scopus, and Web of Science. The search terms included *Patient Safety Culture*, *Perioperative Staff*, *Operating Theaters*, *Safety Attitude Questionnaire*, *Safety Attitude Questionnaire-Operating Room*, and *Hospital Survey on Patient Safety Culture*.

The inclusion criteria focused on studies that examined the relationship between individual and organizational factors and patient safety in hospitals or perioperative settings, specifically those measuring outcomes related to these factors and published in English. Opinion papers, editorial reviews, and articles outside the specified time frame were excluded.

2.2 Patient Safety Culture

Patient safety culture is defined as the values, attitudes, perceptions, and beliefs of the organizational members toward risk management and safety (Amarapathy et al., 2013; Sorra et al., 2016). A good patient safety culture in an organization includes the commitment of the management level to establishing a system for reporting and documenting adverse events, discovering potential risks, and encouraging staff to learn from mistakes (Asefzadeh et al., 2017).

The term patient safety culture is sometimes used interchangeably with patient safety climate, but the concepts are different. Safety climate refers to the attitudes and shared perceptions of the staff about safety aspects in an organization, and it reflects the safety status

of an organization (Mearns & Flin, 1999). In contrast, patient safety culture resides at a more in-depth level, embodying the fundamental values, norms, assumptions, and expectations among individuals or groups (Mearns & Flin, 1999). It reflects the systems and processes related to the highest management in an organization (Mearns & Flin, 1999). Hence, this study uses the term safety culture for consistency, and it covers broader aspects of assessing staff perceptions about patient safety and the impacts of their behaviors on patient safety.

Reason (1997), in his book *“Managing the Risks of Organizational Accidents”*, proposed implementing elements of safety culture, including a reporting culture, a just culture, a flexible culture, and a learning culture. These elements should be incorporated into healthcare organizations to deliver high-quality patient care consistently. Firstly, a safety information system should be in place to gather, evaluate, and disseminate information from adverse events. The readiness of staff to notify errors is critical to the success of this safety information system. The Malaysian Patient Safety Goals and Guidelines on Implementation and Surveillance, introduced in 2013, indicate that a formal system for both mandatory and voluntary reporting of patient safety incidents is in place at SGH (MOH, 2013). Additionally, the training of dedicated risk managers in each department to report incidents, conduct root cause analyses, and implement remedial actions further demonstrates the hospital’s commitment to improving patient safety through organized safety information systems (Kim et al., 2019).

It is also essential to establish a just culture rather than a blame culture where staff are encouraged to report adverse events or to provide critical safety information. However, the boundary between appropriate and inappropriate behaviors must be clearly defined. Besides, a flexible culture should be enforced to deal with a consistently changing

environment. High-reliability organizations (HROs) are valuable in healthcare, with leadership being their most important aspect. The task experts can take charge during acute situations and revert to the typical hierarchical level once the urgent situation has been resolved. At SGH, the strong performance in the ‘Organizational Learning – Continuous Improvement’ dimension, reflects its commitment to learning from errors, a key aspect of effective safety systems and HRO principles such as adaptability and continuous improvement (Kim et al., 2019).

Lastly, an organization should be able to honestly evaluate its safety information system and be ready to make changes as needed.

2.3 Measurement of Patient Safety Culture

Several instruments exist to assess the patient safety culture within healthcare organizations. One of the tools is the Hospital Survey on Patient Safety Culture (HSOPSC), which was developed by the Agency for Healthcare Research and Quality (AHRQ, 2024). The HSOPSC questionnaire assesses 12 patient safety culture dimensions, including ‘Supervisor or Manager Expectations’, ‘Organizational Learning’, ‘Teamwork within Units’, ‘Communication Openness’, ‘Feedback and Communication Regarding Error’, ‘Non-Punitive Respond to Error’, ‘Staffing’, ‘Support of Hospital Management’, ‘Teamwork across Units in Hospital’, ‘Hospital Handoffs and Transitions’, ‘Overall Perceptions of Patient Safety’ and ‘Frequency of Event Reporting’.

HSOPSC items are designed to evaluate system failures in healthcare organizations, especially concerning the work environment and organizational processes (Perjit, 2021). Previous studies have demonstrated the strong psychometric properties of HSOPSC,

including exploratory, confirmatory, and inter-correlation factor analyses (Kim et al., 2019; Salizar & Nur Ainun, 2021; Perjit, 2021).

Another widely used instrument is the Safety Attitude Questionnaire (SAQ), developed by a team of researchers from the University of Texas led by Dr. Sexton (Sexton et al., 2006). Several SAQ versions are tailored to specific clinical settings such as ward, ICU, and operating theater (Sexton et al., 2006). The SAQ instrument assesses six dimensions: 'Job Satisfaction', 'Stress Recognition', 'Safety Climate' Teamwork', 'Working Conditions' and 'Perception of Management'. Employing SAQ enables organizations to implement quality improvement projects to reduce adverse events by identifying areas of insufficient patient care (Bondevik et al., 2019).

SAQ has demonstrated good content validity and internal consistency, with studies showing its association with patient outcomes (Srima et al., 2015; Aniza & Siti, 2022). Studies have proven its psychometric properties in many nations. For instance, Nguyen et al. (2015) affirmed that the Italian version of SAQ is reliable and valid for patient safety culture assessment. Similarly, a study in China by Zhao et al. (2019) confirmed that the Chinese simplified version of SAQ has good psychometric properties.

SAQ instrument is often favored over other instruments like HSOPSC because of its consistently higher scores, which have been associated with positive patient and staff outcomes (Gabrani et al., 2015). Due to its relevance to the perioperative setting, this study uses the Safety Attitude Questionnaire-Operating Room (SAQ-OR). A validated instrument is essential in evaluating the perception of patient safety culture in the perioperative setting and serves as a benchmark for future research. Limited publications globally have examined patient safety culture in perioperative settings using the SAQ-OR questionnaire. SAQ-OR

has been successfully translated and employed in Portuguese, Swedish, and Slovenian hospitals (Pinheiro & Uva, 2016; Nilsson et al., 2017; Pevec, 2023).

Table 2.1 compares the positive response rates to SAQ's six dimensions, as reported in several local studies. Aniza & Siti (2022) and Kim et al. (2022) revealed that healthcare staff scored higher in the job satisfaction dimension, with rates of 67.0% and 61.92%, respectively. Srma et al. (2015) reported that pharmacists had a higher response rate in the stress recognition dimension (58.1%), followed by job satisfaction (46.2%). Given the absence of published data specifically conducted among perioperative staff in Malaysia using SAQ-OR for direct comparison, this is a valuable reference point for assessing their perception of patient safety culture.

Table 2.1: Comparison of Positive Response Rate (%) to Dimensions in Different Local Studies

Dimensions	Srma et al. (2015) Malaysia (Target participants: pharmacists)	Aniza & Siti (2022) Malaysia (Target participants: healthcare staff)	Kim et al. (2022) Malaysia (Target participants: healthcare staff)
Teamwork Climate	38.5	37.1	58.15
Safety Climate	33.3	36.2	59.93
Job Satisfaction	46.2	67.0	61.92
Stress Recognition	58.1	41.7	59.93
Perception of Management	29.9	28.9	52.74
Working Conditions	15.4	22.8	39.7
Overall Safety Score	20.5	23.9	32.7

Table 2.2 compares the mean scores obtained using SAQ and SAQ-OR instruments in different countries. Sexton et al. (2006) findings are used as the benchmark (Srma et al., 2015; Aniza & Siti, 2022), with some studies converting the 5-point Likert scale to a 100-

point scale, where higher scores indicate better safety perception (Sexton et al., 2006; Srma et al., 2015; Aniza & Siti, 2022; Kim et al., 2022).

The results indicate that most studies have higher mean score values on the job satisfaction dimension and lower mean score values on working conditions. In contrast, the benchmark data from Sexton et al. (2006) show a higher mean score value on the teamwork climate dimension and a lower mean score value on the perception of management. Similarly, the countries, including Portugal and Slovenia, also show a lower mean score on the perception of management dimension. On average, dimensions such as teamwork climate, safety climate, and working conditions from these studies score lower than the international benchmark.

Table 2.2: Comparison of Mean Score to Dimensions in Different Studies and Different Countries

Dimensions	Sexton et al. (2006) United Kingdom	Srma et al. (2015) Malaysia	Pinheiro & Uva (2016) Portugal	Aniza & Siti (2022) Malaysia	Kim et al. (2022) Malaysia	Pevec et al. (2023) Slovenia
Teamwork Climate	71.7	67.6	3.4	69.18	68.7	3.8
Safety Climate	69.6	66.8	3.1	69.36	69.3	3.8
Job Satisfaction	70.1	67.3	3.5	76.54	71.7	4.1
Stress	54.7	73.0	3.3	62.80	68.5	3.6
Recognition						
Perception of Management	47.6	62.2	2.8	64.87	66.4	3.1
Working Conditions	57.5	54.8	3.8	62.27	53.7	3.5
Overall Safety Score	-	65.6	-	67.82	66.6	-

2.4 Individual Factors and Patient Safety Culture

Research on patient safety culture among perioperative staff aims to identify the factors that promote a positive patient safety culture and those that hinder it. Determining these factors enables the organization to develop appropriate strategies to prevent adverse events and to deliver high-quality patient care. The individual factors impacting patient safety culture include job satisfaction and stress recognition.

2.4.1 Job Satisfaction

Establishing a patient safety culture in an organization requires the perioperative staff's willingness and commitment to implementing the standard care practice. Job satisfaction has gained much attention because it can affect patient outcomes, staff well-being, and organizational performance. Sexton et al. (2006) defined job satisfaction as an individual's general emotional response toward the job, which can be a positive or negative work experience. It indicates the staff's overall perception of their job and their contentment with their work environment, responsibilities, and interactions.

Studies have shown that higher job satisfaction is associated with improved patient safety outcomes. Huang et al. (2020) found a positive association between job satisfaction and perceptions of patient safety culture, suggesting that satisfied staff are more likely to perceive positive aspects of patient safety culture. Similarly, Aniza and Siti (2022) revealed that increased job satisfaction boosts productivity and enhances patient safety, with satisfied healthcare staff being more inclined to accept quality improvement efforts.

The factors influencing job satisfaction are multifaceted, including organizational and interpersonal elements. Organizational policies that prioritize staff well-being, such as flexible scheduling and wellness programs aimed at reducing burnout, are important to

increase job satisfaction among healthcare staff (Huang et al., 2020). Besides, effective communication, such as regular team meetings, leadership support through mentorship programs, and recognition of accomplishments like employee awards, play significant roles in fostering job satisfaction (Huang et al., 2020).

However, perioperative staff often experience high-stress levels due to demanding workloads, long shifts, and inadequate staffing (Ackah & Kwashie, 2023). The issues can cause burnout, decreased job satisfaction, and compromised patient safety if neglected (Patel et al., 2018; Sovold et al., 2021). Burnout, characterized by emotional exhaustion, depersonalization, and diminished personal accomplishment, negatively impacts decision-making and increases the risk of medical errors (Patel et al., 2018). A study by Huang et al. (2020) further revealed that emotional exhaustion is inversely related to a positive safety climate, making healthcare staff more prone to mistakes.

Numerous studies have shown that job dissatisfaction can lead to absenteeism, decreased efficiency, higher turnover rates, depressive symptoms, and burnout among healthcare staff (Wei et al., 2018; Lopes et al., 2022). Promoting staff engagement is essential to mitigate and counteract these adverse effects (Wei et al., 2018). Organizations should empower staff to make decisions based on their judgment, thereby leading to greater job satisfaction and positively impacting patient safety culture (Kim & Yu, 2021). For instance, Boamah et al. (2017) found that empowered nurses explore innovative ways to perform their tasks, hence improving patient outcomes and job satisfaction. Satisfied perioperative staff strictly adhere to protocols, communicate effectively, and are attentive, thereby reducing the likelihood of errors and adverse outcomes.

2.4.2 Stress Recognition

Selye (1976, as cited in Fink, 2016) proposed stress as the non-specific response of the body to any demand made upon it. Stress is a somewhat subjective term and influenced by individual vulnerabilities, adaptability, and job challenges (Fink, 2016). Job stress refers to the psychological and physical strain felt at work due to environmental demands and pressures. It is characterized by feeling overwhelmed, challenged, and unable to cope with tasks given (Ackah & Kwashie, 2023). The degree of job stress is determined by the volume of the demands and the individual's sense of control in dealing with the stress (Fink, 2016).

Perioperative staff often work under high pressure, making stress recognition essential for ensuring patient safety. Effectively managing stressors relies on the ability to recognize them promptly. According to Ackah and Kwashie, job stress can affect perioperative staff physically, mentally, and emotionally (2023). Prolonged stress causes physical exhaustion and sleep problems, and staff are more prone to get sick. Mentally, stress may cause burnout, depression, and anxiety disorders. Stress also impairs cognition, decision-making, and attention to detail, increasing the likelihood of medical malpractices and compromising patient safety. Early stress recognition enables perioperative staff to maintain focus on patient safety protocols and perform their duties effectively.

The sources of stress among healthcare staff have been reported in several studies, including heavy workloads, staff shortages, and sleep deprivation (Wei et al., 2018; Aniza & Siti, 2022; Ackah & Kwashie, 2023). In the perioperative setting, increased patient volume places greater demands, resulting in perioperative staff working longer hours and interacting with more patients. The complexity of work, poor rostering, and unpredictable schedules further exacerbate stress levels (Sonoda et al., 2018; Ackah & Kwashie, 2023).

In Malaysia, the Healthiest Workplace by AIA 2019 survey revealed that 51% of the 17,595 employees across 230 different sectors experience work-related stress, leading to significant losses of RM1.46 million per year due to absenteeism (Syahirah, 2019). Besides, the study in the U.S. also found that over 50% of individuals felt that stress negatively impacts their work productivity (Fink, 2016). Hence, constant exposure to stress can reduce job satisfaction and productivity healthcare organizations (Sexton et al., 2006; Aniza & Siti, 2022).

Despite the necessity of stress recognition, healthcare organizations face challenges in this area. Asefzadeh et al. (2017) found a significant relationship between stress levels and patient safety culture among nurses in Iran, with high stress linked to human resource issues and inadequate skills. This is especially true for junior staff when encountering unfamiliar cases or team members and disruptive behavior.

The study by Ackah and Kwashie (2023) in the Ghanaian teaching hospital reported that perioperative nurses tend to experience higher stress. The reason is that their roles included setting up the theatre, assisting surgeons, monitoring the condition of unconscious patients, and ensuring equipment availability. The unpredictable nature of their work schedule contributes to fatigue and sleep deprivation. Consistent with the findings by Yosef et al. (2022) revealed that OR clinicians experience higher occupational stress due to long working hours and rotating shifts. Hence, organizations must foster a supportive work environment that values stress recognition to overcome these challenges.

2.5 Organizational Factors and Patient Safety Culture

Organizational factors can be analyzed at two levels, including the hospital and the department. The hospital-level aspect consists of three dimensions, including working

conditions, hospital management support, and frequency of event reporting. There are two dimensions at the department level, including teamwork climate and safety climate.

2.5.1 Working Conditions

According to Manyisa & Aswegen (2017), working conditions in healthcare organizations comprise various factors, including number of staffing, workload, physical infrastructure, organizational culture, and management approaches. The study also emphasizes the importance of working conditions for healthcare staff's well-being and performance, highlighting their vital role in safe patient care.

Adequate staffing is vital in perioperative settings to ensure patient safety. Understaffing can lead to physical and emotional exhaustion, impairing staff focus and increasing the risk of medical errors (Mu'taman et al., 2018; Huang et al., 2020). Nijkamp & Foran (2021) reviewed 216 articles and further highlighted that fatigue, poor staff knowledge, and low nurse-to-patient ratios in operating theaters negatively impact patient safety. Studies conducted in the U.S. emphasized that increased staffing in the operating theater improved patient outcomes (Newhouse et al., 2005).

The availability and functionality of essential equipment are crucial for safe surgical procedures. Malfunctioning equipment can cause patient injury and surgery complications (Phillips, 2017). Besides, the physical layout of the operating theater needs to be carefully considered. An ergonomic design with adequate space enables realistic traffic and workflow patterns, enhancing staff productivity and patient safety (Phillips, 2017).

Effective communication and procedural compliance are fundamental to a strong patient safety culture. Clear communication channels and structured handoffs improve

coordination and reduce misunderstandings and errors (Lee et al., 2016). Communication breakdowns between surgical team members can delay important decisions and cause procedural mistakes. Hence, strong communication cultures where staff can voice concerns and exchange knowledge freely are essential in organizations (Lee et al., 2016).

Leadership, organizational culture, and management practices also influence the safety culture in the organization (Wei et al., 2018). Transformational leadership fosters a positive work environment by inspiring and motivating staff to improve patient care (Boamah et al., 2017). Interpersonal relationships in the workplace further enhance communication, teamwork, collaboration, psychological well-being, and job satisfaction among perioperative staff (Wei et al., 2018). Besides, a just culture, where mistakes are seen as learning opportunities rather than punishment, encourages staff to report issues openly, allowing the organization to address latent safety issues (Marx, 2019).

Healthcare leaders play a vital role in fostering an open, trustworthy, and inclusive workplace that promotes staff well-being and mental health (Sovold et al., 2021). Perioperative staff must be trained in stress recognition and management to overcome challenges and maintain self-care (Sovold et al., 2021). Effective time management and self-care practices improve motivation, job satisfaction, patient safety, and overall care quality while preventing mental health issues and building resilience (Sovold et al., 2021).

Positive working conditions are closely linked to staff well-being and job satisfaction (Manyisa & Aswegen, 2017). Research in the U.S. highlighted that a healthy workplace improved nurse job satisfaction, hence enhancing their job performance and patient care (Wei et al., 2018). Similarly, Aniza and Siti (2022) found that job satisfaction is associated with increased productivity and staff engagement in promoting patient safety.

Workplace training is critical to ensuring staff competency, particularly given the rapid advancements in surgical technology (Ackah & Kwashie, 2023). Perioperative staff must be knowledgeable and skilled in operating various equipment and technologies, such as operating tables, microscopes, and electronic health record (EHR) systems. The study by Leong et al. (2022) at Universiti Kebangsaan Malaysia Medical Centre (UKMMC) revealed that healthcare staff who received training perceived safety better. However, the study found that most of them had never received patient safety training. This lack of training may negatively impact their perception of patient safety (Aniza & Siti, 2022). Supporting this, Azizah et al. (2020) demonstrated that teamwork training has a positive and significant impact on safety culture among perioperative staff in a private hospital in Kuala Lumpur.

Furthermore, enforcing policies and protocols governs the actions and behaviors of perioperative staff, ensuring standardized patient care. A clear clinical guideline can guide the perioperative staff, standardize clinical procedures, and ensure evidence-based practices (Phillips, 2017; Bastani et al., 2021).

2.5.2 Hospital Management Support

Hospital management support involves policies that promote open communication and non-punitive error reporting, along with providing resources like staff training and adequate staffing, to foster a safety culture among perioperative staff. A study by Auer et al. (2014) revealed a direct correlation between hospital management support and staff perception of patient safety, emphasizing the importance of a supportive administrative environment.

Effective leadership within hospital management is crucial in creating a positive safety culture (Sfantou et al., 2017; Huang et al., 2020). Engaged leaders foster open

communication where concerns can be voiced and promptly addressed. Sfantou et al. (2017) showed that effective leadership indirectly decreases mortality by retaining experienced staff, highlighting the significance of leadership support on patient safety.

Wei et al. (2018) conducted a systematic review that highlighted the importance of nursing leadership in staff retention and quality patient care. Clayton et al. (2016) stated that a theater nurse manager is crucial in implementing the strategy that increases communication and camaraderie in the operating theater. Besides knowing nursing theory and practices, a nurse manager must know about operational and financial management skills (Phillips, 2017).

Medical leadership is equally important in strategic planning for healthcare organizations (Sfantou et al., 2017). In anesthesiology, the comprehensive implementation of established patient safety guidelines indicates a commitment to improving safety (Choy, 2010). The commitment is evident in the establishment of bodies such as the ASA's Patient Safety and Risk Management Committee and the Anesthesia Patient Safety Foundation (Choy, 2010).

A systematic study by Sfantou et al. (2017) highlighted the importance of leadership style on care quality, with transformational and employee-oriented leadership being particularly effective. The result concurs with the findings by Boamah et al. (2017), which revealed that transformational leadership improves patient care quality by empowering nurses through autonomy and growth opportunities. Bass (1985, as cited in Boamah et al., 2017) stated that transformational leadership as a style that inspires followers to achieve their full potential toward a common goal.

Adequate resource allocation by hospital management is essential for effective healthcare service delivery. Mu'taman et al. (2018) found that nursing shortages in Malaysian private hospitals negatively impacts patient outcomes. Perjit (2021) further explored the human resource problems in Malaysia, revealing that increased infection rates, medical errors, and longer patient stays are associated with staffing shortages and inexperienced staff. High turnover rates also negatively impact the knowledge and expertise aspect of the human capital of a hospital (Perjit, 2021). Continuous training supported by the hospital management is vital to enhance staff competency and keep them updated with best practices (Mosadeghrad, 2014).

Hospital management support also facilitates effective communication and teamwork. A culture that encourages teamwork and open communication promotes shared responsibility for patient care, ensuring safety and quality (Mosadeghrad, 2014). According to Hwang and Ahn (2015), there is a significant correlation between effective teamwork and enhanced error reporting. Nurses demonstrating strong team communication skills were more willing to report clinical errors to managers.

Besides, management support is crucial for establishing a non-punitive culture where adverse events and near misses are encouraged to be reported, analyzed, and learned from. This reporting process alerts staff to avoid repeating the same mistakes, leading to beneficial development (Kim et al., 2019). Managers should conduct debriefings to identify workflow improvements and provide emotional support to staff involved in adverse events (Woo & Avery, 2021). These sessions serve as opportunities for individual and team learning (Vermeir et al., 2017).

Moreover, hospital management support is important for implementing practical clinical guidelines for patient safety. Management can standardize policies to meet federal, state, and local regulations (Reyes, 2022). Bastani et al. (2021) revealed that hospitals with clear clinical guidelines have better patient safety outcomes, such as short hospitalization stays and more rationale medicine usage. This comprehensive approach, supported by hospital management, creates a conducive environment for perioperative staff and promotes a patient safety culture.

2.5.3 Frequency of Event Reporting

Event reporting involves systematically collecting, analyzing, and disseminating information regarding adverse events and near-misses in hospitals. According to Kaware et al. (2022), the frequency of event reporting reflects how open and transparent an organization is in addressing potential patient harm. In Malaysian, adverse events reporting is handled through the Incident Reporting and Learning System for government hospitals, while private hospitals report directly to the Director-General of Health (Khalid et al., 2022).

Regional variations in patient safety reporting exist, with West Malaysia having higher reporting rates than the East (Khalid et al., 2022). Despite lower reporting rates, the East had higher diagnosis and therapeutic-related incident rates, likely due to accessibility and diagnostic issues (Khalid et al., 2022).

These differences highlight the need to address challenges that hinder effective incident reporting, such as fear of blame or punishment, complicated reporting processes, and lack of support from leadership (Eman et al., 2018; George et al., 2018; Hamed & Konstantinidis, 2021; Woo & Avery, 2021). In Malaysia, healthcare staff fear that their

mistakes will lead to disciplinary actions, such as warnings, and be documented in their personnel files, potentially affecting their future career prospects (Kim et al., 2019).

A study by George et al. (2018) found that only 44.8% of healthcare professionals in Perak reported medication errors, indicating significant underreporting within healthcare organizations. Similarly, Kaware et al. (2022) reported that Nigerian nurses rarely reported medical errors due to factors such as inadequate staffing, fear of punishment, and lack of reporting systems.

Establishing a non-punitive, blame-free culture is essential for increasing reporting rates (Srima et al., 2015; Aniza & Siti, 2022). Studies have shown that blame culture in an organization causes psychological stress for healthcare staff and negatively affects patient safety (Cartino, 2009; Okpala, 2018). Shifting the focus from blaming individuals to viewing reported events as opportunities for organizational learning is crucial in this context.

Kim et al. (2019) at SGH found that many staff believed they would be penalized for medical errors, reinforcing the need for a supportive environment. Encouraging event reporting among perioperative staff helps identify areas for improvement and promotes psychological safety (Woo & Avery, 2021; Aniza & Siti, 2022). Management should use incident reports to address root causes and systemic failures, sharing information across the organization to drive learning and develop targeted interventions that prevent future incidents (Paisley, 2021). Establishing feedback mechanisms keeps staff informed about how reported events lead to positive changes, fostering a culture of continuous improvement and encouraging ongoing reporting (Hamed & Konstantinidis, 2021).

The reasons why incident reporting and learning systems fail have been described in the “Guidelines on Implementation: Incident Reporting and Learning System 2.0 for

Ministry of Health Hospitals” (MOH, 2017). The guideline outlined several barriers, include a lack of leadership, poor follow up, and an ineffective training system (MOH, 2017). The Patient Safety Council of Malaysia was founded in 2003 to develop patient safety performance guidelines. Besides, the Malaysian Patient Safety Goals introduced in 2013, emphasize the need for robust incident reporting and learning systems to investigate incidents and prevent recurrent (MOH, 2013). An effective reporting system is crucial for fostering a safety culture and sustaining quality improvement efforts (Woo & Avery, 2021).

2.5.4 Barriers and Facilitators to Communication in the Operating Theater

Effective communication is important for ensuring patient safety in the perioperative environment, involving surgeons, anesthesiologists, nurses, and support staff. Vermeir et al. (2017) emphasized that verbal communication errors are a predominant source of medical errors and adverse events. The Joint Commission’s sentinel event data shows that communication breakdowns and poor teamwork cause unfavorable perioperative events (The Joint Commission, 2023). Furthermore, CRICO which stands for Controlled Risk Insurance Company reported 23658 malpractice cases from 2009 to 2013, identifying communication failures as a factor in 30% of incidents.

It is well recognized that steep hierarchical gradients between professional roles and over-job tenure deter staff from speaking up (Clayton et al., 2016; Etherington, 2019; Paisley, 2021). Moreover, the perioperative setting is undeniably stressful and complex, which increases the prevalence of sarcasm and inappropriate tone (Reyes, 2022). As a result, such disruptive behaviors may discourage staff from speaking out, along with time constraints that lead to rushed conversations, can increase the risk of adverse events (Pattni et al., 2019). Poor teamwork and insufficient communication training also contribute to

misunderstandings and misinterpretations, especially in diverse teams with varying backgrounds (Clayton et al., 2016).

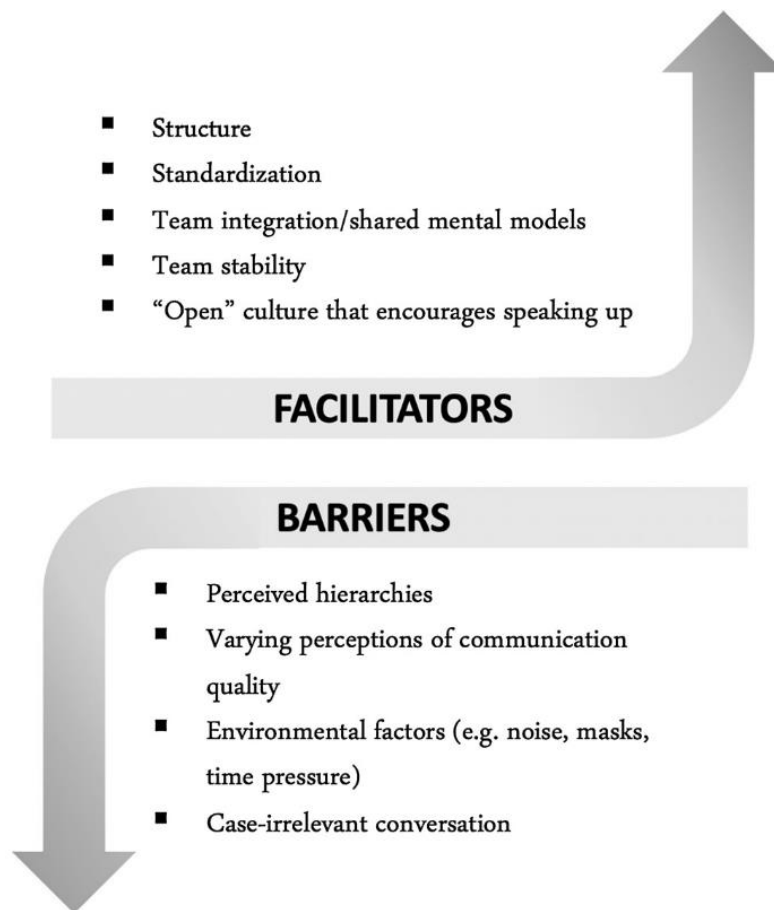


Figure 2.1: Barriers and Facilitators to Communication in the Operating Theater (Etherington et al., 2019)

Thus, perioperative staff is encouraged to use a structured handover tool such as the SBAR approach (see Table 2.3) to improve conversation, which is crucial for team development and performance (Phillips, 2017; Etherington et al., 2019). SBAR uses standard prompt questions to ensure staff communicate clearly and accurately.

Table 2.3: Description of SBAR Tool

SBAR	Description
Situation	A concise statement of the problem
Background	Pertinent and brief information related to the situation
Assessment	Analysis and considerations of options
Recommendation	Action requested/recommended.

Besides, closed-loop communication, where the recipient repeats the sender's message to confirm understanding, also helps prevent miscommunication (AHRQ, 2014). Team training programs, such as Crew Resource Management (CRM) and Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS), improve communication, collaboration, and performance to improve patient safety (Azizah et al., 2020; Buljac-Samardzic et al., 2020). These programs equip perioperative staff with the skills to handle complex and dynamic situations, promoting shared accountability and effective communication for optimal patient outcomes. Supportive leadership further fosters open communication, helping to create a positive work environment (Kourkouta et al., 2021).

Effective communication directly influences patient safety culture by reducing medical errors, improving teamwork, and increasing staff satisfaction (Vermeir et al., 2017). Strategies such as checklists, briefings, assertive language, and training can enhance communication in the operating theater (Etherington et al., 2019; Reyes, 2022).

The WHO Surgical Safety Checklist ensures critical information is communicated before, during, and after surgery, allowing perioperative staff to detect patient care issues and anticipate potential problems (Reyes, 2022). Team briefing is conducted before the start of surgery, where team members can clarify procedure details to ensure everyone is aligned.

A time-out is performed before the patient's skin incision to ensure a shared understanding and foster open communication among the team (Reyes, 2022). These strategies empower staff to speak out for any safety concerns and overcome hierarchical barriers (Pattni et al., 2019). By fostering an open culture within the operating theater, staff can feel safe and encouraged to speak up when they have concerns about safety issues (Clayton et al., 2016; Etherington et al., 2019).

2.5.5 Teamwork Climate

A team consists of two or more individuals working together towards a common goal (Phillips, 2017). The dimension of teamwork measures the cooperation and collaboration between healthcare staff within the same unit and across different units or departments. Good teamwork within units refers to the fact that perioperative staff cooperate, collaborate, and coordinate with each other to deliver safe patient care (Salizar & Nur Ainun, 2020). A positive teamwork climate not only facilitates seamless information exchange but also reduces the likelihood of errors and ensure patient safety (Alsabri et al., 2020).

The operating theater is a complex environment with many factors that can interfere with postoperative outcomes. Effective leadership is crucial for coordinating efforts and ensuring patient safety. Leaders who actively engage with their teams can better comprehend the management structures, positively influencing the organizational commitment of staff and enhancing the overall working environment (Kourkouta et al., 2021).

Besides, effective teamwork among perioperative staff relies on strong communication skills, including structured handoffs, which are essential for ensuring patient safety (Baker et al., 2003). Interprofessional collaboration requires mutual respect, recognition the valuable contributions of each member, and effective information sharing

(Vermeir et al., 2017). The shared mental model can be accomplished by using a surgical safety checklist, aligning the team's effort and minimizing the risk of errors (Etherington et al., 2019).

Tuckman's model of team development as a framework to understand how teams evolve through stages of forming, storming, norming, performing, and adjourning (Sanjiv et al., 2014). During the forming stage, team members are still unsure about their roles, while the storming stage often involves conflicts over roles and personalities (Sanjiv et al., 2014). Once the conflicts are resolved, teams move into the norming stage, where collaboration and trust are established (Sanjiv et al., 2014). In the performing stage, team members work toward a common goal in delivering safe patient care (Sanjiv et al., 2014). In the last adjourning stage, team members experience closure and bonding as the tasks completed (Sanjiv et al., 2014).

A positive teamwork climate reduces adverse events and encourages a culture of reporting, with non-punitive responses promoting continuous learning (Etherington et al., 2019). Moreover, staff working in a positive work environment experience higher job satisfaction and are inclined to stay (Vermeir et al., 2017). A lower turnover rate promotes perioperative team stability, continuity of care, and staff competence.

Team training programs, such as communication and collaboration workshops, enable perioperative staff to build trust and effective teamwork, which are crucial for ensuring patient safety (Etherington et al., 2019). Open communication and collaborative decision-making during these meetings further enhance the teamwork climate. Additionally, team success also requires leadership development to foster a culture of collaboration and trust (Kourkouta et al., 2021). Healthcare leaders are encouraged to improve their

subordinate leadership abilities through team dynamics, conflict resolution, and supportive leadership training (Kourkouta et al., 2021).

2.6 Theoretical Framework

The study employed the Swiss Cheese Model by James Reason and Vincent's Framework for Risk Analysis as the theoretical framework. The Swiss Cheese Model (as illustrated in Figure 2.3) explains that a medical error is seldom the result of a single mistake as there are layers of defense in a complex organization. Hence, weakness committed in one layer of the organization would have been arrested in the subsequent layers. Instead, manifested medical errors happen when the shortcomings of every safety net layer of the system have been breached, and these flaws result in a manifested adverse event (Reason, 2000).

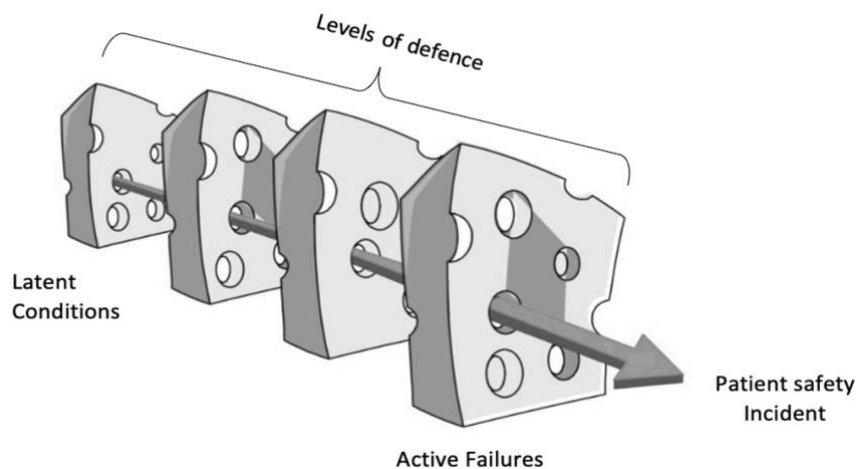


Figure 2.2: Reason's Swiss Cheese Model (Reason, 2000)

Specifically, each layer in this model serves as a barrier or defense, and a mechanism should be in place to prevent medical error. The holes or weaknesses in each defense layer are due to active failures and latent conditions. Active failures are the unsafe acts of

healthcare staff, such as making mistakes and violating procedures while in direct contact with patients. In contrast, failures discovered within the system are latent conditions. These are caused by time constraints, insufficient or inexperienced staff, equipment issues, and long-lasting weaknesses, including unworkable procedures and construction deficiencies related to organizational design and management systems (Reason, 2000).

Latent conditions are usually the result of top-level strategic and other decisions made by government, regulators, and managers (Reason, 1997). For example, establishing unclear protocols or outdated guidelines and a lack of systematic approaches and checklists in delivering standard care put the patients at risk.

Active failures usually have an immediate impact, whereas latent conditions may go unnoticed for an extended period, causing no harm until they interact with local conditions (Reason, 1997). Thus, adverse events happen when these latent conditions combine with active failures and are aided by local triggers. When the holes in every defense system are momentarily aligned, hazards can pass through every defense or barrier or allow a trajectory of accident opportunity to occur (Reason, 2000). Besides, active failures are more difficult to predict, but latent conditions can be corrected before an adverse event (Reason, 2000). Thus, proactive risk management should be implemented to detect these failures before they cause harm to patients.

Based on Reason's model of organizational accidents, Vincent et al. (1998) have proposed a theoretical framework that further analyzes risk and safety in the healthcare setting. According to the framework, patient safety improvement requires a systematic assessment of different elements, including patient, healthcare provider, task, team, work environment, organization, and management.

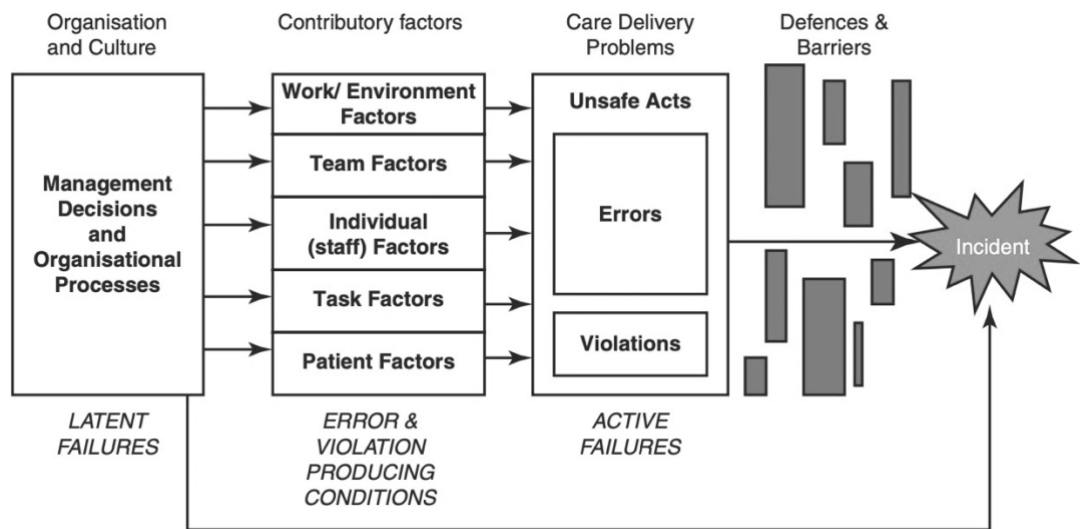


Figure 2.3: Organizational Accident Model from Vincent (Donaldson et al., 2021)

The conditions of the patient, such as the complexity and seriousness, may have the most direct impact on the clinical outcome (Vincent et al., 1998). Additionally, factors like the patient’s language, personality, and psychological issues are also essential because they can influence communication with staff (Vincent et al., 1998). Furthermore, individual factors, including the staff knowledge, skill, and motivation, play an essential role in influencing the implementation of a patient safety culture (Vincent et al., 1998).

The framework also highlights the importance of organizational culture in promoting a patient safety culture. This includes values, norms, and attitudes within the healthcare institution that influence patient care behaviours and decision-making. Besides, the framework promotes learning from errors instead of fostering a blame culture to understand the underlying factors contributing to adverse events (Vincent et al., 1998).

The actions and decisions taken by management have a significant impact on the team dynamics (Vincent et al., 1998). The work environment factors include staffing policies, continuous training and development for staff, and equipment availability and

maintenance are also essential (Vincent et al., 1998). The institutional context, which includes financial resources and constraints as well as external regulatory bodies, profoundly impacts the organization as a whole (Vincent et al., 1998).

Through Vincent's framework, the role of the broader organization is examined by considering various contributing factors that are likely to cause adverse events. Most importantly, the frameworks enable an organization to implement appropriate error-reduction strategies by examining each element in the clinical practice.

2.7 Conceptual Framework

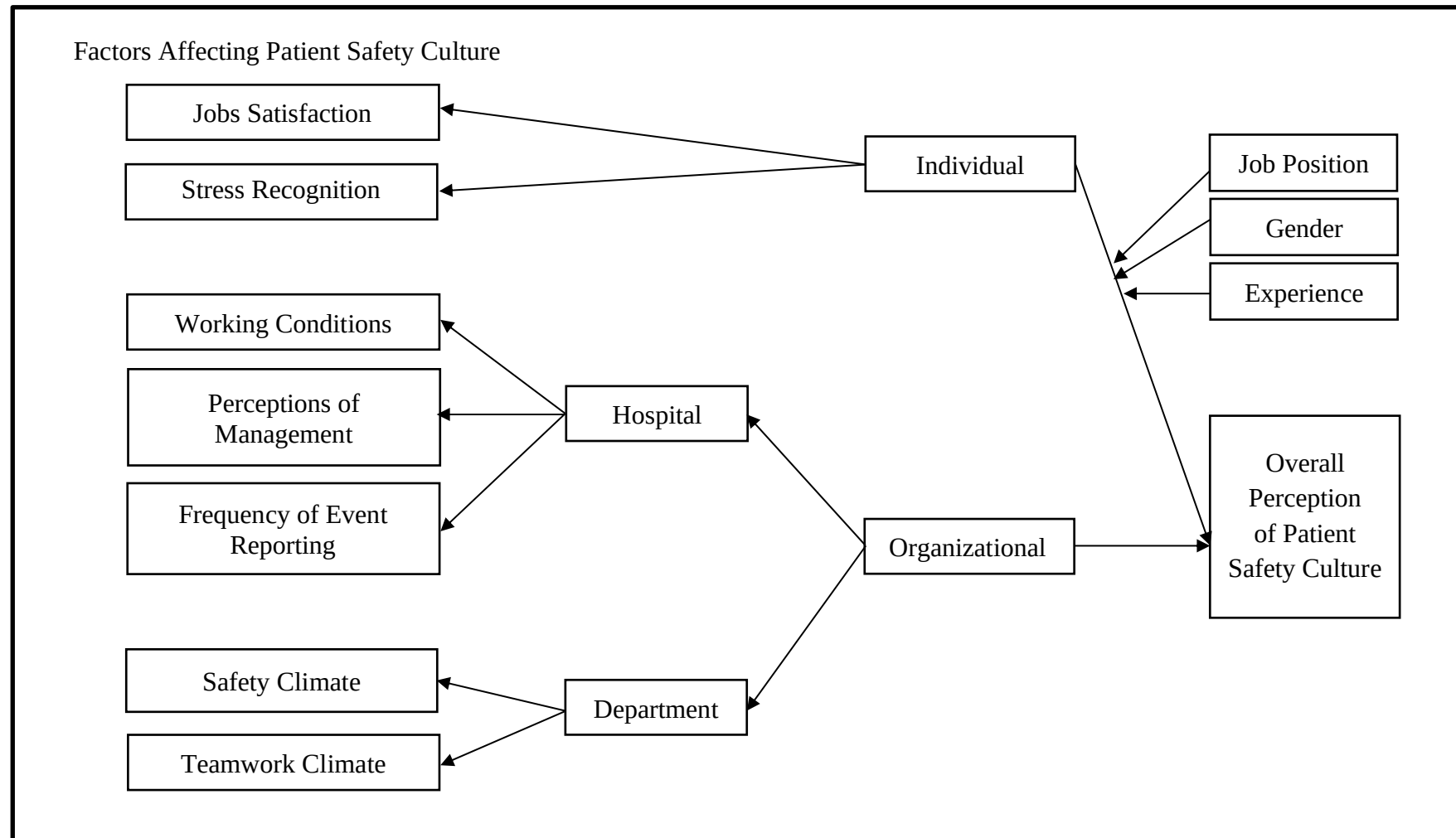


Figure 2.4: Conceptual Framework of Research

2.8 Chapter Summary

This chapter presents the essential concepts of patient safety culture and its dimensions through the SAQ. Patient safety culture underpins healthcare quality and safety, influencing staff attitudes, behaviors, and practices. The complex interaction that defines patient safety culture in various healthcare settings has been illuminated by studying individual and organizational factors, including job satisfaction, stress recognition, working conditions, perceptions of management, frequency of event reporting, safety climate, and teamwork climate. The SAQ-OR's adaptability and relevance to perioperative settings make it suitable for research on patient safety culture within this specialized domain.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Overview

This chapter discussed the research design used to achieve the objectives of the study. Other aspects, including the research design, study population, sampling technique, location, study instrument, data collection using a questionnaire, and statistical analysis, were presented.

3.2 Research Design

The study aimed to determine the overall perception of patient safety culture among perioperative staff and the influence of organizational and individual factors on this culture. The study also examined how job position, gender, and experience moderated the relationship between individual factors and patient safety culture perceptions. Thus, a quantitative research method was used in this study to answer the research questions and to examine the relationship between the variables measured. This approach allowed for systematic measurement and analysis, providing empirical evidence generalizable to a larger population. According to Polit and Beck (2012), a quantitative research design enabled the examination of the relationship between dependent and independent variables. This study was conducted in a cross-sectional design so the researcher could gather data from the study population at a specific point in time, which is ideal for assessing perioperative staff perceptions and relationships between variables (Kumar, 2011).

The research procedures for this study are illustrated in Figure 3.1. The study began by defining its needs, forming research objectives and questions, and reviewing relevant

literature. Ethical approval and permission were obtained before collecting the data using the SAQ-OR. The SAQ-OR was then distributed to perioperative staff to determine their perception of patient safety culture. Data analysis was conducted using statistical instruments to address the research questions and hypotheses, and the results were presented.

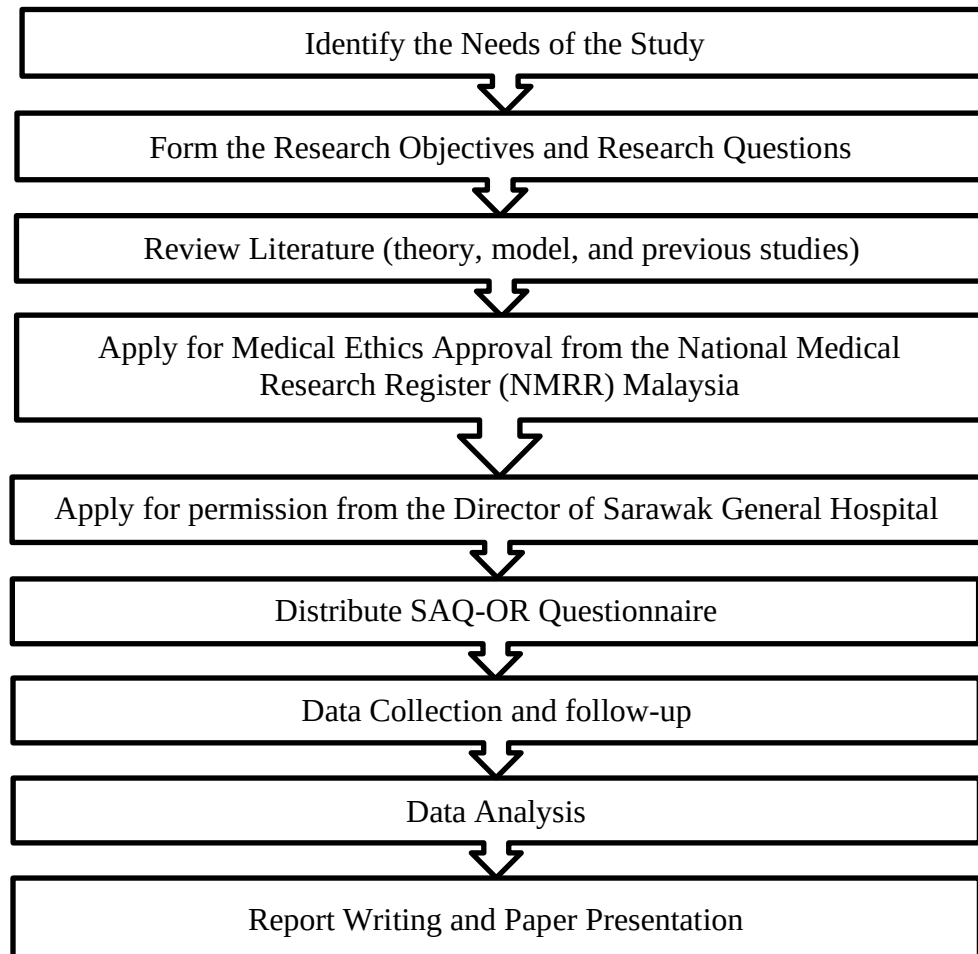


Figure 3.1: Research Procedures (Modified from Chua, 2011)

3.3 Population, Samples and Sampling

A population is defined as a group of people to which the researcher aims to generalize the findings (Jackson, 2009). On the other hand, a sample is a sub-collection of people from the population (Jackson, 2009).

In this study, the targeted population includes perioperative staff who work in the operating theater at Sarawak General Hospital (SGH). The inclusion and exclusion criteria of the participants are shown below.

Inclusion Criteria:

- i. Had been working in the department for more than six months

Exclusion Criteria:

- i. Medical students and nursing students on clinical attachment
- ii. Non-clinical staff
- iii. House officers

The sample size was calculated using G*Power software before data collection (Faul et al., 2007). After inputting an effect size of 0.15, an α error of 0.05, a power of the study (1- β) of 0.95, and 2 groups of independent constructs, namely, “individual factors” and “organizational factors”, the sample size estimation was 107 (see Figure 3.2, Screenshot of G*Power sample size estimation). In order to account for the 20% dropout rate, the total sample size estimation is 128.

According to Creswell & Creswell, the commonly accepted alpha value was 0.05 (2018). Additionally, many nursing studies report non-significant findings likely due to Type II errors (Polit & Beck, 2012). Hence, a 95% power level was chosen to mitigate this risk and ensure the accurate identification of significant factors influencing patient safety culture in the operating theater. Nursing interventions typically had modest (small-to-medium) effects, and variables were usually only moderately correlated (Polit & Beck, 2012).

According to Cohen's criteria, the effect size $f^2 = 0.15$ was considered medium (Faul et al., 2007).

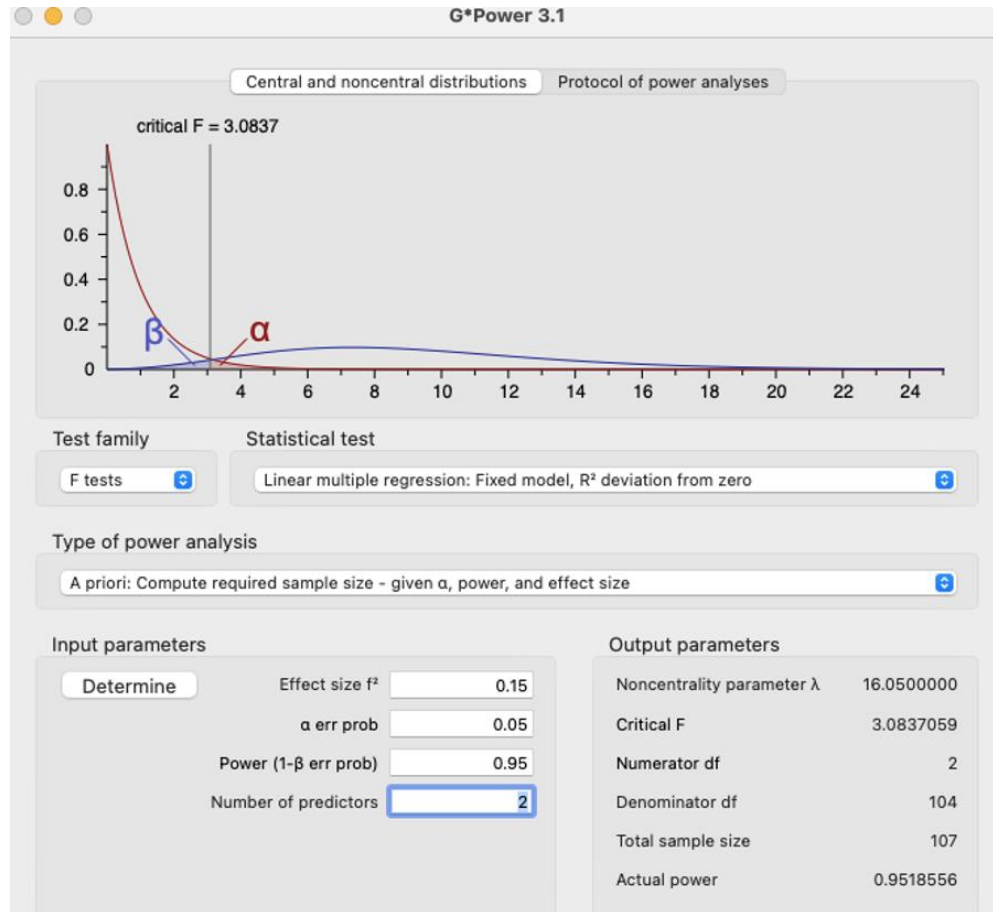


Figure 3.2: Screenshot of G*Power Sample Size Estimation

The total population in the operating theater at SGH comprises 72 surgeons, 88 anesthetists (including medical officers), and 133 perioperative nurses, as confirmed through WhatsApp communication with the consultant anesthesiologist at SGH. For this study, convenience sampling was employed during the distribution of the questionnaire, facilitating ease of access and efficient data collection by distributing questionnaires to readily available participants. A total of 37 doctors, including both surgeons and anesthetists, and 100 nurses participated in the study.

3.4 Study Duration

The questionnaire was distributed to participants from May to July 2023. The data collection process took approximately three months, including follow-ups with non-responders.

3.5 Research Instrument

3.5.1 Description and Structure of the Research Instrument

In this study, the research instrument utilized was a validated SAQ-OR designed to collect data from perioperative staff (refer Appendix B). The front page of the questionnaire was to collect the background information of the respondents. The data to be collected include work position, gender, years of experience in hospital, and years of experience in a specialty.

The study adapted the 30 items from the original English SAQ-OR version from Nilsson et al. (2017). Additionally, 2 items from the frequency of the event-reporting dimension of the Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire were adapted (AHRQ, 2024). This dimension focused on perioperative staff reporting behaviors regarding near misses and adverse events in the OR. This reflected whether the team acknowledged the importance of reporting adverse events or if they felt their reports would be acted upon.

The 32-item questionnaire assessed seven patient safety dimensions, covering both individual and organizational factors within operating theater settings. The 5-point Likert scale (with scores of 1 = “strongly disagree”, 2 = “disagree”, 3 = “neutral”, 4 = “agree”, and 5 = “strongly agree”) was used to collect the response. Items 2, 11, and 24 were negatively worded, so the responses received were reverse-coded for data analysis.

The individual factors measured two dimensions, which included:

i. Job Satisfaction (five items)

This dimension measured staff satisfaction with their jobs and the working environment. Factors such as workload and organizational support could impact job satisfaction and safety attitudes among perioperative staff.

ii. Stress Recognition (four items)

This dimension assessed the extent to which staff recognized the impact of stress on patient safety.

The organizational factors were subdivided into two categories: hospital and department. The hospital-level aspect measured the following dimensions:

iii. Working Conditions (four items)

This dimension included items that measured factors such as adequate training of new staff, a mentorship program, and managing issues among the perioperative team.

iv. Perception of Management (four items)

This dimension measured the staff's perception of hospital management practices. It also helped identify whether management established a conducive working environment and showed that patient safety was a priority in delivering patient care.

v. Frequency of Event Reporting (four items)

This dimension assessed the reporting behavior of adverse events and near misses among perioperative staff.

The department-level aspect measured the following dimensions:

vi. Safety Climate (seven items)

This dimension assessed how staff perceived their workplace in prioritizing patient safety.

vii. Teamwork Climate (six items)

This dimension examined how much staff perceived their workplace supported teamwork and communication. Leadership and training could impact collaboration and patient safety.

Two additional items require the participants to self-grade their perception of individual and organizational factors influencing patient safety using the score “excellent”, “very good”, “good”, “fair” and “poor” respectively. The outcome measure was the overall perceptions of patient safety in the working unit. The overall patient safety dimension consisted of one item that required the participant to self-rate the patient safety culture in their hospital using the same score.

3.5.2 Reliability and Validity of the Research Instrument In This Study

The degree to which a measurement tool achieved its intended purpose was referred to as its validity (Kumar, 2011). Ensuring the validity of the research items was essential for determining whether the instrument was appropriate for the study (Creswell & Creswell, 2018). Reliability refers to the consistency or repeatability of an instrument, and the internal consistency of the instrument was the degree to which sets of items behave consistently (Creswell & Creswell, 2018).

A pilot study was not conducted because the SAQ-OR and HSOPSC questionnaires used in this study are well-validated instruments, as supported by Kalkbrenner (2021), who

notes that pilot testing may not be necessary when using well-validated instruments, especially when applied to similar contexts. The SAQ has demonstrated strong content validity and internal consistency and is often associated with patient outcomes (Srima et al., 2015; Aniza & Siti, 2022). Numerous studies across different countries have confirmed its psychometric strength (Nguyen et al., 2015; Zhao et al., 2019). Additionally, the SAQ-OR has been shown to be a reliable and valid instrument for measuring patient safety culture within surgical teams (Nilsson et al., 2017). Similarly, previous studies have highlighted the strong psychometric properties of the HSOPSC, including exploratory, confirmatory, and inter-correlation factor analyses (Kim et al., 2019; Salizar & Nur Ainun, 2021; Perjit, 2021).

For this study, confirmatory factor analysis (CFA) was conducted using the measurement model assessment in PLS-SEM to evaluate the reliability and validity of the observed variables used to measure latent constructs. Construct reliability was established, with CR values ranging from 0.711 to 0.886, which are above the recommended threshold of 0.7 (Hair et al., 2017). The results of the convergent validity analysis showed that all constructs had AVE values above 0.5, confirming good internal validity. Discriminant validity was also confirmed, with values ranging from 0.723 to 0.784. A detailed analysis will follow in Chapter 4.

3.6 Ethical Consideration and Confidentiality

Medical ethics approval was sought from the Medical Research and Ethics Committee (MREC) through the National Medical Research Register (NMRR) Malaysia. This study obtained ethical approval from the MREC MOH (NMRR ID-22-02887-9UP). The researcher also obtained formal permission from the Director of SGH, where data for this study was obtained.

Before participation, all participants were provided with a Patient Information Sheet (PIS), outlining the study's objectives, procedures, and their rights, including confidentiality and the option to withdraw from the study at any time without consequences. Participants were required to provide informed consent before completing the questionnaire. For the online survey, participants indicated their consent by ticking a box on the Google Forms before proceeding. Those completing the paper-based questionnaire signed a physical consent form before answering.

3.7 Data Collection Technique

This study utilized both digital and hardcopy formats of the SAQ-OR questionnaire. The online questionnaire was created using Google Forms, which offered several advantages such as cost-effectiveness and ease of distribution. Participants were informed that the questionnaire would take approximately 15 minutes to complete. They were encouraged to complete the questionnaire at their convenience, considering their busy schedules.

The researcher conducted a briefing session with the co-investigator and the matron of the operating theater department to explain the study's purpose and the inclusion and exclusion criteria. These staff members assisted in distributing the questionnaires to participants. Since gathering all perioperative staff simultaneously was impractical, the online survey link was shared via WhatsApp with a brief explanation of the study purpose. Participants were also encouraged to contact the researcher by phone or email if they have any questions arose.

Participants completing the online questionnaire were not required to log in, preserving their anonymity. For those completing the hardcopy version, consent forms were signed before questionnaire distribution. A follow-up on online responses was conducted

four weeks after the initial distribution. When it was observed that only a few nurses had responded online, the matron personally distributed hardcopy questionnaires to the remaining nurses to increase response rate. Participants then returned the completed questionnaire to the matron or placed it in a bag in the management office.

Two additional follow-ups were carried out via telephone over a six-week period after the initial deadline. A total of 58 responses were received from the online survey, while 100 hardcopy questionnaires were distributed, of which 79 completed questionnaires were returned.

3.8 Data Analysis

All the data collected were transferred to Microsoft Excel before being analyzed using the Statistical Package for the Social Sciences version 26 (SPSS) and Structural Equation Modeling (PLS-SEM) approach provided by SmartPLS 4. Data transformation was performed in SPSS, involving creating new variables using Transform, Recode, or Compute commands as necessary. Data cleaning comprised validation, modification, and missing data tracing before analysis. This ensured data integrity and reliability for further analysis.

3.8.1 Descriptive Analysis

Descriptive statistics provide the characteristics of research participants for a comprehensive data interpretation. This analysis uses mean, standard deviation, and frequency distribution to compare data across groups. This study used mean scores, frequencies, and percentages to present the socio-demographic data and patient safety culture dimensions scores.

An analysis of positive responses based on the collected data was conducted in this study. A “positive response” has been defined as when respondents selected a rating of 5 for ‘agree strongly’ and 4 for ‘agree’ on the Likert scale (Srima et al., 2015). Each item’s score was transformed from the 5-point Likert scale to a 100-point scale, with values as follows: 1=0, 2=25, 3=50, 4=75, and 5=100 (Aniza & Siti, 2022). To obtain a dimension-specific score from 0 to 100, the scores of items within the same dimension were added and then divided by the number of items within that dimension. The dimension with a score equal to or more than 75% was considered to have a positive safety attitude, whereas the dimension with a score equal to or less than 50% was considered to need further attention or improvement (Zhao et al., 2019).

3.8.2 Inferential Analysis

Partial Least Square (PLS) Structural Equation Modelling (SEM) in SmartPLS was used to develop the conceptual model (Ringle et al., 2015). PLS-SEM has been used to predict and explain the variance in a study of safety culture (Tappura et al., 2022). Besides, the PLS-SEM approach could simultaneously measure numerous dependent and independent variables (Hair et al., 2017). SEM allowed for measurement error in observable variables when estimating the relationship (Hair et al., 2017). This study examined the relationships between seven safety dimensions and the perception of patient safety culture among perioperative staff. Thus, applying PLS-SEM can provide a better prediction of the relationships.

3.8.3 Measurement Model

The two-stage approach of PLS-SEM by Anderson and Gerbing (1988) was used for data analysis. Stage 1 involved confirmatory factor analysis (CFA) using the measurement

model assessment. The study assessed the quality of the constructs by evaluating the measurement model, which examined the relationships between latent constructs and their corresponding observable indicators. The measurement model evaluated the reliability and validity of the observed variables used to measure latent constructs.

According to Kumar (2011), reliability pertains to the consistency and stability of a measuring instrument. It ensures that a measurement yields consistent results each time it is employed. The two most commonly used methods for establishing reliability include Cronbach's alpha and Composite Reliability (CR) (Dijkstra & Henseler, 2015). The traditional criterion for internal consistency was Cronbach's alpha, which estimated reliability by analyzing the interconnections among observed indicator variables (Hair et al., 2017). Due to the limitations associated with Cronbach's alpha, specifically its sensitivity to the number of items in the scale and its tendency to underestimate internal consistency reliability, an alternative measure known as CR was employed in this study.

Unlike Cronbach's alpha, which assumed equal reliability among all indicators, PLS-SEM prioritized indicators based on their individual reliability (Hair et al., 2017). This approach considered varying outer loadings of the indicator variables, making CR a more suitable measure for assessing internal consistency reliability in this study. A CR value above 0.7 is acceptable. Thus, removing statements that introduce errors can improve questionnaire reliability and CR scores.

For convergent validity, item factor loadings and Average Variance Extracted (AVE) values were employed (Hair et al., 2017). "Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement. The idea is that two or more

measures of the same thing should covary highly if they are valid measures of the concept” (Bagozzi et al., 1991, p.425).

Factor loadings refer to “the extent to which each of the items in the correlation matrix correlates with the given principal component. Factor loadings can range from -1.0 to +1.0, with higher absolute values indicating a higher correlation of the item with the underlying factor” (Pett et al., 2003, p.299).

Factor loadings of > 0.7 were considered acceptable for inclusion, while factor loadings < 0.4 were removed (Hair et al., 2017). The grand mean value of the squared loadings of all items associated with a factor was referred to as the AVE. AVE was then considered for items with factor loadings ranging from 0.4 to 0.7. If the AVE was > 0.5 , the item was included (Hair et al., 2017). When the AVE value is 0.5 or above, convergent validity is achieved. According to Fornell and Larcker (1981), this indicates that the indicators successfully converge to assess the underlying concept.

Discriminant validity was assessed using the Fornell and Larcker criterion and potential cross loading (Fornell & Larcker, 1981). “Discriminant validity is the degree to which measures of different concepts are distinct. The notion is that if two or more concepts are unique, then valid measures of each should not correlate too highly” (Bagozzi et al., 1991, p.425).

The Fornell and Larcker criterion (1981) assessed how much an item relied on its own construct or factor (as measured by the square root of its AVE value) in comparison to its correlation with other constructs or factors (as measured by the square of correlation values). Discriminant validity, as per the Fornell & Larcker (1981) criterion, is confirmed

when the square root of the AVE for a construct exceeds its correlation with all other constructs (Hair et al., 2017).

In this study, data were collected from individual respondents through self-reported surveys. The method raised concerns about the potential influence of common method variance (CMV) on the hypothesized relationships within the PLS path model. Thus, CMV was assessed using Harman's one-factor test. CMV, defined by Bagozzi and Yi (1991), refers to variance arising from systematic measurement errors rather than accurately representing the constructs under study.

3.8.4 Structural Model

Stage 2 involved the structural model assessment for hypothesis testing. Different hypotheses were proposed to evaluate the relationship of predictors on the outcome. Bootstrapping was performed with 500 re-samplings to evaluate the significance of path coefficients for both direct and indirect relationships. The R^2 coefficient, effect sizes, and predictive relevance (Q^2) were used to assess the predictive accuracy of the conceptual framework.

According to Hair et al. (2017), the coefficient of determination (R^2 value) within the structural model signifies the explained variance of endogenous latent variables. A higher R^2 suggests a more comprehensive explanation and better predictability of a construct's values through structural model paths (Hair et al., 2017). The R^2 ranges from 0 to 1, representing the percentage of variance explained, with higher values indicating greater predictive accuracy (Hair et al., 2017). According to Cohen (1988), cut-off R^2 values of 0.26, 0.13, and 0.02 indicated substantial, moderate, and weak levels of predictive accuracy respectively. The acceptable R^2 value depends on the study discipline (Hair et al., 2017).

The effect size (f^2) was employed to measure the impact of removing an exogenous construct from the model by examining the change in the R^2 value on the endogenous constructs (Hair et al., 2017). The effect size can be calculated using the following formula (Hair et al., 2017).

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}} \quad \text{Equation 3.1}$$

According to Cohen (1998), a predictor variable has a high impact at the structural level when f^2 is 0.35, a medium impact when f^2 is 0.15, and a small impact when f^2 is 0.02. The model's effect size shows how much an exogenous latent variable contributes to the R^2 value of an endogenous latent variable. In simple terms, the effect size evaluates the magnitude or strength of the relationship between latent variables.

This study employed a blindfolding procedure to determine the predictive relevance (Q^2) of the research model. According to Hair et al. (2017), this procedure applies explicitly to endogenous latent variables with a reflective measurement model. As Hair et al. (2017) recommended, cross-validated redundancy was employed to assess the predictive relevance of the research model in the structural framework. Q^2 values greater than 0 for a reflective endogenous latent variable in the structural model indicate the predictive relevance of the path model for that specific construct (Hair et al., 2017).

3.9 Chapter Summary

The research design and workflow processes for phases 1 and 2 were discussed in this chapter, demonstrating careful data-collecting planning. Data was rigorously cleaned and recorded after collection to ensure integrity and analytical readiness. SPSS was used for

descriptive data analysis. A SmartPLS was used to examine the complex relationships among the study variables within the research framework.

CHAPTER 4

RESULT

4.1 Overview

This chapter explores the research findings designed to address the earlier research objectives. The study results are presented through both descriptive and inferential analyses. Descriptive analysis, including mean values, frequencies, and percentages, helps explain each dimension and its singular outcomes. PLS inferential statistics are used to test and analyze the research hypotheses, aligning with the fundamental principles of standard structural equation modeling. This method is employed to predict and comprehend the role and formation of individual constructs, as well as their interrelationships. The chapter presents the outcomes of the measurement and the structural models.

4.2 Missing Value Exclusion

Missing data might result from respondents intentionally or unintentionally avoiding specific questions (Hair et al., 2017). In the present study, 9% of respondents chose the ‘not applicable’ alternative. The original SAQ stipulates ‘not applicable’ as a missing value with no score (Nilsson et al., 2017). SmartPLS handles missing values via mean value replacement or casewise deletion (Hair et al., 2017). Casewise deletion is discouraged due to its potential to reduce data variation and introduce biases, particularly if specific groups are systematically removed (Hair et al., 2017).

Mean value replacement can diminish data variability (Hair et al., 2017). However, this method is endorsed when missing values are exceptionally low, with Hair et al. (2017) justifying its application when missing values amount to less than 5% per indicator.

In this study, missing values in the current sample are imputed using mean imputation. The extent of missing values is relatively minimal compared to the overall study sample size. Importantly, the sample size has not significantly diminished, indicating no severe missing data biases. The total percentage of missing values is 0.08% for the entire sample.

4.3 Descriptive Statistics

Table 4.1 shows that surgeons comprise 6.6% of the sample, anesthetists 9.5%, medical officers 9.5%, assistant medical officers 1.5%, and nurse practitioners and clinical nurse specialists 5.8%. The majority of respondents in this survey are registered nurses (67.2%). Regarding the gender distribution, 79.6% of the respondents are female due to a higher percentage of perioperative nurses, and 20.4% are male. The majority of respondents possess extensive professional experience in both the hospital environment and their current specialization. This is likely due to factors such as permanent positions in the government sector, service bonds or job security with associated benefits. 35.8% of the respondents have at least 6 to 10 years of hospital experience, while 43.1% have 11 years or more. Additionally, 35.8% of respondents have worked in their specialization for 6 to 10 years, and 32.8% for 11 years or more.

Table 4.1: Demographic Profile of Participants (N=137)

Demographics	Frequency (N)	Percentage (%)
Position		
Surgeon	9	6.6
Anesthetist	13	9.5
Medical Officers include Postgraduate Student	13	9.5
Assistant Medical Officer	2	1.5
Nurse Practitioner, Clinical Nurse Specialist	8	5.8
Registered Nurse	92	67.2
Gender		
Male	28	20.4
Female	109	79.6
Years in Hospital		
Less than 1 year	9	6.6
1 to 5 years	20	14.6
6 to 10 years	49	35.8
11 or more years	59	43.1
Years in Specialty		
Less than 1 year	15	10.9
1 to 5 years	28	20.4
6 to 10 years	49	35.8
11 or more years	45	32.8

Table 4.2 provides an overview of the positive response rate for all the items in SAQ-OR and the mean positive response rate for each dimension. The results of all the items ranged from 10.2% to 81.0%. The item ‘The levels of staffing in our ORs are sufficient to handle the number of patients’ from the ‘perceptions of management’ dimension scored the lowest with 10.2%. Conversely, the item ‘When my workload becomes excessive, my performance is impaired’ from the ‘stress recognition’ dimension scored the highest with 81.0%.

The ‘stress recognition’ dimension scored the highest mean positive response rate with 73.0% while the ‘perceptions of management’ dimension recorded the lowest mean

score at 22.6%. Besides ‘stress recognition’ dimension, ‘safety climate’ (61.1%), ‘teamwork climate’ (58.7%), ‘job satisfaction’ (55.0%), and ‘frequency of event reporting’ (51.1%) dimensions all scored more than 50% but yet below 75%. On the other hand, the dimensions of ‘perceptions of management’ and ‘working conditions’ scored 22.6% and 46.4%, respectively, indicating areas that need improvement.

Table 4.2: Positive Response Rate (N=137)

Dimensions	Positive Response Rate (%)	Average Positive Response Rate
Safety Climate		
1. I would feel safe being treated here as a patient.	64.2	61.1
2. Medical errors are handled appropriately in this hospital.	62.0	
3. I receive appropriate feedback about my performance.	65.7	
4. In the OR, it is difficult to discuss errors.	40.9	
5. I am encouraged by my colleagues to report any patient safety concerns I may have.	65.7	
6. The culture in the ORs here makes it easy to learn from the errors of others.	65.0	
7. I know the proper channels to direct questions regarding patient safety in the ORs here.	64.2	
Teamwork Climate		
1. Nurse input about patient care is well received in the OR.	72.3	58.7
2. In the ORs here, it is difficult to speak up if I perceive a problem with patient care.	36.5	
3. Disagreements in the ORs here are resolved appropriately (i.e., not who is right, but what is best for the patient.)	55.5	
4. I have the support I need from other personnel to care for patients.	65.7	
5. It is easy for personnel in the ORs here to ask questions when there is something that they do not understand.	65.7	
6. The physicians and nurses here work together as a well-coordinated team.	56.2	

Table 4.2 continued**Job Satisfaction**

1. I like my job.	75.9	55.0
2. Working in this hospital is like being part of a large family.	59.1	
3. This hospital is a good place to work.	43.1	
4. I am proud to work at this hospital.	53.3	
5. Morale is high in the ORs here.	43.8	

Stress Recognition

1. Fatigue impairs my performance during emergency situations.	77.4	73.0
2. When my workload becomes excessive, my performance is impaired.	81.0	
3. I am less effective at work when fatigued.	79.6	
4. I am more likely to make errors in tense or hostile situations.	54.0	

Perceptions of Management

1. Hospital administration supports my daily efforts.	22.6	22.6
2. Hospital management does not knowingly compromise the safety of patients.	24.1	
3. The levels of staffing in our ORs are sufficient to handle the number of patients.	10.2	
4. I am provided with adequate, timely information about events in the hospital that might affect my work.	33.6	

Working Conditions

1. This hospital does a good job of training new personnel.	53.3	46.4
2. All the necessary information are available before the start of a procedure.	53.3	
3. This hospital deals constructively with problem physicians and employees.	21.2	
4. Trainees in my discipline are adequately supervised.	57.7	

Frequency of Event Reporting

1. A mistake when is caught and corrected before reaching the patient is often reported.	60.6	51.1
2. A mistake when reaches the patient and could have harm the patient, but did not, is often reported.	41.6	

Note: The dimension with a score $\geq 75\%$ was considered positive safety attitude whereas the dimension with a score $\leq 50\%$ was considered as needing further improvement (Zhao et al., 2019)

Table 4.3 provides an overview of the mean score for each dimension. The ‘stress recognition’ dimension obtained the highest mean score of 76.12, indicating a relatively positive perception among participants regarding how stress affects their performance. In contrast, the ‘perceptions of management’ dimension obtained the lowest mean score of 45.63, suggesting concerns about the effectiveness of management practices in the operating theater.

Table 4.3: Mean Score (N=137)

Dimensions	Mean	SD	Overall Mean
Safety Climate			
1. I would feel safe being treated here as a patient.	69.53	18.86	67.09
2. Medical errors are handled appropriately in this hospital.	69.30	20.63	
3. I receive appropriate feedback about my performance.	68.20	19.60	
4. In the OR, it is difficult to discuss errors.	54.20	26.18	
5. I am encouraged by my colleagues to report any patient safety concerns I may have.	70.26	20.46	
6. The culture in the ORs here makes it easy to learn from the errors of others.	69.53	20.50	
7. I know the proper channels to direct questions regarding patient safety in the ORs here.	68.61	21.01	
Teamwork Climate			
1. Nurse input about patient care is well received in the OR.	73.72	20.63	66.89
2. In the ORs here, it is difficult to speak up if I perceive a problem with patient care.	56.07	22.46	
3. Disagreements in the ORs here are resolved appropriately (i.e., not who is right, but what is best for the patient.)	63.14	26.79	
4. I have the support I need from other personnel to care for patients.	71.17	22.05	

Table 4.3 continued

5. It is easy for personnel in the ORs here to ask questions when there is something that they do not understand.	71.90	20.88	
6. The physicians and nurses here work together as a well-coordinated team.	65.33	22.12	
Job Satisfaction			
1. I like my job.	74.45	20.89	65.77
2. Working in this hospital is like being part of a large family.	67.52	21.73	
3. This hospital is a good place to work.	59.85	21.30	
4. I am proud to work at this hospital.	65.33	20.17	
5. Morale is high in the ORs here.	61.68	22.08	
Stress Recognition			
1. Fatigue impairs my performance during emergency situations.	79.38	23.46	76.12
2. When my workload becomes excessive, my performance is impaired.	80.84	24.68	
3. I am less effective at work when fatigued.	80.11	21.10	
4. I am more likely to make errors in tense or hostile situations.	64.15	30.54	
Perceptions of Management			
1. Hospital administration supports my daily efforts.	50.74	22.22	45.63
2. Hospital management does not knowingly compromise the safety of patients.	50.38	24.52	
3. The levels of staffing in our ORs are sufficient to handle the number of patients.	26.82	27.89	
4. I am provided with adequate, timely information about events in the hospital that might affect my work.	54.56	22.53	
Working Conditions			
1. This hospital does a good job of training new personnel.	63.50	22.28	61.49
2. All the necessary information are available before the start of a procedure.	64.42	21.59	
3. This hospital deals constructively with problem physicians and employees.	51.29	20.49	
4. Trainees in my discipline are adequately supervised.	66.73	19.40	
Frequency of Event Reporting			
1. A mistake when is caught and corrected before reaching the patient is often reported.	68.47	21.44	63.96

Table 4.3 continued

2. A mistake when reaches the patient and could have harm the patient, but did not, is often reported.	59.44	22.00
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Note: Higher scores indicate better safety perception (Sexton et al., 2006)

As shown in Table 4.4, the majority of respondents rated their workplace as ‘good’ in terms of organizational factors (56.9%), individual factors (51.8%), and patient safety (55.5%). Only 17.5% of respondents rated organizational factors as ‘excellent’ or ‘very good’, while 25.6% rated them as ‘fair’ or ‘poor’. For individual factors, 20.4% of respondents gave an ‘excellent’ or ‘very good’ rating, while 27.7% rated them as ‘fair’ or ‘poor’. For patient safety, 26.3% rated it as ‘excellent’ or ‘very good’, and 18.3% as ‘fair’ or ‘poor’.

Table 4.4: Organizational Factors, Individual Factors and Patient Safety Rating (N=137)

Dimension	Frequency (N)	Percentage (%)
Organizational Factors Rating		
Excellent	3	2.2
Very Good	21	15.3
Good	78	56.9
Fair	32	23.4
Poor	3	2.2
Individual Factors Rating		
Excellent	1	0.7
Very Good	27	19.7
Good	71	51.8
Fair	34	24.8
Poor	4	2.9
Patient Safety Rating		
Excellent	4	2.9
Very Good	32	23.4
Good	76	55.5
Fair	23	16.8
Poor	2	1.5

4.4 Common Method Variance

The results of Harman's test, presented in Table 4.5, indicated that the first factor accounted for only 30.182% of the overall variance. This finding suggests that CMV did not significantly impact the study results (Podsakoff & Organ, 1986).

Table 4.5: Common Method Variance Result

Component	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	10.564	30.182	30.182

4.5 Multicollinearity

The Variance Inflation Factor (VIF) test assesses potential multicollinearity among the indicators (Fornell & Bookstein, 1982). Hair et al. (2017) stated that multicollinearity is not a significant concern if the VIF value is below 5. Table 4.6 shows that all indicators in this study had VIF values below the suggested level.

Table 4.6: Multicollinearity Test based on VIF for Indicators

Indicator	VIF
SC1	2.112
SC2	2.307
SC3	1.591
SC4	1.325
SC6	1.288
SC7	2.189
TC1	1.311
TC3	1.590
TC4	2.069
TC5	1.876
TC6	1.774
JS1	1.238
JS2	2.307
JS3	2.511
JS4	2.503
JS5	1.676
SR1	1.549

Table 4.6 continued

SR3	1.294
SR4	1.429
PM1	1.229
PM3	1.200
PM4	1.391
WC1	1.912
WC2	1.457
WC3	1.319
WC4	1.484
FRE1	1.037
FRE2	1.037

SC: Safety Climate, TC: Teamwork Climate, JS: Job Satisfaction, SR: Stress Recognition,

PM: Perception of Management, WC: Working Conditions, FRE: Frequency of Reporting

Event

4.6 Partial Least Squares Structural Equation Modeling (PLS-SEM)

4.6.1 Reliability Analysis

The results on CR, presented in Table 4.7, indicate CR values ranging from 0.711 to 0.886. All indicators exhibit a reliability statistic over the required threshold of 0.7 (Hair et al., 2017). Hence, construct reliability is established.

Table 4.7: Construct Reliability Analysis

Indicator	Cronbach's Alpha	Composite Reliability
SC	0.813	0.863
TC	0.815	0.871
JS	0.839	0.886
SR	0.710	0.810
PM	0.621	0.782
WC	0.745	0.841
FRE	0.318	0.711

SC: Safety Climate, TC: Teamwork Climate, JS: Job Satisfaction, SR: Stress Recognition,

PM: Perception of Management, WC: Working Conditions, FRE: Frequency of Reporting

Event

4.6.2 Convergent Validity

The convergent validity results in this study show that all constructs had AVE values over 0.5, as indicated in Table 4.8.

Table 4.8: Construct Convergent Validity

Indicator	Average Variance Extracted (AVE)
SC	0.523
TC	0.576
JS	0.615
SR	0.595
PM	0.549
WC	0.571
FRE	0.573

SC: Safety Climate, TC: Teamwork Climate, JS: Job Satisfaction, SR: Stress Recognition, PM: Perception of Management, WC: Working Conditions, FRE: Frequency of Reporting Event

In this study, two items (SR2 and TC2) were iteratively removed from the analysis due to low factor loadings (<0.40). Another two items (PM2, SC5) were iteratively removed due to poor AVE value. After removing these items, the remaining items exhibited factor loadings between 0.503 to 0.942. Table 4.9 shows detailed factor loadings for all items, confirming their robust correlation with the underlying factors.

Table 4.9: Factor Loadings

Indicator	SC	TC	JS	SR	PM	WC	FRE
SC1	0.823						
SC2	0.862						
SC3	0.734						
SC4	0.503						
SC6	0.520						
SC7	0.811						
TC1		0.653					
TC3		0.760					
TC4		0.821					
TC5		0.768					
TC6		0.784					
JS1			0.544				
JS2			0.808				
JS3			0.867				
JS4			0.855				
JS5			0.802				
SR1				0.741			
SR3				0.592			
SR4				0.941			
PM1					0.867		
PM3					0.623		
PM4					0.711		
WC1						0.861	
WC2						0.751	
WC3						0.670	
WC4						0.727	
FRE1							0.942
FRE2							0.507

SC: Safety Climate, TC: Teamwork Climate, JS: Job Satisfaction, SR: Stress Recognition,

PM: Perception of Management, WC: Working Conditions, FRE: Frequency of Reporting

Event

4.6.3 Discriminant Validity

In this study, the square root of AVE for each construct was greater than its correlation with other constructs, as shown in Table 4.10. Hence, discriminant validity is established for all the constructs.

Table 4.10: Fornell and Larcker Criterion

Indicator	FRE	JS	PM	SC	SR	TC	WC
FRE	0.757						
JS	0.306	0.784					
PM	0.353	0.641	0.741				
SC	0.427	0.661	0.505	0.723			
SR	0.026	-0.201	-0.192	-0.077	0.771		
TC	0.356	0.622	0.421	0.708	0.043	0.759	
WC	0.461	0.634	0.689	0.602	-0.036	0.538	0.755

Note: Bold represent the square root of AVE values. SC: Safety Climate, TC: Teamwork

Climate, JS: Job Satisfaction, SR: Stress Recognition, PM: Perception of Management, WC:

Working Conditions, FRE: Frequency of Reporting Event

Cross loadings show if an item corresponds with its intended construct rather than other study constructs. Table 4.11 demonstrates that all items have stronger factor loadings on their respective constructs, confirming their alignment with the designated constructs. Based on the evaluation of cross loadings, discriminant validity is achieved.

Table 4.11: Cross Loadings

Indicator	FRE	JS	PM	SC	SR	TC	WC
FRE1	0.942	0.352	0.405	0.436	-0.06	0.356	0.443
FRE2	0.507	-0.01	-0.008	0.13	0.232	0.127	0.211
JS1	0.094	0.544	0.149	0.275	-0.177	0.353	0.114
JS2	0.184	0.808	0.383	0.511	-0.108	0.582	0.442
JS3	0.252	0.867	0.623	0.55	-0.242	0.451	0.583
JS4	0.256	0.855	0.581	0.577	-0.085	0.556	0.572
JS5	0.334	0.802	0.606	0.597	-0.177	0.499	0.616
PM1	0.297	0.634	0.867	0.438	-0.146	0.42	0.556
PM3	0.177	0.313	0.623	0.231	-0.217	0.169	0.398
PM4	0.325	0.378	0.711	0.466	-0.061	0.29	0.626
SC1	0.313	0.641	0.501	0.823	-0.138	0.536	0.508
SC2	0.378	0.509	0.438	0.862	-0.082	0.56	0.566
SC3	0.26	0.545	0.413	0.734	-0.06	0.553	0.433
SC4	0.106	0.239	0.152	0.503	-0.058	0.339	0.234
SC6	0.404	0.294	0.212	0.52	0.198	0.519	0.351
SC7	0.391	0.521	0.335	0.811	-0.066	0.602	0.424
SR1	0.039	-0.05	-0.125	-0.072	0.741	0.067	0.02
SR3	0.016	-0.06	-0.034	-0.026	0.592	0.139	-0.051
SR4	0.018	-0.242	-0.209	-0.073	0.941	-0.004	-0.042
TC1	0.306	0.302	0.205	0.383	0.129	0.653	0.269
TC3	0.239	0.5	0.288	0.574	-0.039	0.76	0.421
TC4	0.215	0.541	0.348	0.595	0.109	0.821	0.469
TC5	0.281	0.385	0.29	0.523	-0.001	0.768	0.385
TC6	0.296	0.589	0.436	0.597	-0.025	0.784	0.48
WC1	0.35	0.576	0.581	0.539	-0.084	0.482	0.861
WC2	0.371	0.49	0.525	0.549	-0.109	0.502	0.751
WC3	0.293	0.442	0.532	0.314	-0.037	0.23	0.67
WC4	0.383	0.391	0.434	0.402	0.142	0.398	0.727

SC: Safety Climate, TC: Teamwork Climate, JS: Job Satisfaction, SR: Stress Recognition,

PM: Perception of Management, WC: Working Conditions, FRE: Frequency of Reporting Event

4.6.4 Structural Model

The conclusive step involved confirming the proposed relationships of the study, as outlined in Table 4.12, aligning with the research hypotheses.

Table 4.12: List of Hypotheses and Relative Paths

Hypothesis	Path
H1: There are significant relationships between organizational factors and the perception of patient safety culture among perioperative staff.	OrgzFactor -> PSRating
H2: There are significant relationships between individual factors and the perception of patient safety culture among perioperative staff.	IndvFactor -> PSRating
H3: Job position, gender, and experience moderate the relationship between individual factors and the perception of patient safety culture among perioperative staff.	IndvFactor *Position, Gender, YearsSpec -> PSRating

OrgzFactor: Organizational Factor, PSRating: Patient Safety Rating, IndvFactor: Individual Factor, YearsSpec: Years of Experience in a Specialty

The structural model aimed to assess the research hypotheses formulated in this study. This study investigated how independent variables, encompassing individual and organizational factors, affect the dependent variable, the perception of patient safety culture among perioperative staff. The path model depicted in Figure 4.1 shows these relationships, excluding the moderating factors of job position, gender, and experience.

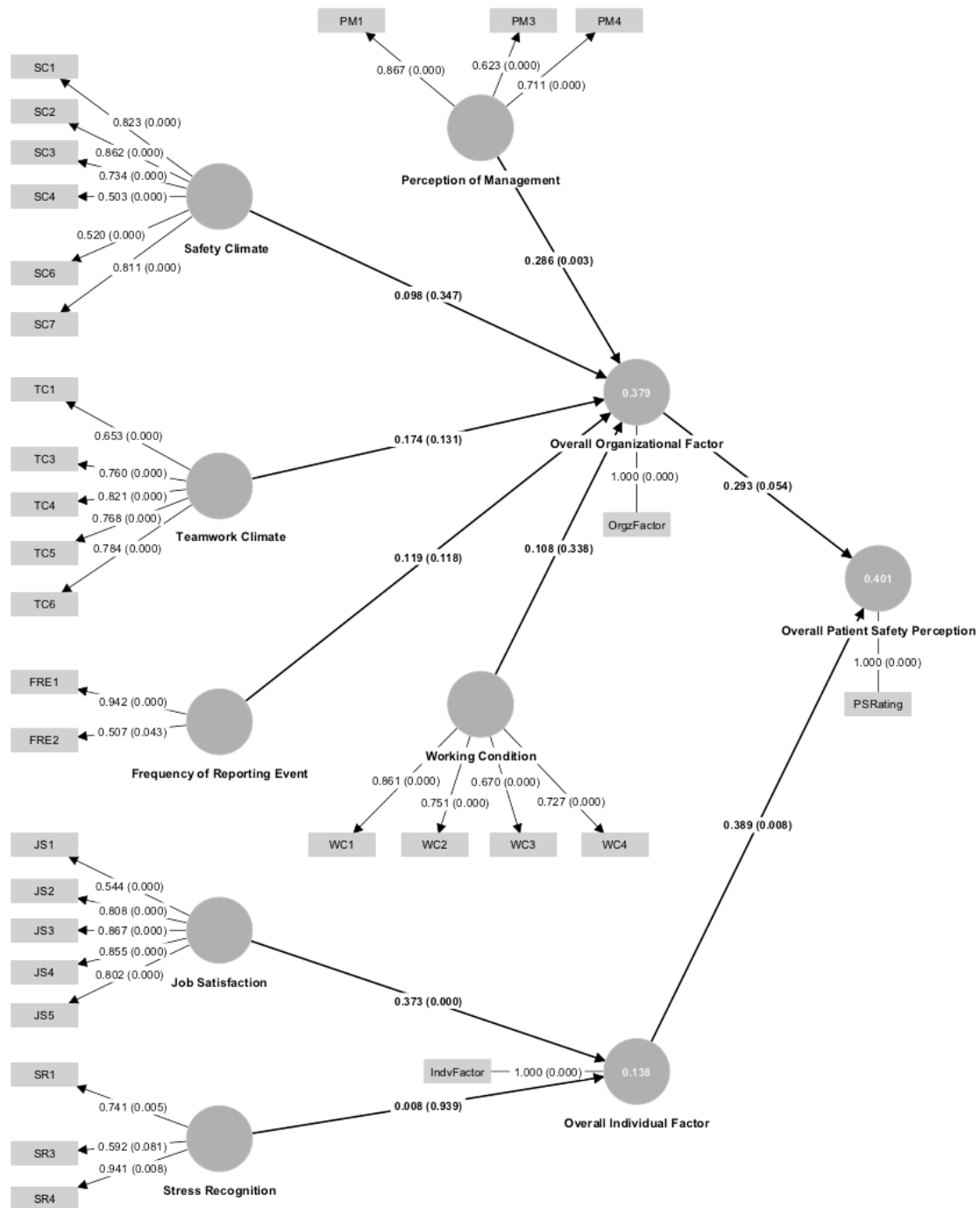


Figure 4.1: Structural Model without Moderators

Hypothesis 1 (H1) examined whether organizational factors significantly and positively affect the perception of patient safety culture among perioperative staff. Although the results revealed a positive relationship, the p-value was 0.054 ($B = 0.293$, $t = 1.930$). Therefore, the relationship did not reach statistical significance at a 95% confidence interval. H2 was not supported.

Hypothesis 2 (H2) examined whether individual factors significantly and positively affect the perception of patient safety culture among perioperative staff. The results showed a significant positive impact of individual factors on the perception of patient safety culture among perioperative staff ($B = 0.389$, $t = 2.662$, $p = 0.008$). Hence, H3 was supported. The results are presented in Table 4.13.

Table 4.13: Direct Hypotheses Testing

Path	Original sample	Bootstrapping mean	STDEV	T	P value	Decision
H1: OrgzFactor -> PSRating	0.293	0.305	0.152	1.930	0.054	Not supported
H2: IndvFactor -> PSRating	0.389	0.380	0.146	2.662	0.008	Supported

Relationships are significant at $P < 0.05$, OrgzFactor: Organizational Factor, PSRating:

Patient Safety Rating, IndvFactor: Individual Factor

4.6.5 Moderator Effect of Job Position, Gender and Years of Experience in Specialty

The moderating effect of job position, gender, and years of experience in a specialty on the relationship between individual factors and perception of patient safety culture among perioperative staff were determined. This study used Cohen's guidelines to determine the effect size and assess the strength of the moderating effects. Figure 4.2 and Table 4.14 show the moderating effect results.

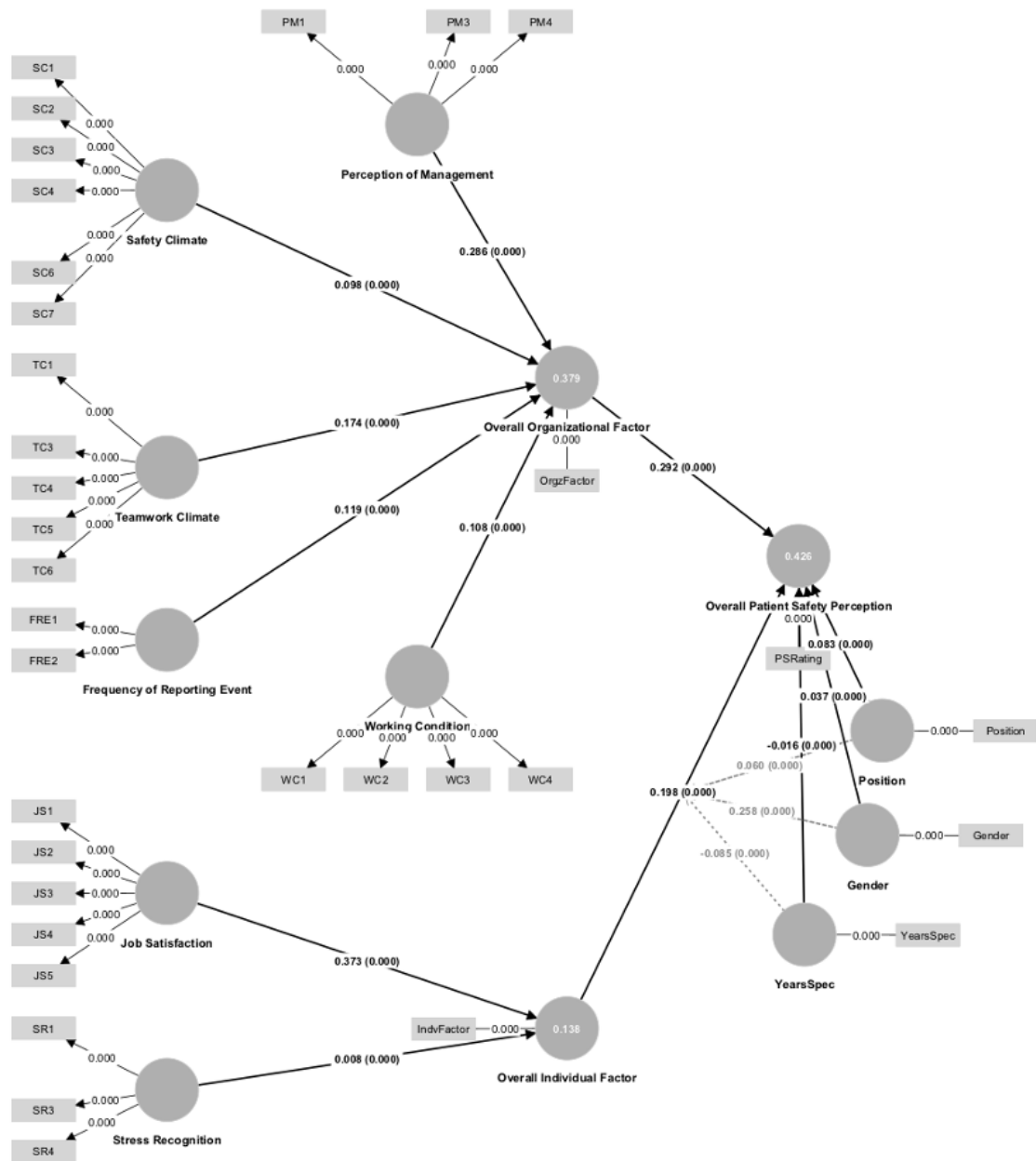


Figure 4.2: Structural Model with Moderating Effects

Hypothesis 3 (H3) examined whether job position, gender, and years of experience in a specialty significantly moderate the relationship between individual factors and the perception of patient safety culture among perioperative staff. The results revealed that individual factors are not moderated by job position in relation to the perception of patient safety culture ($B = 0.048$, $t = 0.565$, $p = 0.572$). Similarly, the results revealed that individual factors are not moderated by gender in relation to the perception of patient safety culture ($B = 0.183$, $t = 0.652$, $p = 0.515$). Additionally, years of experience in a specialty also did not moderate the relationship ($B = -0.103$, $t = 1.319$, $p = 0.187$). Hence, H3 was not supported.

Table 4.14: Moderating Hypotheses

Path	Original sample	Bootstrapping mean	STDEV	T	P value	Decision
H3: IndvFactor *Position -> PSRating	0.048	0.040	0.086	0.565	0.572	Not supported
IndvFactor *Gender -> PSRating	0.183	0.182	0.281	0.652	0.515	Not supported
IndvFactor *YearsSpec -> PSRating	-0.103	-0.096	0.078	1.319	0.187	Not Supported

Relationships are significant at $P < 0.05$, PSRating: Patient Safety Rating, IndvFactor: Individual Factor

4.6.6 Assessment of Variance Explained in the Endogenous Latent Variables

Table 4.15 presents the R^2 value of the endogenous latent variables. The results indicate that the R^2 for individual factors is 0.138, signifying a moderate level of predictive accuracy. Additionally, the R^2 value for organizational factors (0.379) is over 0.26, indicating a substantial level of predictive accuracy. The combined R^2 value for the perception of patient safety culture is 0.426, indicating that individual factors and

organizational factors together explain 42.6% of the variance in the perception of patient safety culture among perioperative staff.

Table 4.15: Variance Explained in the Endogenous Latent Variables (R^2)

Latent Variable	Variance Explained R^2
Individual Factors	0.138
Organizational Factors	0.379

4.6.7 Assessment of Effect Size (f^2)

Table 4.16 presents the corresponding effect sizes for the latent variables in the structural model.

Table 4.16: Effect Size of the Latent Exogenous Variables (f^2)

R-squared	Included	Excluded	f-squared	Effect size
Individual Factors	0.401	0.328	0.122	Small
Organizational Factors	0.401	0.360	0.068	Small
Position	0.411	0.408	0.005	None
Gender	0.408	0.403	0.008	None
Years of Experience in a Specialty	0.413	0.403	0.017	None

Table 4.16 shows that the effect sizes for individual and organizational factors on the perception of patient safety culture were 0.122 and 0.068, respectively. According to Cohen (1988), these effect sizes for the two exogenous latent variables on the perception of patient safety culture are small. Additionally, the effect sizes for the moderating variables including, position, gender, and years of experience in a specialty, on the relationship between individual factors and the perception of patient safety culture among perioperative staff were 0.005, 0.008, and 0.017, respectively. According to Cohen (1988), the effect sizes of these latent exogenous variables on the relationship between individual factors and the perception of patient safety culture are considered as none.

4.6.8 Assessment of Predictive Relevancy (Q^2)

As indicated in Table 4.17, the Q^2 value for the endogenous latent variables was over 0, confirming the establishment of predictive relevance.

Table 4.17: Predictive Relevance of the Latent Endogenous Variables (Q^2)

	SSO	SSE	$Q^2 (= 1 - SSE/SSO)$
Individual Factors	137.00	126.582	0.076
Organizational Factors	137.00	93.530	0.317
Perception of Patient Safety Culture	137.00	97.882	0.286

4.7 Chapter Summary

This study supported using PLS-SEM path modeling to examine the conceptual framework in Chapter 2. The findings were presented through various tables and figures after the significance of path coefficients evaluation. The perception of patient safety culture scores among perioperative staff with the outcomes of each singular dimension of SAQ-OR were calculated.

The ‘stress recognition’ dimension had the highest mean positive response rate at 73.0%, indicating a strong awareness of stress management among staff. In contrast, the ‘perceptions of management’ dimension had the lowest at 22.6%, suggesting concerns regarding the effectiveness of management practices in the operating theater that require attention. Most of the respondents graded the organizational factors rating, individual factors rating, and patient safety rating in their workplace as ‘good’.

The study findings revealed a significant positive relationship between individual factors and the perception of patient safety culture. In contrast, the association between organizational factors and the perception of patient safety culture was positive but not

significant. The moderating effects of position, gender, and years of experience in a specialty on the relationship between individual factors and the perception of patient safety culture were also non-significant.

CHAPTER 5

DISCUSSION

5.1 Overview

This chapter discusses the key findings from Chapter 4, focusing on the perception of patient safety culture among perioperative staff and the complex interplay between individual and organizational factors influencing this perception.

5.2 The Level of Perception of Patient Safety Culture among Perioperative Staff

The results of this study revealed that although the majority (55.5%) of the perioperative staff at SGH ranked the patient safety culture in their workplace as good, only 26.3% of them viewed their workplace as excellent or very good with regards to patient safety culture, indicating there is still a need to improve safety practices in the operating theater. Respondents described a work environment characterized by urgency, with concerns about insufficient preparation time for the operating theater before surgical procedures begin.

Such a sense of urgency and time constraints might drive staff to bypass standard care procedures or overlook critical details, potentially increasing the risk of error. This situation is likely due to heavy workload, possibly contributed by factors such as high patient caseload resulting in exhausting operating theater lists and inadequate staffing levels (Aniza & Siti, 2022). This issue is similarly indicated in this study, as evidenced by the item on staffing numbers that obtained the least positive responses. Malaysia has one healthcare worker (comprising doctors and nurses) for every 186 people, which meets the WHO benchmark of 1:225 (CodeBlue, 2020). However, this figure conceals an uneven distribution

between urban and rural areas, leading to inadequate staffing and highlighting the need for more equitable resource allocation (CodeBlue, 2020). This staffing shortage contributes to higher medical errors and compromised patient safety (Perjit, 2021).

The poor perception of patient safety culture among perioperative staff could also be attributed to management issues, as evidenced by the finding that the perceptions of management dimension received the lowest mean positive response score (22.6%) in this study. Apart from inadequate staffing, respondents also perceived low support from hospital management in their work. Management should establish a clear and structured Standard Operating Procedure (SOP) for reporting safety incidents, including near misses. Standardizing these processes ensures consistency and comprehensive data collection, making it easier to address system flaws (Nuckols, 2011). A non-punitive error reporting system is crucial to fostering a culture of transparency and learning, where staff feel safe to report mistakes without fear of punishment, a key principle of a just culture (Marx, 2019). Moreover, management should implement a feedback loop that informs staff about how reported incidents are addressed and what changes are made to prevent future occurrences. As highlighted by Nuckols (2011), effective feedback loops motivate staff to continue reporting and contribute to improving overall safety practices.

Additionally, the working condition dimension also scored low in the number of positive responses (46.4%), indicating the need for a more conducive working environment to boost staff morale. Within this dimension, particularly low positive feedback was noted regarding conflict resolution processes in the operating theater, suggesting that there are probable difficulties in how the hospital manages personal conflicts. Hence, it is important to cultivate an open communication culture and implement transparent conflict resolution

mechanisms or supportive measures to resolve these issues. The use of structured communication tools, such as the SBAR (Situation, Background, Assessment, Recommendation) approach, standardizes critical patient handoffs, minimizing communication breakdowns and reducing the risk of misunderstandings and conflicts (Phillips, 2017). Leadership fosters open communication by setting clear goals, encouraging input from all team members, and empowering them to speak up (Phillips, 2017). Actively seeking feedback and involving the team in decisions demonstrates that everyone's voice matters, preventing conflicts and improving performance (Phillips, 2017). Mutual support within the team, through timely, respectful feedback, further ensures that concerns are addressed before escalating (Phillips, 2017).

The result was similarly noted in previous local studies conducted by Aniza & Siti (2022) and Kim et al. (2022), which used the SAQ questionnaire to assess the perception of healthcare staff from various clinical settings within local hospitals. Both studies identified lower mean scores in the dimensions related to management and working conditions. Specifically, the perioperative setting is fraught with stressors and complex work processes that can significantly impact the perception of perioperative staff (Goras et al., 2020). Given the associated risks and time-sensitive nature of surgical procedures, this necessitates the perioperative staff to think critically and act fast. Hence, perioperative staff requires precise coordination and reaffirming information to manage various expected or unexpected situations effectively (Goras et al., 2020), failure of which may lead to medical errors that could jeopardize patient safety. This scenario likely underscores a heightened reliance on management to ensure the smooth running of operating lists from day to day.

The safety climate (61.1%) and teamwork climate (58.7%) scored only moderately high, suggesting a need for better teamwork and good interdisciplinary communication to safeguard patient safety. Indeed, effective teamwork in the perioperative setting requires seamless collaboration among different team members, including clear communication and a shared commitment to patient safety (Vermeir et al., 2017). Implementing the surgical safety checklist is another measure to improve teamwork and communication between team members (Etherington et al., 2019). By introducing structured communication at critical stages during surgical procedures, the checklist ensures that all team members are informed about key aspects such as patient identity, surgical site, and procedure details, promoting a shared understanding and collaborative environment (Reyes, 2022). The checklist also serves as a seamless communication tool between patient care areas and reduce the risk of errors (Phillips, 2017).

The stress recognition component in this study was found to be notably significant, with a score of 73.0%, indicating that respondents were highly aware of the influence of fatigue, stress, and severe workload on their work performance. This demands close attention, as burnout and poor mental health among healthcare staff can result in higher rates of absenteeism and turnover (Nursyahda et al., 2022), which can affect team dynamics and ultimately compromise patient safety in the operating theater.

Healthcare staff, including doctors and nurses, often experience high stress in their daily practices. Doctors face various stressors, from making critical life-and-death decisions to navigating interpersonal pressures from peers and supervisors (Amirul et al., 2018). The prevalence of anxiety symptoms among doctors calls for measures to support their mental well-being (Nur Faizah et al., 2021). Similarly, due to demanding workloads and challenging

environment, the increased risk of burnout among nurses also necessitates immediate attention (Nursyahda et al., 2022).

Furthermore, it is essential to consider the impact of long working hours on healthcare staff. In Malaysia, the regular working hours for employees should be 40 hours per week, with a maximum of 45 hours. However, healthcare staff often have to work overtime daily or even carry out double shifts due to high workload (Tan & Ragananthini, 2023). Long working hours have been shown to be associated with higher anxiety, depression, fatigue, and sleepiness, reducing the staff's ability to deliver care effectively and thus compromising patient safety (Mu'taman et al., 2023).

Additionally, the stressful working environment is exacerbated by the high turnover rate of healthcare staff in Malaysia (Ifrah et al., 2020). High turnover rates disrupt effective communication and teamwork and hinder the development of cohesive team dynamics (Phillips, 2017). Building effective teamwork is important to promote job satisfaction and retention among healthcare staff (Sanjiv et al., 2014). Tuckman's model of team development offers valuable insights into fostering team dynamics (Sanjiv et al., 2014). In the perioperative setting, a high turnover not only impedes the development and progression through Tuckman's stages but also can lead to a cycle where the team members are perpetually stuck in the forming and storming phases and unable to fully mature into norming or performing stages. This can have detrimental effects on team morale, productivity, and the ability to achieve objectives efficiently.

The mean positive response rate for the frequency of event reporting dimension in this study was 51.1%, suggesting only a moderate level of event reporting. This could be due to an ineffective reporting system, insufficient feedback from managers, fear of

disciplinary action, and an unwillingness to recognize or acknowledge near misses that could potentially harm patients (Kaware et al., 2022). Hofstede's cultural dimensions framework also illustrates how cultural factors, particularly the power distance index (PDI), can influence perceptions of hierarchical structures and authority gradients within an organization (Chew, 2024). In a Malaysian healthcare setting, a steep PDI issue may contribute to junior doctors' hesitance to challenge decisions due to deference to authority figures and fear of possible punitive actions (Chew, 2024). Moreover, operating theater nurses may feel vulnerable when speaking up due to the hierarchical structure of a healthcare organization (Pattni et al., 2019). This finding aligns with Kim et al. (2023) in SGH, where staff at lower hierarchical levels were less likely to speak up for patient safety, possibly due to perceptions that their opinions are undervalued, as well as a low level of psychological safety and a less supportive environment. Importantly, teams with higher levels of psychological safety, as stated by Edmondson (1999), are more likely to engage in open communication and learn from failure, suggesting that addressing these cultural and organizational factors can enhance adverse event reporting rates.

5.3 The Relationship between Organizational Factors and the Perception of Patient Safety Culture among Perioperative Staff

In the PLS-SEM approach of this study, it was found that, albeit not reaching statistical significance at a 95% confidence interval, the relationship between organizational factors and the perception of patient safety culture among perioperative staff was nevertheless still positive, suggesting that organizational factors play a significant role in influencing patient safety culture. Previous studies have shown that organizational factors, including effective leadership and communication openness, were positively correlated with improved patient safety culture in healthcare institutions (Sfantou et al., 2017; Alsabri et al.,

2020). Due to strong emphases on strong leadership, clear communication, and good conflict resolution skills as key determinants of patient safety culture in a healthcare organization, this highlights the necessity of fostering Speak Up, Reporting, Learning, and Just cultures (Tan et al., 2019).

Undoubtedly, individual factors, such as fatigue or stress, may predispose a staff to commit risky acts at work and thus increase the likelihood of mistakes (Reason, 2000). However, according to the Swiss Cheese Model, although at the individual level, risky individual behaviors like taking shortcuts and violating procedures may occur, at the organizational level, these various organizational factors should act as layers of defense to safeguard safety culture and to identify, arrest, and rectify individual errors at the subsequent layer of defense, thus mitigating latent individual errors from manifesting as active errors that can harm the patient. Specifically, in the perioperative setting, the effectiveness of implementing procedures, including time-outs and surgical counts, depends on the cooperation and collaboration of team members (acting as another “layer of defense” against mistakes made during operation) to ensure all processes are carried out correctly.

Vincent’s framework further emphasizes the influence of organizational factors on overall patient safety culture. Importantly, the framework advocates for a non-punitive approach by prioritizing systemic improvements over individual blame (Vincent et al., 1998). According to Mosadeghrad (2014), hospitals with strong safety cultures prioritize safety, encourage open communication, and foster effective teamwork. Moreover, Srma et al. (2015) similarly highlighted the importance of establishing a non-punitive culture to increase the reporting rate. Besides, other contributing factors such as environmental (e.g., working in a busy perioperative setting) and team dynamics (e.g., a team that consists of

many junior and inexperienced staff) can also impact the abilities of perioperative staff to deliver care effectively, thus highlighting the importance and complexity of organizational factors in causing active medical failures. Hence, although in this study, the relationship between organizational factors and the perception of patient safety culture did not reach statistical significance at a 95% confidence interval, it is believed that this positive relationship still has clinical or practical significance in perioperative settings.

5.4 The Relationship between Individual Factors and the Perception of Patient Safety Culture among Perioperative Staff

In the PLS-SEM approach of this study, a statistically significant and positive relationship was observed between individual factors and the perception of patient safety culture among perioperative staff, highlighting the importance of cultivating a positive, supportive work environment to boost staff morale. Individual factors have a more direct impact on the psychological well-being of perioperative staff in the workplace compared to organizational factors, as they are closely related to individual experiences.

Policymakers play a vital role in addressing issues faced by local contract doctors, ensuring their promotion to permanent positions, and facilitating specialty training for career advancement (Junaid et al., 2023). This aligns with Herzberg's Two-Factor Theory, which states that motivators like career advancement opportunities increase intrinsic motivation and job satisfaction (Aisyah et al., 2023). Similarly, supporting nurses through initiatives like post-basic training or higher education degrees can contribute significantly to their professional growth and job satisfaction. As suggested by Aniza and Siti (2022), satisfied staff are more likely to engage in positive safety behaviors, thus increasing patient safety culture.

Furthermore, the positive relationship between stress recognition and the perception of patient safety culture found in this study also signifies the importance of recognizing and acknowledging the unavoidable stressors in a perioperative setting due to critical decisions and time-sensitive operations (Sonoda et al., 2018). Therefore, recognizing stress as a factor influencing patient safety culture underscores the necessity for stress management among perioperative staff. Sovold et al. (2021) have highlighted the critical role of stress management in enhancing self-care practices, which in turn contribute to improved job satisfaction and directly impact patient safety.

Furthermore, the particularly stressful conditions of the work environment faced by doctors in Malaysian public hospitals, which often have to undertake on-call duties for up to 33 consecutive hours, further compound the situation and necessitate immediate attention. The brief inter-shift duration of only 15 hours raises concerns about high levels of fatigue, disruption of wake-sleep cycles, and inadequate time for recovery (Mohd Fadhli et al., 2020). This may impair their work performance and compromise the quality of patient care. Besides, studies on burnout that have been conducted among nurses in Malaysia further emphasize the need for management interventions to alleviate the mental strain on healthcare workers (Yukthamarani et al., 2020; Nursyahda et al., 2022). These findings align with Maslach's definition of burnout, which includes emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach et al., 2001). Hence, there is a need for holistic patient safety approaches that consider the unique experiences and viewpoints of perioperative staff. Organizations should not focus only on structural or procedural changes but also cater to the well-being and specific stressors experienced by the perioperative staff.

5.5 The Moderating Effect of Job Position, Gender, and Years of Experience in a Specialty on the Relationship between Individual Factors and the Perception of Patient Safety Culture

The study revealed that job position, gender, and years of experience in a specialty did not significantly moderate the relationship between individual factors and the perception of patient safety culture among perioperative staff. The finding is consistent with Asem et al. (2019), who found that personal characteristics such as gender, specialty, and years of graduation may not significantly influence the perception of patient safety among doctors. Nevertheless, training programs aimed at improving team communication and collaboration have been shown to enhance healthcare team performance and patient safety (Azizah et al., 2020; Buljac-Samardzic et al., 2020).

The majority of respondents in this survey were registered nurses (67.2%), and 79.6% of the respondents were female, largely due to the higher percentage of perioperative nurses in the sample. This imbalance in gender and job position may have contributed to the lack of significant moderating effects, as the large proportion of female nurses could have limited the variability in responses, making it difficult to detect any moderating influences of gender or job position.

On the other hand, previous studies across various healthcare specialties have demonstrated that personal characteristics can significantly influence perceptions of patient safety culture. For example, Nuaim et al. (2018) found that healthcare professionals from different disciplines perceived patient safety dimensions differently. Besides, Gambashidze et al. (2021) showed that job positions and managerial functions can significantly impact the perception of patient safety culture.

Therefore, although this study suggests these demographic variables may not significantly moderate the relationship between individual factors and the perception of patient safety culture, the importance of demographic variables in influencing patient safety culture should not be underestimated. In fact, the absence of significant moderating effects of job position, gender, and years of experience in a specialty may also suggest that regardless of their job position, gender, and number of years of experience, all healthcare staff had similar perceptions of the importance of patient safety culture.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Overview

This chapter summarizes the study findings and presents its strengths and limitations. This is then followed by exploring the implications of the findings that are important for management, policymakers, and perioperative nurses. Lastly, recommendations are provided for organizations, and future research to enhance knowledge on patient safety is discussed.

6.2 Summary of the Study Findings

With regards to the first research objective, the perception of patient safety culture among perioperative staff was generally rated as good, with only a small percentage viewing it as excellent or very good, suggesting a need for improvement in certain aspects. The dimension of perceptions of management was found to be the lowest. Inadequate staffing and perceived low management support were among the factors identified. There were also concerns about a rushed working environment and time pressure for preparation, potentially leading to adverse events. Moreover, the high level of stress recognition among perioperative staff indicated an awareness of the impact of workload on their well-being. Adequate management support is essential to ensure a positive working environment, which includes allocating necessary resources and establishing policies to optimize workflow processes. This support allows perioperative staff to perform their duties efficiently.

With regards to the second research objective, albeit not achieving significance at a 95% confidence interval, a positive relationship between organizational factors and the

perception of patient safety culture among perioperative staff was identified, highlighting the important role of organizational influence. Therefore, healthcare organizations should prioritize initiatives aimed at fostering a patient safety culture.

With regards to the third research objective, individual factors comprised of job satisfaction and stress recognition were found to have a statistically significant influence on the perception of patient safety culture among perioperative staff. Thus, policymakers should consider these factors when establishing safety policies and protocols, especially by addressing administrative issues related to staffing levels and concerns.

With regards to the fourth to the sixth research objectives, while this study did not find any significant moderation by job position, gender, and years of experience in a specialty, it is believed that it is still important to examine these demographic characteristics in influencing the perception of patient safety culture.

6.3 Strengths and Limitations of the Study

This study highlights the importance of addressing the enhancement of patient safety culture among perioperative staff, especially focusing on the perception of management and working conditions dimensions, as revealed in the findings. The study findings were similar to the local study results using the same measuring instrument, SAQ, in examining the perception of patient safety culture in various healthcare settings (Aniza & Siti, 2022; Kim et al., 2022). These consistent findings signify a shared trend in the Malaysian healthcare system, indicating potential areas for improvement. The results are also in accordance with Yukthamarani et al. (2020), who indicated that the current local healthcare system is unable to provide enough human capital development and safe working conditions.

Additionally, the use of Partial Least Squares Structural Equation Modeling (PLS-SEM) in this study offers a significant methodological advantage. The PLS-SEM approach can simultaneously analyze multiple dependent and independent variables, allowing for a more comprehensive examination of complex relationships (Hair et al., 2017). By employing this advanced statistical method, the study provides better predictions of the relationships between individual and organizational factors, as well as the moderating effects on patient safety culture. This analytical approach enhances methodological accuracy, enabling a detailed analysis of the factors that influence perioperative safety, thereby contributing to both theoretical advancements and practical interventions in healthcare settings.

However, there are a few limitations to consider in this study. Firstly, the study population was confined to a hospital in the state of Sarawak, located in East Malaysia, due to time, expense, and distance constraints. Hence, the results of this study may not be generalizable to the whole of Malaysia. In addition, the SAQ-OR instrument heavily relies on self-reported behavior and cooperation from perioperative staff. The staff may give positive responses, which potentially introduce social desirability bias and affect the accuracy of the study. Moreover, their perceptions of the patient safety culture might change over time and vary with daily activities. This study only collected quantitative data from perioperative staff through a survey questionnaire, without incorporating qualitative data analysis for richer and more descriptive findings. Qualitative approaches, such as observing daily practices, retrieving event reporting frequencies from reporting systems, or reviewing medical records, are suggested for future work in this research area.

Besides, the R^2 of the structural model in this study was only 42.6%, indicating that individual and organizational factors together explained less than half of the total variance

in perceptions of patient safety culture. This aligns with the iceberg model of organizational culture, which suggests that the “visible aspects of an organization” only represent a fraction of the entire factors influencing the perception of patient safety culture, with possibly underlying factors that lie beneath the surface that could have contributed to the unexplained variance in patient safety culture perception beyond the scope of this study (Braithwaite, 2010). Afework et al. (2023) found that examining the broader external environment, including the availability of standard operation procedures (SOP) and policies, might offer additional valuable insights into patient care practices. Additionally, a systematic review by Darma et al. (2020) found a significant impact of organizational factors, including leadership, resources such as manpower and working conditions, broader societal and cultural values on health and modern medicine, and organizational structures on patient safety culture. Hence, further research may include these external aspects for a comprehensive and in-depth study.

6.4 Implications

6.4.1 Implications for Hospital Management

The findings of this study provide insight for hospital management to determine how perioperative staff perceive patient safety culture in their workplace and the safety dimensions. It is essential to identify strengths and weaknesses so that targeted interventions and policies can be implemented to enhance patient safety culture. The staff has indicated low satisfaction with the lack of staffing to handle patients. Hospital management should prioritize this issue, as maintaining adequate staffing is important to deliver safe patient care and prevent staff burnout. Additionally, the staff expressed concern about the work support received, which indicates a need for management to establish support mechanisms by providing adequate resources to enhance staff satisfaction.

The findings also show that staff are less satisfied with the management approach in handling conflict resolution. Hence, there is a need to foster a culture of open communication and proper conflict resolution in order to establish a positive work environment and increase staff morale. Management should prioritize strategies that address both organizational support and individual factors to support staff well-being and promote a positive working environment (Maan et al., 2020). Addressing these challenges enables hospital management to implement strategies aligned with the goal of improving patient safety culture in the operating theater.

6.4.2 Implications for Perioperative Nurses

In this study, specific concerns regarding patient safety within the operating theater setting are emphasized. The importance of teamwork and communication among all team members, including surgeons, anesthesiologists, and nurses, in promoting patient safety culture is highlighted. Perioperative nurses play a crucial role in overseeing patient care throughout surgical procedures and maintaining effective communication within the surgical team to ensure patient safety throughout the entire surgical procedure. Hence, empowering perioperative nurses to advocate for patient safety and establishing a supportive environment for reporting adverse events is crucial.

Additionally, the study highlights the importance of integrating patient safety principles and practices into nursing education. Patient safety training should be incorporated into academic and practical settings to better prepare perioperative nurses to foster a patient safety culture within the operating theater. Perioperative nurses need to be equipped with strong teamwork and communication skills to collaborate with team members and handle complex surgical situations effectively. Simulation-based scenarios enable

perioperative nurses to develop critical thinking skills and prompt responses in real-life examples while also enhancing their communication and teamwork skills.

Perioperative nurses are encouraged to engage in research addressing factors influencing patient safety culture and contribute insights to evidence-based practices. These actions are crucial for driving positive changes, and active involvement in continuous improvement efforts remains essential for perioperative nurses to ensure the delivery of safe patient care.

6.4.3 Implications for Policymakers

Recognizing the unique challenges faced by staff, policymakers are obliged to develop policies targeting these issues and allocate adequate resources directed toward the perioperative department. Staffing levels, seeking support, and ongoing training programs are essential components that can be addressed through well-informed policies.

6.5 Recommendations

Organizations should provide continuous training and development programs, such as workshops, seminars, and conferences on patient safety, to perioperative staff to raise their awareness of safety practices. This can ensure that staff stay up-to-date on the latest safety initiatives outlined by the Patient Safety Council Malaysia. Additionally, organizations should promote the annual celebration of World Patient Safety Day, aligning with the global initiative to foster collaborative commitment toward patient safety. Perioperative staff are also encouraged to engage in quality improvement projects focused on patient safety and risk prevention strategies to foster a culture of ongoing learning and improvement for patient safety outcomes.

Strong leadership support is crucial for fostering a positive patient safety culture in organizations. A good leader can work collaboratively and communicate effectively with the team, departments, and stakeholders to ensure patients receive the best care. Hence, organizations should prioritize cultivating leaders by offering leadership development programs tailored for managers to further enhance their abilities to initiate the implementation of safety measures, lead the team to actively participate in safety initiatives, and provide unwavering support to the team. Leadership visibility and commitment to safety practices create a culture where patient safety is a shared responsibility for the staff.

There is also an area of improvement regarding the frequency of reporting behaviors among perioperative staff. Organizations should promote a just culture where mistakes are viewed as learning opportunities rather than punishments. This can encourage staff to report adverse events or near misses without fear of being taken action or negatively reflected on their profile. Thus, it is essential to establish a user-friendly and easily accessible reporting system for staff to report adverse events. Besides, establishing clear communication channels or providing regular feedback ensures that staff are aware of the outcomes of reported incidents. Knowing the positive changes after reporting reinforces staff's willingness to report adverse events in the future.

Organizations should collect regular feedback from perioperative staff while disseminating essential information during routine team meetings and briefings to ensure all team members are well informed about any changes and updates of safety protocols. It is essential to foster open communication where perioperative staff can speak up about any issues or concerns, thereby enhancing teamwork and contributing to a safer working environment. Empowering staff by actively involving them in decision-making processes

related to patient safety protocols so that they feel their opinions are taken into account and contribute to the safety initiatives.

Besides, organizations should monitor the psychological well-being of perioperative staff as they often experience high-stress levels due to heavy workloads and frequent overtime resulting from staff shortages. Developing stress management programs and encouraging perioperative staff to attend can enhance their stress-coping abilities and promote overall well-being. Establishing adequate support systems, such as meeting sessions with supervisors and peer support groups, provides a platform for staff to express their stressors and seek advice to mitigate their stress levels. Debriefing sessions should be provided for staff following traumatic events to reduce the risk of burnout. Additionally, ensuring strategic workforce planning by considering factors such as patient acuity and case complexity can help ensure appropriate staffing levels and manageable workloads, thus preventing the risk of burnout.

6.6 Future Research

In future research, qualitative methods can be included in the patient safety research, in addition to quantitative survey methodology to gain a deeper understanding of perioperative staff experiences and safety culture factors. Observation, interviews, and medical record review methods can capture the subjective perspectives of staff, uncovering the complexities of their interactions, decision-making processes, and perceptions of patient safety. Employing both quantitative and qualitative methods can enhance the validity of the research findings as they complement each other.

Furthermore, future research can consider including both public and private hospitals to better understand the unique organizational contexts influencing patient safety culture, as

the scope of this study only focuses on SGH. The Malaysian healthcare system operates on a two-tier system (Yukthamarani et al., 2020). Public and private healthcare settings operate under different organizational structures, with public hospitals managed by MOH and funded through the country's tax revenue. Examining how hospital administrative systems and resource allocation affect safety practices will help provide targeted interventions for perioperative staff across different contexts.

It is also vital to examine the dynamic interaction between individual and organizational factors in influencing patient safety culture. Future research can incorporate other aspects, such as organizational policies, leadership, and psychological safety. Longitudinal studies can track changes in safety perceptions over time to better understand if factors influencing safety perceptions vary over time.

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APPENDICES

Appendix A: Participant Information Sheet and Informed Consent Form

PARTICIPANT INFORMATION SHEET AND INFORMED CONSENT FORM (for adult subjects)

1. **Title of study:** Patient Safety Culture and Its Associated Factors among Perioperative Staff
2. **Name of investigator and institution:**
 - I. Bong Yi Lin, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak.
 - II. Prof Dr. Chew Keng Sheng, Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak.
 - III. Dr. Peter Tan Chee Seong, Anesthesiology Department, Sarawak General Hospital
3. **Name of sponsor:** Self-sponsored
4. **Introduction:**

It is important that you understand why the research is being done and what it will involve. Please take your time to read through and consider this information carefully before you decide if you are willing to participate. Ask the study staff if anything is unclear or if you would like more information. After you are properly satisfied that you understand this study, and that you wish to participate, you must sign this informed consent form.

Your participation in this study is voluntary. You do not have to be in this study if you do not want to. You may also refuse to answer any questions you do not want to answer. If you volunteer to be in this study, you may withdraw from it at any time. If you withdraw, any data collected from you up to your withdrawal will still be used for the study.

This study has been approved by the Medical Research and Ethics Committee, Ministry of Health Malaysia.

5. **What is the purpose of the study?**

The purpose of this study is to investigate the patient safety culture and its associated factors among perioperative staff.

This research will be conducted for a duration of 24 months (01/07/2022 till 30/06/2024). The expected number of participants is 128 individuals.

6. What are my responsibilities when taking part in this study?

It is important that you answer all of the questions asked by the study staff honestly and completely which will take about 15 minutes of your time. The researchers will obtain the following information from you:

1. Your gender
2. Your occupation
3. Years of experience
4. Job satisfaction
5. Stress level
6. Teamwork within the unit
7. Hospital management support
8. Safety climate
9. Working conditions
10. Frequency of event reporting
11. Perception of patient safety culture in the working area

You will be given a survey form to be answered. This form contains 32 items belong to seven factors: teamwork climate (6 items), job satisfaction (5 items), perceptions of management (4 items), safety climate (7 items), working conditions (4 items), stress recognition (4 items), and frequency of event reporting (2 items).

7. What are the potential risks and side effects of being in this study?

The risk is minimal. Some questions in the questionnaire may make you uncomfortable. The chances and magnitude of discomfort experienced in the research are not greater than those normally encountered in the daily life of the general population or during the performance of routine physical or psychological examinations or tests. You are free to decline to answer any of the questions that you feel uncomfortable with.

8. What are the benefits of being in this study?

Information obtained from this study will offer perioperative staff more understanding of the patient safety culture in the operating theatre department, specifically in improving their patient safety awareness at work.

9. Who is funding the research?

This study is self-funded by the principal investigator. You will not be paid for participating in this study.

10. Will my information be kept private?

All your information obtained in this study will be kept and handled in a confidential manner, in accordance with applicable laws and/or regulations. When publishing or presenting the study results, your identity will not be revealed at all. Individuals involved

in this study, qualified monitors and auditors, and governmental or regulatory authorities may inspect the study data, where appropriate and necessary.

Your details will be kept on a password-protected database and will be linked only with a study identification number for this research. The details of your Malaysian national identification number or passport number will not be collected in this study. Instead, a study identification number will be used on the data sheets. All data will be entered into a computer that is password protected.

On completion of the study, data in the computer will be copied to CDs and the data in the computer erased. CDs and any hardcopy data will be stored in a locked office of the investigators and maintained for a minimum of three years after the completion of the study. The CDs and data will be destroyed after that period of storage. All participants will not be allowed to view their personal study data, as the data will be consolidated into a database with the data from other participants.

Generally, all participants will not be individually contacted regarding the study findings. You however, can write to the principal investigator to request access to the study findings.

11. Who should I call if I have questions?

If you have any questions about the study or you want information about this study, please contact the principal investigator, Ms. Bong Yi Lin at telephone number 011-36606380 or the co-investigator, Prof Dr. Chew Keng Sheng at telephone number 019-9869520. If there is any updated (and relevant) information regarding this consent form and/or in the event of termination of the study, you will be notified immediately.

If you have any questions about your rights as a participant in this study, please contact: The Secretary, Medical Research & Ethics Committee, Ministry of Health Malaysia, at telephone number 03-3362 8407/8205/8888.

INFORMED CONSENT FORM

Title of Study: Patient Safety Culture and Its Associated Factors among Perioperative Staff

By signing below I confirm the following:

- I have been given oral and written information for the above study and have read and understood the information given.
- I have had sufficient time to consider participation in the study and have had the opportunity to ask questions and all my questions have been answered satisfactorily.
- I understand that my participation is voluntary and I can, at any time, be free to withdraw from the study without giving a reason. I understand the risks and benefits, and I freely give my informed consent to participate under the conditions stated. I understand that I must follow the investigator's instructions related to my participation in the study.
- I understand that study staff, qualified monitors and auditors, the sponsor or its affiliates, and governmental or regulatory authorities, have direct access to the collected information in order to make sure that the study is conducted correctly and the data are recorded correctly. All personal details will be treated as STRICTLY CONFIDENTIAL.
- I will receive a copy of this subject information/informed consent form signed and dated to bring home.

Subject:

Signature:

I/C number:

Name:

Date:

Investigator conducting informed consent:

Signature:

I/C number:

Name:

Date:

Impartial witness:

Signature:

I/C number:

Name:

Date:

Appendix B: Safety Attitude Questionnaire (SAQ-OR)

This survey asks for your opinions about job satisfaction, stress recognition, perceptions of management, working conditions, safety climate, and teamwork climate in your hospital and will take about 15 minutes to complete.

If a question does not apply to you or your hospital or you don't know the answer, please select "Not Applicable". Choose your responses using the scale below:

A	B	C	D	E	×
Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly	Not Applicable

- **"Patient Safety"** is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of healthcare delivery.
- A **"patient safety event"** is defined as any type of healthcare-related error, mistake, or incident, regardless of whether or not it results in patient harm. Example of patient safety events includes incidents of patient fall, pressure ulcer, wrong site surgeries are done, and retention of foreign body in the patient's body.

Background Information

Position: (mark only one)

Nursing

- ☐ Nurse Practitioner, Clinical Nurse Specialist (NP, CNS)
- ☐ Registered Nurse (RN)
- ☐ Nursing Assistant

Medical

- ☐ Surgeon
- ☐ Anesthetist
- ☐ Medical officers include postgraduate students
- ☐ Assistant Medical Officer

Other

Other, please specify:

☐

Mark your gender: ☐ Male

☐ Female

Years in hospital: ☐ Less than 1 year

☐ 1 to 5 years

☐ 6 to 10 years

☐ 11 or more years

Years in specialty: ☐ Less than 1 year

☐ 1 to 5 years

☐ 6 to 10 years

☐ 11 or more years

1.	Nurse input about patient care is well received in the OR.	A	B	C	D	E	×
2.	In the ORs here, it is difficult to speak up if I perceive a problem with patient care.	A	B	C	D	E	×
3.	Disagreements in the ORs here are resolved appropriately (i.e., not who is right, but what is best for the patient.)	A	B	C	D	E	×
4.	I have the support I need from other personnel to care for patients.	A	B	C	D	E	×
5.	It is easy for personnel in the ORs here to ask questions when there is something that they do not understand.	A	B	C	D	E	×
6.	The physicians and nurses here work together as a well-coordinated team.	A	B	C	D	E	×
7.	I would feel safe being treated here as a patient.	A	B	C	D	E	×
8.	Medical errors are handled appropriately in this hospital.	A	B	C	D	E	×
9.	I know the proper channels to direct questions regarding patient safety in the ORs here.						
10.	I receive appropriate feedback about my performance.	A	B	C	D	E	×
11.	In the OR, it is difficult to discuss errors.	A	B	C	D	E	×
12.	I am encouraged by my colleagues to report any patient safety concerns I may have.	A	B	C	D	E	×
13.	The culture in the ORs here makes it easy to learn from the errors of others.	A	B	C	D	E	×
14.	I like my job.	A	B	C	D	E	×
15.	Working in this hospital is like being part of a large family.	A	B	C	D	E	×
16.	This hospital is a good place to work.	A	B	C	D	E	×
17.	I am proud to work at this hospital.	A	B	C	D	E	×
18.	Morale is high in the ORs here.	A	B	C	D	E	×
19.	When my workload becomes excessive, my performance is impaired.	A	B	C	D	E	×
20.	I am less effective at work when fatigued.	A	B	C	D	E	×
21.	I am more likely to make errors in tense or hostile situations.	A	B	C	D	E	×
22.	Fatigue impairs my performance during emergency situations.	A	B	C	D	E	×
23.	Hospital administration supports my daily efforts.	A	B	C	D	E	×
24.	Hospital management does not knowingly compromise the safety of patients.	A	B	C	D	E	×
25.	This hospital deals constructively with problem physicians and employees.						
26.	I am provided with adequate, timely information about events in the hospital that might affect my work.	A	B	C	D	E	×
27.	The levels of staffing in our ORs are sufficient to handle the number of patients.	A	B	C	D	E	×
28.	This hospital does a good job of training new personnel.	A	B	C	D	E	×
29.	All the necessary information are available before the start of a procedure.	A	B	C	D	E	×
30.	Trainees in my discipline are adequately supervised.	A	B	C	D	E	×

- | | | | | | | | |
|-----|--|---|---|---|---|---|---|
| 31. | A mistake when is caught and corrected before reaching the patient is often reported. | A | B | C | D | E | × |
| 32. | A mistake when reaches the patient and could have harm the patient, but did not is often reported. | A | B | C | D | E | × |

Organizational Factor Rating

1. How would you rate your perception on organizational factor that influence patient safety?

Poor	Fair	Good	Very Good	Excellent
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Individual Factor Rating

1. How would you rate your perception on individual factor that influence patient safety?

Poor	Fair	Good	Very Good	Excellent
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Patient Safety Rating

1. How would you rate your unit/work area on patient safety?

Poor	Fair	Good	Very Good	Excellent
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Your Comments

Please feel free to provide any comments about how things are done or could be done in your hospital that might affect patient safety.

Thank you for completing the survey – your time and participation are greatly appreciated.

Appendix C: Items and Composite Measures

Safety Climate

1. I would feel safe being treated here as a patient.
2. Medical errors are handled appropriately in this hospital.
3. I receive appropriate feedback about my performance.
4. In the OR, it is difficult to discuss errors.
5. I am encouraged by my colleagues to report any patient safety concerns I may have.
6. The culture in the ORs here makes it easy to learn from the errors of others.
7. I know the proper channels to direct questions regarding patient safety in the ORs here.

Teamwork Climate

1. Nurse input about patient care is well received in the OR.
2. In the ORs here, it is difficult to speak up if I perceive a problem with patient care.
3. Disagreements in the ORs here are resolved appropriately (i.e., not who is right, but what is best for the patient.)
4. I have the support I need from other personnel to care for patients.
5. It is easy for personnel in the ORs here to ask questions when there is something that they do not understand.
6. The physicians and nurses here work together as a well-coordinated team.

Job Satisfaction

1. I like my job.
2. Working in this hospital is like being part of a large family.
3. This hospital is a good place to work.
4. I am proud to work at this hospital.
5. Morale is high in the ORs here.

Stress Recognition

1. Fatigue impairs my performance during emergency situations.
2. When my workload becomes excessive, my performance is impaired.
3. I am less effective at work when fatigued.
4. I am more likely to make errors in tense or hostile situations.

Perceptions of Management

1. Hospital administration supports my daily efforts.
2. Hospital management does not knowingly compromise the safety of patients.
3. The levels of staffing in our ORs are sufficient to handle the number of patients.
4. I am provided with adequate, timely information about events in the hospital that might affect my work.

Working Conditions

1. This hospital does a good job of training new personnel.
2. All the necessary information are available before the start of a procedure.
3. This hospital deals constructively with problem physicians and employees.

4. Trainees in my discipline are adequately supervised.

Frequency of Event Reporting

1. A mistake when is caught and corrected before reaching the patient is often reported.
2. A mistake when reaches the patient and could have harm the patient, but did not is often reported.

Appendix D: Ethical Approval Letter



JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN
(Medical Research & Ethics Committee)
KEMENTERIAN KESIHATAN MALAYSIA
d/a Kompleks Institut Kesihatan Negara
Blok A, No 1, Jalan Setia Murni U13/52,
Seksyen U13, Bandar Setia Alam,
40170 Shah Alam, Selangor.



Tel: 03-3362 8888/8205

Ref : 22-02887-9UP (2)
Date: 15-March-2023

BONG YI LIN
UNIVERSITI MALAYSIA SARAWAK

Dear Sir/ Mdm,

ETHICS INITIAL APPROVAL: NMRR ID-22-02887-9UP (IIR)
PATIENT SAFETY CULTURE AND ITS ASSOCIATED FACTORS AMONG PERIOPERATIVE STAFF

This letter is made in reference to the above matter.

2. The Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH) has provided ethical approval for this study. Please take note that all records and data are to be kept strictly **CONFIDENTIAL** and can only be used for the purpose of this study. All precautions are to be taken to maintain data confidentiality. Permission from the District Health Officer / Hospital Administrator / Hospital Director and all relevant heads of departments / units where the study will be carried out must be obtained prior to the study. You are required to follow and comply with their decision and all other relevant regulations.

3. The investigators and study sites involved in this study are:

HOSPITAL UMUM SARAWAK
Bong Yi Lin (Principal Investigator)
Chew Keng Sheng
Peter Tan Chee Seong

4. The following study documents have been received and reviewed with reference to the above study:

Documents received and reviewed with reference to the above study:

1. Study Protocol Version 3.0, dated 18-October-2022
2. Patient Information Sheet (PIS) & Informed Consent Form (ICF) English Version 4.0, dated 18-October-2022
3. Patient Information Sheet (PIS) & Informed Consent Form (ICF) Malay Version 4.0, dated 18-October-2022
4. Questionnaire Version 3.0, dated 18-October-2022
5. Investigator's documents : Declaration of Conflict of Interest (COI), IA-HOD-IA, and CV:
 - a) Bong Yi Lin (Principal Investigator)
 - b) Chew Keng Sheng
 - c) Peter Tan Chee Seong

5. Please note that ethical approval is valid until **14-March-2024**. The following are to be reported upon receiving ethical approval. Required forms can be obtained from the National Medical Research Registry (NMRR) website:

- i. **Continuing Review Form** has to be submitted to MREC within 2 month (60 days) prior to the expiry of ethical approval.

22-02887-9UP (2)

- ii. **Study Final Report** upon study completion to the MREC.
- iii. Ethical approval is required in the case of **amendments / changes** to the **study documents/ study sites/ study team**. MREC reserves the right to withdraw ethical approval if changes to study documents are not completely declared.

6. This study involves the following methods:

i. Questionnaire

- 7. Please take note that the reference number for this letter must be stated in all correspondence related to this study to facilitate the process.

Comments (if any): NIL

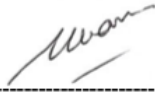
Project Sites:

HOSPITAL UMUM SARAWAK

Decision by Medical Research & Ethics Committee:

- (☒) Approved
- (☐) Disapproved

Date of Approval : 15-March-2023



DR NURAIN BINTI MOHD NOOR
Chairperson
Medical Research & Ethics Committee
Ministry of Health Malaysia
MMC No: 31576

NH/Approval2023/Mrecshare

Appendix E: Data Collection Permission Letter



**CLINICAL RESEARCH CENTRE
SARAWAK GENERAL HOSPITAL
INSTITUTE FOR CLINICAL RESEARCH
NATIONAL INSTITUTES OF HEALTH**
Jalan Tun Ahmad Zaidi Aduce
93586 Kuching, Sarawak
MALAYSIA

Tel: +6 082-276 820
Fax: +6 082-276 823

Date: 17th April 2023

Dear Ms Bong Yi Lin,

**RE: PATIENT SAFETY CULTURE AND ITS ASSOCIATED FACTORS AMONG
PERIOPERATIVE STAFF [NMRR-22-02887-9UP(IIR)]**

In response to your letter referenced: UNIMAS/NC-21.02/04-01/18 (35), this study has been reviewed and approved by the MoH National Institutes of Health, and its Medical Research and Ethics Committee.

This study has also been reviewed at Sarawak General Hospital (SGH), and agreed upon by its director, Dr Ngian Hie Ung.

However, it is advised this study be discussed with the relevant heads of department at SGH where this study is being conducted (if applicable), so that the study protocol can be executed timely.

Thank you.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

.....
Dr Alan Fong Yean Yip
Ketua Pusat Penyelidikan Klinikal,
Hospital Umum Sarawak
Kementerian Kesihatan Malaysia

cc.

Dr Ngian Hie Ung, Pengarah, Hospital Umum Sarawak (SGH), Kuching.