Journal of Quality Measurement and Analysis *JQMA* 21(3) 2025, 79-97
e-ISSN: 2600-8602 *http://www.ukm.my/jqma*
https://doi.org/10.17576/jqma.2103.2025.05

RELATIONSHIP BETWEEN INTERACTIONAL QUALITY, PATIENTS' PERCEIVED VALUE AND PATIENT SATISFACTION IN MILITARY HOSPITAL

(*Hubungan antara Kualiti Interaksi, Tanggapan Berfaedah oleh Pesakit dan Kepuasan Pesakit di Hospital Tentera*)

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ABSTRACT

A systematic review of the military hospital literature indicates that interactional quality consists of three critical dimensions, namely responsiveness, assurance, and empathy. The competence of service providers, such as employees, to implement these quality dimensions can indirectly affect patient satisfaction through patients' perceived value of the healthcare service system. This causal linkage has been extensively examined in both private and public healthcare systems; however, the mediating role of patients' perceived value is seldom highlighted in the military healthcare research literature. This gap has inspired the current study to investigate the association between interactional quality, patients' perceived value, and patient satisfaction. A cross-sectional data of 212 patients were gathered through purposive sampling at an established military hospital in Peninsular Malaysia. The measurement model and structural model were analyzed using SmartPLS. The findings of the structural equation modeling confirm that patients' perceived value does act as an essential mediating variable between interactional quality and patient satisfaction. This result supports the multi-dimensionality of perceived value and aids practitioners in developing customer assistance programs to maintain and improve the performance of military hospital services.

Keywords: interactional quality; patients' perceived value; patient satisfaction

ABSTRAK

Kajian sistematik terhadap literatur hospital tentera menunjukkan bahawa kualiti interaksi terdiri daripada tiga dimensi penting, iaitu responsif, jaminan, dan empati. Kecekapan penyedia perkhidmatan (contohnya, pekerja) untuk melaksanakan dimensi kualiti ini secara tidak langsung boleh mempengaruhi kepuasan pesakit melalui tanggapan berfaedah oleh pesakit terhadap sistem perkhidmatan penjagaan kesihatan. Hubungan sebab-akibat ini telah dikaji dengan ekstensif dalam sistem penjagaan kesihatan yang dimiliki oleh pihak swasta dan awam, tetapi peranan pengantara tanggapan berfaedah oleh pesakit adalah jarang ditonjolkan dalam literatur penyelidikan penjagaan kesihatan tentera. Jurang kajian tersebut telah mendorong kajian ini untuk menyiasat hubungan antara kualiti interaksi, tanggapan berfaedah oleh pesakit, dan kepuasan pesakit. Data keratan rentas sebanyak 212 pesakit telah dikumpulkan melalui persampelan bertujuan di hospital tentera di Semenanjung Malaysia. Model pengukuran dan model struktur dianalisis menggunakan SmartPLS. Dapatan pemodelan persamaan struktur mengesahkan bahawa tanggapan berfaedah oleh pesakit bertindak sebagai pembolehubah pengantara yang penting antara kualiti interaksi dan kepuasan pesakit. Keputusan ini menyokong konsep multi-dimensional tanggapan berfaedah oleh pesakit dan membantu pengamal dalam membangunkan program bantuan pelanggan untuk mengekalkan dan meningkatkan prestasi perkhidmatan hospital tentera.

Kata kunci: kualiti interaksi; tanggapan berfaedah oleh pesakit; kepuasan pesakit

1. Introduction

Military organization transformations, particularly in healthcare systems, have been significantly influenced by the modern polycentric world's geopolitical landscape (Zarudnitsky 2024). Recent geopolitical developments, such as U.S.-China tensions (Liu *et al.* 2025), the Russia-Ukraine conflict (Bas 2025), Middle East instability (Solehudin *et al.* 2025), global energy transition (Bashir *et al.* 2025), resource competition (Boutouala 2024), and Asia-Pacific tensions (Ahmad 2025), have driven these changes. In response, military leadership has initiated healthcare modernization efforts through various means: allocating unique health budgets (Torab-Miandoab *et al.* 2025), enhancing personnel readiness for austere environments (Gasko *et al.* 2025), providing comprehensive healthcare training (Lokyan *et al.* 2025), addressing pandemic and biodefence threats (Soyege *et al*. 2024), improving mental health services (Sharifian *et al.* 2025), fostering international collaborations (Tagarev & Fluri 2025), and addressing ethical considerations in military healthcare provision (van Baarle & van Baarle 2025). These initiatives aim to create more robust, adaptable, and ethically sound military healthcare systems that can meet the complex challenges posed by the current global geopolitical environment.

Modernizing military healthcare systems has provided significant benefits for military personnel, their families, and veterans, enabling them to enhance health maintenance, prevent injuries, and access specialized medical care. These improvements have increased service quality (Hariyadi *et al.* 2025; Widodo & Sundari 2025). Service quality studies have identified two primary categories of determinants affecting patient satisfaction in military healthcare: individual factors, such as demographics, personal characteristics, and socioeconomic status (House *et al*. 2022), and organizational aspects, including training, care quality, and efficiency (Farooq *et al*. 2020). While these determinants have been extensively studied, the influence of interactional quality has been comparatively underexplored (Ismail *et al*. 2024; Razak *et al*. 2022). According to the Service Quality Model (Grönroos 1984; Parasuraman *et al.* 1985), functional quality (the process of delivering the service to customers) plays a crucial role in achieving outcome quality (the result of the service provided to customers). Interactional quality is a crucial dimension of functional quality, highlighting that effective communication and positive interpersonal interactions between healthcare providers and patients are key drivers of enhancing healthcare system performance (Ismail *et al*. 2024; Razak *et al*. 2022).

Several scholars such as Mariana *et al*. (2020) and Pérez-Arechaederra *et al.* (2025) studied interactional quality practices at five of the most successful military hospitals around the world, including Walter Reed National Military Medical Center (USA), Landstuhl Regional Medical Center (Germany), Royal Centre for Defence Medicine (UK), Australian Defence Force Hospital (Australia) and Singapore General Hospital (Singapore). These hospitals have demonstrated interactional quality by enhancing healthcare providers' communication skills, involving patients in care decisions, facilitating interdisciplinary collaboration, developing empathetic skills, providing support services, promoting cultural competence, and offering telehealth services. As a result, adopting these quality systems has improved patient outcomes and elevated the hospitals' status to world-class.

Recent meta-analyses of military health organizations highlight that adequate interactional quality is essential for healthcare systems to achieve their objectives, regardless of their design (Ismail *et al*. 2024; Razak *et al*. 2022). Interactional quality, characterized by responsiveness, assurance, and empathy in patient interactions, enhances patients' perceived value of military healthcare services (Mariana *et al*. 2020; Pérez-Arechaederra *et al*. 2025). Notably, 21st century empirical studies on military healthcare systems suggest that the relationship between interactional quality and patients' perceived value may contribute to higher patient satisfaction

(Mariana *et al*. 2020; Razak *et al*. 2022). However, numerous previous studies have been done, and the effect size and nature of interactional quality as a mediating variable remain underexplored in the military hospital research literature (Mariana *et al*. 2020). This gap in previous research has inspired the researchers to quantify the mediating role of patients' perceived value in the relationship between interactional quality and patient satisfaction.

Researchers have identified several reasons for the existing gaps. Firstly, many studies have focused on describing the features of interactional quality without thoroughly exploring its effects (Thomas & Turner 2025). Secondly, numerous studies have employed direct effects models to analyze the correlation between cause and manifest constructs: a) between interactional quality and patients' perceived value, and b) between patients' perceived value and patient satisfaction (Razak *et al*. 2022; El Garem *et al*. 2024). These correlations have been extensively measured using simple statistical analyses such as descriptive statistics and bivariate analysis. However, the results have failed to highlight the mediating effect of patients' perceived value in model testing (Ismail *et al*. 2024; Razak *et al*. 2022). Finally, military practitioners have raised concerns about the applicability of existing research, as it predominantly focuses on developed countries with global power ambitions (Cullen *et al.* 2024; Gross 2024), Western military hospital needs (Stathakarou *et al*. 2024; Frassini 2024), or conflict-prone geopolitical regions (Naamati-Schneider *et al.* 2024; Haque *et al.* 2024). This focus has led to general recommendations that may not adequately address the multifaceted nature of perceived value or provide guidance for enhancing service performance in various military hospital management contexts (Ismail *et al*. 2024). Consequently, there is an urgent need to evaluate the mediating role of patients' perceived value in the relationship between interactional quality and patient satisfaction.

2. Literature Review

2.1. *Interactional quality*

Interactional quality, in other words, refers to quality communication, which is defined as receiving or exchanging information, opinions, or ideas by writing, speech, or visual means. Quality communication helps improve operational efficiency and prevent organizational dissatisfaction (Rauf *et al.* 2021; Rauf *et al.* 2018). In the context of service, it is usually interpreted from the customer's perspective. Interaction quality emerges when customers perceive that they are well-served by the service staff and that the service staff can meet their needs through professionalism and efficient service (An *et al.* 2023). In the service context, it refers to customers who perceive their needs and expectations as being met when interacting with service providers. According to the SERVQUAL Model (Parasuraman *et al.* 1985; 1988), interactional quality comprises three essential dimensions: responsiveness, assurance, and empathy. In military healthcare systems, these dimensions are applied through various initiatives to address a wide range of patient needs, from routine care to specialized services and mental health support. For example, responsiveness is often demonstrated through the development of health surveillance systems for disaster response, the implementation of HIV prevention programs (Ibu & Mhlongo 2023), the provision of mental health support and telemedicine services (O'Shea *et al.* 2024), improvements in hospital management for quality and safety (Markazi-Moghaddam *et al.* 2024), the creation of telehealth solutions for pandemic response (Pomer *et al.* 2024), and the enhancement of veterans' healthcare services, particularly for women (Schafer *et al.* 2024).

Whereas, assurance is referred to the knowledge and courtesy of the employee and their abilities to inspire confidence, by forming a partnership between Sierra Leone of non-

governmental organizations and the UK Joint Inter-Agency Taskforce, the UK Defense Medical Services, and the Republic of Sierra Leone Armed Forces to train workers use standard operating procedures to upscale Ebola treatments (Naoum *et al.* 2021), integrating military health surveillance system in the national health system to enhance decision making relating to health and treatment measures during natural disasters (Ibu & Mhlongo 2023), using a military global health engagement programs to reduce malaria and other vector borne diseases in the Pacific and Southeast Asia (Huang *et al.* 2024), creating electronic word-of-mouth to address complaints in improving service performance (Jalloh & Round 2024), and implementing the unification of clinical pathology services to standardize quality management processes, increase resource exchange and sharing, and facilitate cooperative contingency plans to improve military medicine (Olson *et al*. 2023). Thus, empathy is related to employees showing care and person-centeredness by knowing patients' condition, perspective, and feelings, and using effective communication and building a better interpersonal relationship in treatments, providing therapeutic religion by military chaplains to soldiers while they are transitioning to civilian life, stimulating dialogue and existential engagement, and aiding their physical healing (Chamberlin *et al.* 2023), putting into light patients who suffer from distress and injury and need to let go of their aggressiveness (Gantiva *et al.* 2023; Gettings *et al.* 2022), teaching survival skills in order not to experience patients' depression, fear, and anxiety due to work-related stress situations and taking care of coronavirus-infected patients (Engel *et al.* 2023), providing personal and cognitive support, active listening, response style, advice giving, and prescribing of therapeutic exercises to treat trauma and stress-related conditions, especially during wars (Parvin *et al.* 2024), helping military veterans who suffer from loneliness, social isolation, and mental illness (Larsson *et al.* 2024).

2.2. *Patient satisfaction*

It refers to the extent to which patients perceive that the outcomes and processes of health services meet their needs and expectations (Kalaja 2023). Patient satisfaction is influenced by multiple factors, including physicians, staff, treatment, diagnostic facilities, availability of medication, and the quality management of the healthcare system (Naroliya *et al.* 2024). In military healthcare contexts, patient satisfaction encompasses various aspects, such as contentment with strategies to improve service availability and timeliness (Abiero *et al*. 2020), satisfaction with appointment and treatment promptness (Razak *et al*. 2022), accessibility of healthcare facilities for service members in remote or deployed locations (Albaqami & Alshagrawi 2025), satisfaction with insurance and benefits affecting healthcare access for military personnel and their families (Tomas & Kandjimi 2025), and the effectiveness of patient navigation in improving access to healthcare services (Lindsey *et al.* 2023). These diverse facets help fulfill patients' needs, potentially increasing patient satisfaction with healthcare service systems.

2.3. *Patients' perceived value*

It is often based on their subjective judgment of the benefits versus the costs associated with healthcare services. They find healthcare services valuable when the benefits, such as service delivery, health outcomes, quality of life, and accessibility, outweigh the costs, including financial expenses, time, and convenience (Yaltagil 2024). In the military healthcare systems, critical features of perceived value emphasize convenience, accessibility, and timely care. They are often practiced by performing technology-based remote consultations, reducing wait times, effective communication and trust in healthcare providers (Olapeju *et al*. 2023), providing better access to mental health services and treatments (Larsson *et al*. 2024), offering specialized

care for military-related injuries (van der Wal *et al*. 2024), providing medical or chiropractic care for patients with low back pain (Hays *et al.* 2023), delivering timely care, and ensuring continuity of care for active duty personnel and their families in remote areas (Cantor & Tong 2023), introducing telehealth and telemedicine to increase access for specialized care (Anggrahito & Hutabarat 2025), and decreasing random wait times, increasing access to services, continuity of care, and practicing effective cultural interactions to meet patient needs (Larsson *et al*. 2024). These various healthcare services will benefit patients, potentially upgrading their perceptions of the value of military healthcare services.

2.4. *Relationship between interactional quality and patient outcomes*

Interactional quality is a vital component of service quality theory. The Service Quality Model by Grönroos (1984), the SERVQUAL Model by Parasuraman *et al.* (1985; 1988), and the SERVPERFORM Model by Cronin and Taylor (1992) all suggest that interactional quality consists of three main dimensions: responsiveness, assurance, and empathy. These dimensions are crucial in helping service providers achieve positive customer outcomes. Application of these theories in military healthcare systems reveals that interactional quality is often interpreted as an essential antecedent of customer outcomes, such as patients' perceived value (Hays *et al.* 2023) and patient satisfaction (Albaqami & Alshagrawi 2025).

2.4.1. Interactional quality and patients' perceived value

Interactional quality has been acknowledged as a determinant of patients' perceived value. Recent meta-analysis studies in military healthcare management reveal that interactional quality consists of significant features: First, employees often implement responsiveness by responding promptly, addressing patients' needs and concerns, demonstrating professionalism and competence, acting quickly in urgent or high-pressure situations, exhibiting eagerness and availability to support patients, offering solutions to patients' needs and delivering timely information on patients' care plan, treatment progress, and any medical decisions (Anggrahito & Hutabarat 2025).

Second, employees typically practice assurance by communicating reliable information, building confidence and calmness, keeping promises, demonstrating a high level of technical competence, remaining trustworthy, honest, and ethical during crises, providing a high level of care to patients requiring specialized treatments, giving clear explanations about medical conditions and treatment options, and providing prompt feedback to meet patients' requests and reduce distress (Anggrahito & Hutabarat 2025).

Third, workers usually exhibit empathy by acknowledging and responding to patients' emotional needs, understanding and sharing their emotional and psychological experiences, showing genuine concern for patients who have undergone psychological trauma or serious physical injury, providing sympathetic care, listening attentively to patients' problems, and giving them time and space to express their health issues, recognizing each patient as an individual, tailoring care to meet their unique emotional and physical needs, understanding patients' emotional states and respond appropriately, using body language such as eye contact, gestures, and tone of voice in dealing with patients to create understanding, calmness, and warmth (Anggrahito & Hutabarat 2025). The competence of employees in integrating such interaction quality features has led to higher patients' perceived value of military healthcare services (Hays *et al.* 2023). Thus, we hypothesize that:

H1: There is a positive association between responsiveness and patients' perceived value
H2: There is a positive association between assurance and patients' perceived value
H3: There is a positive association between empathy and patients' perceived value

2.4.2. *Interactional quality and patient satisfaction*

Interactional quality is a crucial factor in enhancing patient satisfaction. A systematic literature review of military healthcare acknowledges that quality of interaction has three essential dimensions: First, employees always practice responsiveness by expediting the delivery of care and paying more attention to patients who require urgent care without delay, such as patients with combat injuries, trauma, high-stress medical conditions, time-sensitive situations, and traumatic injuries (Albaqami & Alshagrawi 2025).

Second, employees usually execute assurance by using empathetic listening to patients' concerns, using their knowledge and expertise to provide personalized care specifically to patients with physical injuries, complex trauma, or psychological trauma, and exhibiting their respect, safety, trust, and confidence in delivering treatments for patients in extraordinary stress situations (Albaqami & Alshagrawi 2025).

Third, employees often practice empathy by understanding and sharing with their patients who are experiencing complex emotional and physical conditions under high-stress conditions, providing personalized care, seeing the patient's diverse cultural nuances, being sensitive to the patient's needs and devoting time to listening attentively to the patient's concerns, engendering patient trust, being kind and compassionate to patients experiencing unique stress, anxiety, isolation, and other military-related health issues, and adopting a holistic approach to treat many aspects of patient care (Parvin *et al.* 2024). Such an interactional style, if implemented, can further enhance patient satisfaction levels with military healthcare systems (Albaqami & Alshagrawi 2025; Clark *et al.* 2024). Based on the above, we propose:

H4: Responsiveness is positively related to patient satisfaction
H5: Assurance is positively related to patient satisfaction
H6: Empathy is positively related to patient satisfaction

2.7. *Patients' perceived value as a mediating variable*

Perceived value is a crucial aspect of the customer value theory. For example, the Expectation-Disconfirmation Theory, as proposed by Oliver (1980), suggests that a service delivered to meet or exceed expectations increases the perceived value of the service to its customers. On the other hand, the Customer Value Model by Zeithaml (1988) postulates that the cost of a service is comparatively lower than its benefits, which may raise customers' perceived value. Furthermore, the Functional-Value and Emotional-Value Model proposed by Sweeney and Soutar (2001) suggests that a service's perceived functional and emotional benefits can enhance customers' perceived value. Applying these theories within an interactional quality context shows that the essence of expectation-disconfirmation, customer value, and functional and emotional value is often defined as the perceived value (Eaglehouse *et al.* 2025; Emary *et al.* 2025).

Perceived value is widely recognized as an essential antecedent of patient satisfaction in previous studies. Patients often demonstrate the value of military healthcare services in various ways, such as recognizing the importance of using Acceptance and Commitment Therapy to enhance their psychological flexibility, resilience, and mental health (Wang *et al.* 2025). They recognize the contribution of electronic health records in saving costs, improving care, increasing user satisfaction, enhancing patient safety, and reducing medical errors (Torab-

Miandoab *et al.* 2025). They recognize the benefits of equal access for pancreatic cancer patients to receive proper diagnoses and treatments (Eaglehouse *et al.* 2025). They recognized the value of electronic service management information systems and therapeutic communication in monitoring service quality to enhance patient satisfaction (Setyanto & Arafah 2025). They also appreciate the timely care provided to patients with chronic low back pain, which enables them to receive better treatments (Emary *et al.* 2025). Therefore, recent studies have shown that when patients perceive healthcare services as high quality, convenient, and/or cost-effective, it can lead to higher patient satisfaction (Mariana *et al*. 2020; Pérez-Arechaederra *et al*. 2025).

Additional studies support the notion that perceived value serves as a crucial link between interactional quality and patient satisfaction. For instance, Anggrahito and Hutabarat (2025) collected 600 data points from active-duty personnel at various military hospitals. They found that employees' competence in implementing responsiveness (responding promptly to patients), assurance (demonstrating professionalism, competence, and a reliable understanding of the care process), and empathy (understanding and sharing the patient's feelings, fostering emotional support, and strengthening the patient-provider relationship) had strongly influenced patients' perceived value (the benefits patients received relative to the costs of using healthcare services). This perception, in turn, could lead to greater patient satisfaction. Meanwhile, Razak *et al*. (2022) studied 500 military patients in an army hospital. They reported that the willingness of employees to implement responsiveness (quick response times and timely communication), assurance (competence to create trust and professionalism), and empathy (showing care and concern beyond the medical procedures) had powerfully evoked patients' perceived value of healthcare services (gained benefits from medical treatments and emotional supports), which in turn could result in higher patient satisfaction. Thus, we hypothesize that:

H7: Interactional quality is positively related to patient satisfaction
H8: Patients' perceived value mediates the relationship between responsiveness and patient satisfaction
H9: Patients' perceived value mediates the relationship between assurance and patient satisfaction
H10: Patients' perceived value mediates the relationship between empathy and patient satisfaction

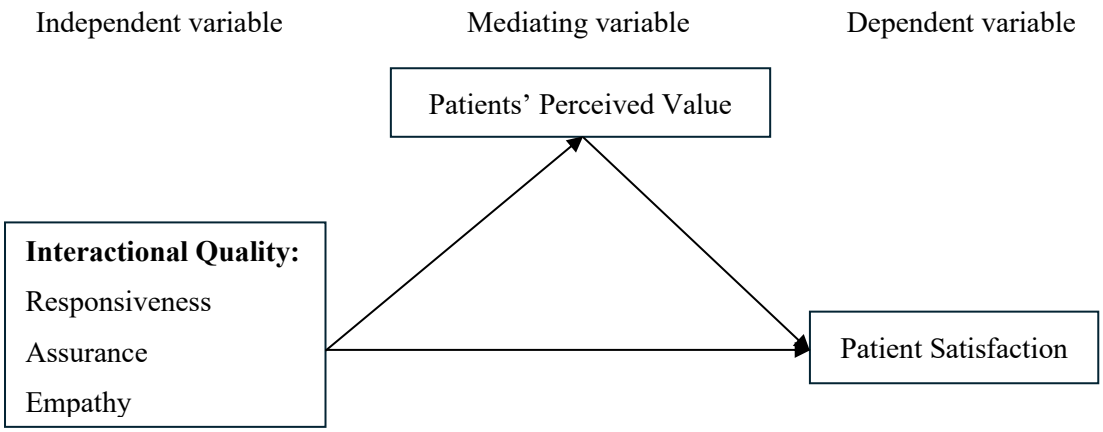

Figure 1: Conceptual framework

3. Methodology

3.1. *Patient satisfaction*

Cross-sectional research is used to collect data using survey questionnaires. This method may help researchers collect relevant, non-biased, and high-quality data (Sekaran & Bougie 2016).

The context of this study is armed forces hospitals established by the Malaysian federal government to maintain the healthcare and well-being of military personnel, their families, veterans, and civilians employed by the Ministry of Defence (Aljunid & Kamarruddin 2023). The mission of these hospitals is to conserve the fighting strength of the Malaysian Armed Forces by providing comprehensive medical support and maintaining combat readiness, enhancing disaster medicine services, and equipping the hospitals with state-of-the-art diagnostic and therapeutic facilities and the latest advanced medical equipment, as well as supplying special instruments for underwater and hyperbaric medicines to treat diving-related injuries (Almanac Malaysia 2025).

Awang *et al.* (2023) state that quality of health coverage is a basic need desired by people at the national, state, institutional, and community levels. To address this need, the Ministry of Health Malaysia, in collaboration with the World Health Organization, has developed Malaysia's new 5-year National Policy for Quality in Healthcare. As an essential player in this system, the Ministry of Defence Malaysia has adopted the plan's content to strengthen its commitment to improving health outcomes and reducing waste in the armed forces' healthcare system. The Ministry of Defence has adopted 10 key focus areas of the plan to improve health aspects: 1) people-centered care; 2) governance and organizational structure; 3) resource allocation; 4) internalizing a quality culture among all healthcare staff; 5) communication and engagement with stakeholders; 6) knowledge exchange, communication, and coordination among programs; 7) workforce competency and capability; 8) health management information, quality monitoring, and feedback systems; 9) quality indicators and core measures; and 10) monitoring and evaluation of quality initiatives.

These critical health aspects have become an essential indicator for the Malaysian Ministry of Defence in formulating the Malaysian Armed Forces Health Service Transformation Plan 2017-2020. This transformation plan is designed to enhance the quality of health services beyond patient satisfaction, aligning with health and active living (Aljunid & Kamarruddin 2023). To achieve this goal, the leadership of the Malaysian military hospital has invited internal and external experts to design a professional development program that aims to equip employees with professional standards. This initiative is essential for promoting quality interactions between patients and staff providers through responsiveness, reassurance, and empathy. It aims to treat patients experiencing post-traumatic stress disorder, other stress-related conditions, recovery from trauma, or combat-related stress.

In Malaysian military hospitals, for example, responsiveness is usually practiced by providing immediate disease prevention, health education, and continuity of healthcare services during disasters (Ma *et al.* 2024), helping patients to get better healthcare treatments (Ismail *et al.* 2024) and responding immediately to assess the needs of victims in urban disasters to improve their health (Abdul Salam *et al.* 2024). Assurance is frequently done by training employees to treat patients flexibly and innovatively while practicing medical ethics (Kamarruddin *et al.* 2020), demonstrating telemedicine, tele-Medicaid, and courtesy in medical treatments (Ismail *et al.* 2024), and practicing intraoral radiographs to diagnose and treat oral health behavior of naval personnel (Nik Azis *et al.* 2025). Hence, empathy is often exhibited by providing unique treatments, corrective surgeries, special clinical examinations, procedures, and transportation for trauma patients, paying personal attention to individual patients (Ismail

et al. 2024), and prioritizing the promotion of health and disease prevention for army personnel involved in behaviors that compromise health and oral health (Azil *et al.* 2023).

The implementation of such interaction styles simultaneously in military healthcare services has led to positive patient attitudes, as evidenced by increased perceived value (Aljunid & Kamarruddin 2023) and improved patient satisfaction (Ismail *et al.* 2024). This result is interesting; however, the mediating role of patients' perceived value in the relationship between such constructs has been neglected in the Malaysian military healthcare system. Given the inadequacy of existing studies, it is imperative to discover this relationship further within the study context.

3.2. *Measurement*

The survey questionnaire was developed based on the research literature on interactional quality. Next, the back translation method was employed to translate the survey questionnaire from English to Malay and then back from Malay to English. This method can accurately preserve the meaning of the original content, minimize cultural bias and misinterpretation, ensure that the measured constructs are understood in the same way in both the source and target languages, and reduce the risk of measurement bias (Brislin 1970). The survey questionnaire has three parts. First, there are three dimensions of interactional quality: responsiveness (RPONSE), assurance (SURANC), and empathy (EPATHY). RPONSE consists of 7 items adapted from the military healthcare literature on responsiveness (van der Wal *et al*. 2024). The dimensions of this variable include access to care, timeliness of care, communication, and information, as well as the competence and professionalism of employees. SURANC comprises 11 items adapted from the military healthcare literature on assurance (Olapeju *et al*. 2023). EPATHY consists of 7 items adapted from the military healthcare literature on empathy (Olapeju *et al*. 2023). Second, patients' perceived value (PVALUE) has nine items adapted from patients' perceived value of military healthcare systems (Olapeju *et al*. 2023; van der Wal *et al*. 2024). Third, patient satisfaction (PSATIS) consists of 6 items adapted from the patient satisfaction literature in military healthcare (van der Wal *et al*. 2024). Finally, all items were evaluated using a 7-point Likert scale, with responses ranging from "Strongly Disagree/Dissatisfaction" (1) to "Strongly Agree/Satisfaction" (7). Respondents' backgrounds were used as control variables, given the study's focus on patient attitudes.

3.3. *Sample*

The target population consisted of patients at a military hospital in Peninsular Malaysia. A purposive sampling technique was employed to distribute the survey to 500 individuals, including army personnel, family members, veterans, and employees of the Malaysian Ministry of Defense. This sampling method was chosen because management did not provide a complete list of patient information, which prevented the researchers from using a random technique to select respondents. Of the number, 208 (41.6%) usable questionnaires were returned. Respondents completed the survey voluntarily, with their consent, and under the assurance of confidentiality.

3.5. *Data analysis*

The SmartPLS was used to analyze the survey questionnaires following the guidelines provided by Hair *et al.* (2017). This program can explore and predict complex concepts using non-normal, categorical, and/or ordinal data, as well as small sample sizes (Hair *et al.* 2017). The data analysis procedure consists of two primary stages. First, the measurement model is

assessed using the PLS Algorithm to ensure the validity and reliability of the instrument. Next, the structural model is tested using Bootstrapping, Blindfolding, PLS prediction, and Importance-Performance Map Analysis (IPMA) (Hair *et al.* 2017).

4. Results

4.1. *Measurement model*

The PLS Algorithm tested the reliability and validity of the measurement scale. Table 1 shows that the outer loadings for the study constructs exceed 0.70 (Henseler *et al.* 2009), and the average extracted variance (AVE) values exceed 0.5 (Hair *et al.* 2017), indicating that the constructs meet the standards for convergent validity. Additionally, the composite reliability values exceed 0.8 (Hair *et al.* 2017), indicating high internal consistency.

Table 1: Convergent validity and composite reliability

Construct	Outer Loading	AVE	CR
RPONSE.		0.767	0.958
1. employees respond quickly and effectively in emergency situations.	0.888		
2. employees provide support when patients need medical treatments.	0.898		
3. employees anticipate patients' needs and provide assistance before they ask.	0.797		
4. employees address patients' medical concerns and problems in a timely manner.	0.896		
5. employees are able to adjust an appointment schedule for patients in a reasonable time frame without unnecessary delays.	0.845		
6. employees clearly communicate the next steps in patients' treatments and provide timely updates on their conditions.	0.906		
7. employees always try their best to help patients.	0.893		
SURANC.		0.689	0.961
1. employees have the knowledge to answer patients' medical questions.	0.814		
2. employees make me feel confident that patients' needs will be met.	0.800		
3. employees act in a professional manner when interacting with patients.	0.870		
4. employees deliver health information on their promises.	0.846		
5. employees treat patients with respect and courtesy.	0.856		
6. employees clearly explain the services offered and their processes.	0.843		
7. employees have abilities that are appropriate for the tasks performed.	0.739		
8. employees are given freedom to make important decisions.	0.787		
9. doctors and nurses provide the best care for their health.	0.845		
10. employees show respect for patients' background and understand the unique challenges they face.	0.852		
11. medical staff have the specialized knowledge needed to address military-specific health issues.	0.869		
EPATHY. Patients evaluate that		0.698	0.961
1.employees provide clear explanations about treatment.	0.799		
2.employees give individual attention.	0.851		
3.Employees provide operating hours that are convenient for patients	0.860		
4.employees never ignore patients' needs.	0.909		
5.employees understand specific patients' needs.	0.886		
6. this hospital offers the best services.	0.774		
8. employees always apologize for every time they make mistakes.	0.755		
PVALUE.		0.772	0.951
1. the medical care patients received was worth the time and resources invested.	0.842		
2. the value of the care patients received justifies any waiting time or administrative steps.	0.807		
3. the healthcare benefits provided were cost-effective.	0.924		
4. patients received medical treatments that met their needs.	0.875		

Table 1 (continued)			
5. patients received medical treatments that were thorough and comprehensive.	0.887		
6. employees were knowledgeable and skilled.	0.883		
7. employees were committed to assist them.	0.892		
8. employees delivered clearly the information about patients' diagnoses and treatments.	0.882		
9. employees handled healthcare services efficiently	0.867		
PSATIS.		0.763	0.967
1. the medical facilities offered at this hospital.	0.904		
2. the hospital environment is clean, comfortable, and conducive to patient recovery.	0.892		
3. the medical treatment received met patients' expectations.	0.891		
4. the ability of employees to provide services as promised.	0.805		
5. the employees practiced respectful, courteous, and professional attitudes.	0.915		
6. the operating hours of this hospital.	0.860		

Note. CR = Composite reliability

Table 2 shows that the Heterotrait-Monotrait Ratio of Correlations (HTMT) values for the study constructs are below 0.85, and the confidence interval values in parentheses are below 1.0, indicating that the constructs meet the criteria for discriminant validity (Hair *et al.* 2017; Henseler *et al.* 2009).

Table 2: Discriminant validity

Constructs	RPONSE	SURANC	EPATHY	PVALUE
PVALUE	0.603 (0.019, 0.356)	0.682 (0.203, 0.591)	0.569 (0.063, 0.391)	0.569 (0.063, 0.391)
PSATIS	0.439 (0.461, 0.016)	0.642 (0.095, 0.558)	0.730 (0.324, 0.602)	0.672 (0.128, 0.426)

According to Table 3, the mean values of the study constructs range from 4.6258 to 5.1456, indicating that respondents' perceptions of the constructs vary from high (4) to highest (7). Additionally, the VIF values for the study constructs are below 5.0, suggesting that collinearity is absent in the study sample (Hair *et al.* 2017).

Table 3: Variance inflation factor and descriptive statistics

Construct	Mean	Standard Deviation	Variance Inflation Factor	
			PVALUE	PSATIS
RPONSE	5.1456	1.03712	2.139	2.208
SURANC	4.8934	1.11987	2.286	2.579
EPATHY	4.9739	1.05264	1.431	1.546
PVALUE	4.6258	1.13125		
PSATIS	4.8061	1.17694		

4.2. *Structural model*

The results of testing the structural model, based on Hair *et al.* (2017), revealed three key findings: Firstly, the root mean square residual value is 0.075, which is smaller than 0.10, hence indicating a good fit model. Secondly, the effect size test reveals that the relationship between RPONSE and PVALUE has an f2 value of 0.032, which falls within the range of 0.15 to 0.35, indicating a medium effect of RPONSE on PVALUE. For the relationship between RPONSE and PSATIS, the f2 value is 0.127, which is greater than 0.02 but less than 0.15, showing a

weak effect of RPONSE on PSATIS. Similarly, the f2 value of 0.127 for the relationship between SURANC and PVALUE is above 0.02 and below 0.15, indicating a weak effect of SURANC on PVALUE. EPATHY has a medium effect on PVALUE, with an f2 value of 0.080, which is higher than 0.02 but lower than 0.15. The effect of EPATHY on PSATIS is significant, with an f2 value of 0.370, indicating a strong effect on PSATIS. Finally, the f2 value for the relationship between PVALUE and PSATIS is 0.119, which falls between 0.02 and 0.15, indicating a weak effect of PVALUE on PSATIS. Lastly, according to the blindfolding test, the Q2 values for PVALUE (Q2 = 0.373) and PSATIS (Q2 = 0.470) are greater than zero, indicating predictive relevance.

Table 4 presents the Q^2-predict values for all PLS-SEM and LM RMSE items, ranging from 0.240 to 0.491 and 0.200 to 0.562, respectively. This suggests that the prediction errors for the models follow a J-shaped symmetric distribution. Furthermore, the PLS-SEM values exhibit less prediction error than the LM RMSE values, indicating that this model has low predictive power (Shmueli *et al.* 2019).

Table 4: Predictive relevance

Items	PLS SEM	LM RMSE	PLS SEM - LM RMSE	LM RMSE – PLS SEM
H3	1.026	1.033	-0.007	0.007
H4	1.006	1.084	-0.078	0.078
H5	1.101	1.204	-0.103	0.103
H6	1.131	1.109	0.022	-0.022
H7	0.939	1.002	-0.063	0.063
H8	1.024	1.096	-0.072	0.072
F1	0.928	0.894	0.034	-0.034
F2	1.071	0.945	0.126	-0.126
F3	0.932	0.864	0.068	-0.068
F4	0.893	0.904	-0.011	0.011
F5	1.064	0.958	0.106	-0.106
F6	1.124	1.066	0.058	-0.058
F7	1.087	0.990	0.097	-0.097
F8	1.065	1.038	0.027	-0.027
F9	1.091	1.119	-0.028	0.028

From Table 5, based on Cohen (1988), it is observed that RPONSE, SURANCE, and EPATHY contribute 49% to the variance of PVALUE. The magnitude of this result exceeds 0.26, indicating a substantial effect size for the model. Similarly, RPONSE, SURANCE, and EPATHY explain 59% of the variance in PSATIS, with a magnitude greater than 0.26, signifying a large effect size. Additionally, PVALUE contributes 42% to the variance of PSATIS, a value greater than 0.26, indicating a substantial effect. Furthermore, RPONSE, SURANCE, EPATHY, and PVALUE together explain 41% of the variance in PSATIS, a value also larger than 0.26, signifying a huge effect.

The hypothesis testing reveals four important results: First, H1 (B=0.187; t=2.230), H2 (B=0.386; t=3.860), and H3 (B=0.242; t=3.045) are supported, respectively. This result shows

that RPONSE, SURANC, and EPATHY are determinants of PVALUE. Second, H4 (B=0.197; t=1.972), H5 (B=0.328; t=3.025) and H6 (B=0.461; t=6.693) are supported, respectively. This result indicates that RPONSE, SURANC, and EPATHY are antecedents of PSATIS. Third, H7 (B = 0.294; t = 3.695) is supported. This result indicates that PSATIS predicts PVALUE. Finally, H8: (B=0.642; t=11.961), H9: (B=0.642; t=12.539) and H10: (B=0.642; t=11.503) are supported, respectively. This result displays that PVALUE mediates the effect of RPONSE, SURANC, and EPATHY on PSATIS.

Table 5: Results of testing the hypotheses

Hypothesis	Beta	T-Statistics	R2	Decision
H1: RPONSE → PVALUE	0.187	2.230	0.489	Moderate Effect
H2: SURANC → PVALUE	0.386	3.860		Large Effect
H3: EPATHY → PVALUE	0.242	3.045		Large Effect
H4: RPONSE → PSATIS	0.197	1.972	0.593	Large Effect
H5: SURANC → PSATIS	0.328	3.025		Large Effect
H6: EPATHY → PSATIS	0.461	6.693		Large Effect
H7: PVALUE → PSATIS	0.294	3.695	0.415	Large Effect
H8: RPONSE → PVALUE → PSATIS	0.642	11.961	0.412	Large Effect
H9: SURANC → PVALUE → PSATIS	0.642	12.539		Large Effect
H10: EPATHY → PVALUE → PSATIS	0.642	11.503		Large Effect

Note. Significant value at * t > 1.97

Finally, the IPMA test reveals that interactional quality performs the highest, at 64.710, followed by CSATIS at 63.525 and PVALUE at 60.427. This test identifies PVALUE as the critical management issue that practitioners must address.

5. Discussion

The study also highlights that patients' perceived value is the mediating variable between interactional quality and patient satisfaction. In the organizational sample, leadership has developed plans for structured and unstructured training modes to help managers, supervisors, and front-line staff improve patient interactions by promoting responsiveness, assurance, and empathy in healthcare services. Implementing such interactions is an essential means of fulfilling the expectations of their hospitals' vision, missions, and goals.

Most respondents perceive high responsiveness, assurance, empathy, patients' perceived value, and patient satisfaction. This finding suggests that employees' competence in effectively executing these quality characteristics in healthcare services will significantly influence patients' perceived value, leading to higher patient satisfaction.

The present study makes three significant contributions: theoretical, methodological robustness in research, and practical implications. This study identifies three essential findings in the case of a theoretical contribution. First, responsiveness, assurance, and empathy significantly predict patients' perceived value and satisfaction. These results are consistent with the notion of the Service Quality Model by Grönroos (1984), the SERVQUAL Model by Parasuraman *et al.* (1985; 1988), and the SERVPERFORM Model by Cronin and Taylor (1992), which suggest that the competence of service providers such as employees to practice responsiveness (responding to customer needs and requests, assisting customers promptly, and

responding quickly), assurance (using competence, knowledge, courtesy, and professionalism in performing duties), and empathy (understanding customer needs and emotions, and offering personalized and attentive service) in delivering services can enhance positive customer outcomes. The main idea of these theories has received backing from previous military healthcare system studies, which acknowledge that employees' ability to simultaneously implement responsiveness, assurance, and empathy in providing healthcare services can lead to higher patients' perceived value (van der Wal *et al*. 2024) and patient satisfaction (Kokcu 2020).

Second, patients' perceived value is an essential determinant of patient satisfaction. This finding receives strong support from prior studies on the military healthcare system, which indicate that when patients perceive value in military healthcare services, it can drive greater patient satisfaction (Mariana *et al*. 2020; Pérez-Arechaederra *et al*. 2025).

Third, patients' perceived value mediates the relationship between interactional quality and patient satisfaction. The result has supported the key argument of the Expectation-Disconfirmation Theory by Oliver (1980), the Customer Value Model by Zeithaml (1988), and the Functional-Value and Emotional-Value Model by Sweeney and Soutar (2001), which explain that customers' perceived value will emerge when the service providers such as employees meets or exceeds their expectations, offers more benefits than costs, and provides emotional and functional advantages in service delivery. This perception can significantly contribute to positive customer outcomes. The broad proposition of these theories has been supported by previous research on military healthcare systems, which reveals that the capability of employees to interact with patients by implementing responsiveness, assurance, and empathy will enhance patients' perceived value of healthcare services. As a result, this perception can lead to greater patient satisfaction (Razak *et al*. 2022). Regarding the robustness of the research methodology, the measurement scale developed for this study has successfully passed the reliability and validity standards, ensuring that it can generate accurate and reliable research findings.

The IPMA results identify that patients' perceived value is the weakest performance in the relationship between latent constructs in the research framework. It has been a key challenge for practitioners to prioritize improving the effectiveness of military hospital service systems. Suppose the patients' perceived value is ignored in the military hospital services. In that case, this will lower their perceived value of the hospital services, which, in turn, may result in lower patient satisfaction. To address this problem, top management should focus on the strategic aspects: First employees should communicate transparently with patients about their health issues, including diagnosis, treatment options, post-traumatic stress disorder treatments, and care plans. This communication may increase patients' understanding, trust, and appreciation of the military healthcare services.

Second, healthcare education programs should be offered to increase patient knowledge about medical treatments related to chronic diseases, such as musculoskeletal injuries, treatments for post-traumatic stress disorder, traumatic brain injury, best practices, available treatment options, and the overall healthcare system. This educational program can encourage patients to take control of their health, see the benefits of the healthcare system, and increase their satisfaction with military health services.

Third, healthcare plans should be developed to integrate psychological therapies, stress management techniques, and physiological treatments, ensuring they meet the patient's background, needs, priorities, and objectives. This care plan may encourage patients to actively participate in the treatment process and increase their confidence in the military healthcare system.

Fourth, advanced medical technologies and innovative solutions, such as telehealth, telemedicine, and mobile applications, should be further developed to provide more effective treatment and healthcare plans. These modernization initiatives in military healthcare systems can provide patients in remote or deployed locations with greater access and convenience, enabling them to consult specialists in real-time and receive timely interventions through improved monitoring and diagnostics.

Fifthly, the families of military personnel should be actively involved in the healthcare delivery process. Offering family counseling and health education programs can help them recognize the signs and symptoms of various stress disorders, understand available treatment options, and encourage collaboration between military personnel and their families to improve overall health and well-being. Ultimately, the commitment of military leadership is crucial for enhancing research on diseases and developing effective rehabilitation methods to address physical and mental health issues. This initiative may help patients improve their health, safety, and ability to meet daily obligations. If these suggestions receive heavy attention, this may enhance the productivity and quality of military healthcare systems.

6. Conclusion

The conceptual framework of this study was developed based on the interactional quality literature. The measurement model confirms that the study instrument meets the criteria for validity and reliability analysis. Structural equation modeling reveals that the effects of responsiveness, assurance, and empathy on patient satisfaction are mediated by patients' perceived value of the healthcare service. The results of this study are consistent with and have extended previous studies published primarily in Western and Asian countries. This study further suggests that employees' ability to implement interaction quality can lead to positive patient outcomes, including increased trust and engagement. Hence, this positive outcome may help maintain and improve the overall effectiveness of military healthcare systems in times of globalization and unpredictable security.

This study provides valuable insights for future research. First, respondents' backgrounds, including gender, age, marital status, and patient type, should be included in future research to understand the similarities and differences in their perceptions of the study model. Second, longitudinal studies can be utilized in future research to examine changes or developments within specific groups and identify trends, causal relationships, and long-term patterns.

Third, the performance of the study framework can be clearly understood if tested in different healthcare contexts, such as public, private, and military hospitals. Fourth, other indicators of interaction quality, such as interpersonal communication and honesty, should be considered in future research, as they are broadly related to patient outcomes. Fifth, patient outcome types, such as trust, engagement, and safety, should be used in future research because they are widely discussed in the interaction quality literature. Finally, other mediating constructs, such as self-efficacy and management support, should be further investigated, as they have been identified as essential links between interactional quality and patient outcomes. The above suggestions should be further explored to improve future research.

Acknowledgments

The authors thank the Graduate School of Business, Universiti Kebangsaan Malaysia (GSB-2025-017), UUCKL, UiTM (Pahang Campus), and the research respondents for their support of this research.

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Received: 12 December 2024
Accepted: 23 May 2025

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