





Hospital Work Conditions and the Mediation Role of Burnout: Residents and Practising Physicians Reporting Adverse Events

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Background: “Patient Safety” in everyday practices is a target of healthcare leaders, and adverse events reported by healthcare providers directly reflect patient safety in the health system. Recognising how residents and practising physicians rate adverse events concerning their work conditions and burnout must be explored.

Objective: This study aims to explore the mediation effect of burnout dimensions (emotional exhaustion and burnout-interpersonal disengagement) between the effects of work conditions on perceived patient safety by exploring the adverse events that residents and practising physicians reported.

Methods: A quantitative and cross-sectional study collected data from 249 residents and practising physicians in a huge teaching hospital and primary health care centre (PHC) in the Eastern Province of Saudi Arabia. Hayes Macro regression analysis was employed to evaluate the multiple mediation effect of burnout dimensions, with 5000 bootstrapping and a confidence interval (CI) of 95% for statistical inference and $p \leq 0.05$ for the significance level.

Results: Leadership support ($B = 0.39$, $t = 6.24$, $p < 0.001$) and physician engagement ($B = 0.43$, $t = 6.50$, $p < 0.001$) were associated with a decreased rate of adverse events to patient safety, whereas workload ($B = -0.23$, $t = -3.73$, $p < 0.001$) was negatively associated with an increased rate of adverse events. Burnout was shown to mediate the relationship between the effects of physician's leadership support ($R^2 = 0.26$, $F = 27.50$, $p < 0.001$), work engagement ($R^2 = 0.25$, $F = 27.07$, $p < 0.001$) and workload ($R^2 = 0.23$, $F = 24.23$, $p < 0.001$) on the rate of adverse events.

Conclusion: This study provides insights into burnout dimensions and their consequences on patient safety indicators (ie, adverse events). Work conditions (ie, leadership support, physician engagement, and workload) directly affect the rate of adverse events and indirectly through mediators like burnout-emotional exhaustion and burnout-interpersonal disengagement.

Keywords: leadership support, physician engagement, workload, burnout, adverse events, patient safety

Introduction

“Patient Safety” depends on healthcare science and everyday practice in different workplaces, offering a way to give care without creating negative impacts for patients under the care of the medical group. Since the Institute of Medicine (IOM) (currently, The National Academy of Medicine) released the report ‘To Err is Human’ in 1999, several initiatives have been established to prevent medical errors, improve patient safety and enhance population health.^{1–3} Nonetheless, the burden of preventable medical errors has substantially increased during the last two decades; around 98,000 patients die

annually in the United States (US).⁴ Recently, up to 400,000 annual deaths in US hospitals were estimated to result from preventable adverse events.⁵ Adverse events were considered the third leading cause of death.^{6,7}

In Saudi Arabia, a total of 3041 annual incidents were reported in 2008.⁸ Moreover, the number of medico-legal complaints in Saudi Arabia increased from 1165 cases in 2007 to 2413 cases in 2013.⁹ Most of these complaints were against physicians (88.4%).¹⁰ The rise in incidents that may jeopardise patient care provided by physicians in Saudi Arabia is alarming.

Responsively, several system reforms were initiated to transform the healthcare system in Saudi Arabia towards safer, and higher quality care in conformity with Vision 2030.¹¹ Patient safety became a focus for system improvement, motivating research in this field. A healthy work condition is essential to enhance the performance of physicians.¹² Different factors in the workplace have been found to influence care provided and patient safety (ie, leadership support, physician engagement and workload).

A growing literature has attempted to characterise the impacts of leadership support, physician engagement and workload on patient safety (ie, the incidence of adverse events). Interestingly, most of this literature has examined direct relationships. For instance, leadership support, physician engagement and workload were linked to the perceived care outcomes.^{13,14} Actively engaged physicians have a lower rate of medical errors.¹⁵ However, a high physician workload increases the risk of medical errors and jeopardises patient care.¹⁶ Good leadership support is expected to decrease physicians' dissatisfaction and burnout, thus enhancing their performance.¹² Physician involvement and supervisor support considerably affect a worker's sense of encouragement¹⁷ and are associated with their performance.¹⁸

The investigation in this study sought to highlight the role of one pandemic psychological work distress, "burnout", as an intervening factor between the three work conditions in the hospital and the reported adverse events among residents and practising physicians. Burnout was reported to be moderate to high among practising physicians.¹⁹ Theoretically, burnout has a significant bio-psychosocial impact,^{20,21} increasing job withdrawal²² and absenteeism rates.²³ Additionally, burnout increases the likelihood of physician turnover, which has costs related to patient health.²⁴ Burned-out physicians are at a higher risk of making poor decisions and medical errors that may jeopardise safety and quality of care.^{23,25} Furthermore, burnout results in serious consequences to patient health and safety and negatively impacts healthcare organisations.²⁶ Therefore, the assumption is that physicians working in healthy work conditions might be less likely to have burnout, consequently improving their perceived patient safety. Despite some evidence, little is known regarding the role of residents and practising physicians' burnout as a mechanism through which work conditions affect their perceived patient safety (ie, reported adverse events). Therefore, this study explores the mediation effect of burnout between these associations.

The Theoretical Framework

Studies in human factors have expanded the understanding of human interactions to improve healthcare systems.^{27–29} The theoretical framework of this study was built using social exchange theory³⁰ and incorporating the model of Systems Engineering Initiative for Patient Safety (SEIPS).³¹ The social exchange theory concentrates on developing healthy workplace relationships between staff and their managers for the mutual benefit of staff and the institution.³² This encompasses the exchange benefit of providing healthy work conditions for residents and practising physicians, resulting in safer care.

The SEIPS model expands Donabedian's theory of the quality of care,³³ which categorises the components of the health system into structures, processes and outcomes. Donabedian theory supposes that structural input with quality processes leads to improved outcomes. Previous studies have used SEIPS to develop a model in the disciplines of education and healthcare to provide higher quality services.^{34,35} SEIPS considers human interactions with a work system and provides a better understanding of how physicians' work conditions (leadership support, physician engagement, and workload) affect patient safety (See [Figure 1](#)). Leadership support, physician engagement and workload are structural factors, burnout dimensions (ie, emotional exhaustion and interpersonal disengagement) are processes, and patient safety is the outcome. Incorporating these theories can help better understand the role of physician burnout as a mechanism through which work conditions affect their perceived patient safety (ie, adverse events). Therefore, it advances the body of knowledge and provides insights for policymakers and hospital managers.

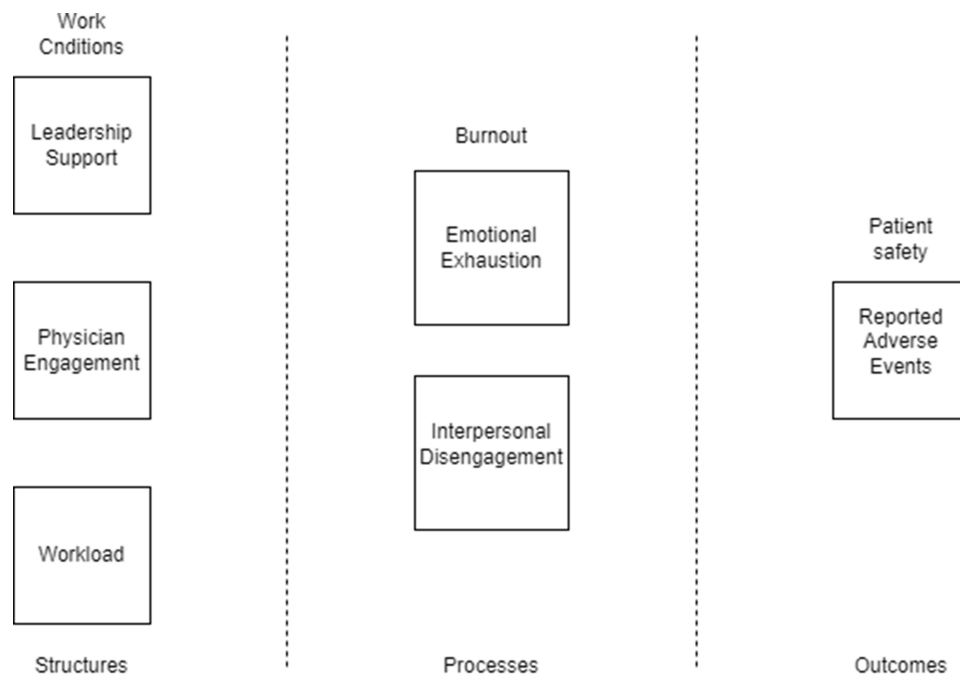


Figure 1 The theoretical framework of the study. Provided in a separate file with 300 dpi.

Methodology

Materials and Methods

A cross-sectional study was conducted in a teaching hospital (with a capacity of 381 beds) and primary health care centre (PHC) in the Eastern Province of Saudi Arabia. The study population consisted of 722 residents and practising physicians, the total number of physicians working in the teaching hospital and PHC. Data were collected from January to March 2019. Inclusion criteria were the physicians who were working in the following departments: internal medicine, general surgery, paediatrics, obstetrics and gynaecology, anaesthesia and emergency medicine, in addition to the physicians working in the PHC. Medical students, interns, rotating residents and training residents from other departments or hospitals were excluded. Informed consent was obtained from all participants. The participants were informed about the study's aims and that their response was voluntary. A sample size of 248 physicians was considered adequate based on Krejcie and Morgan's table at a confidence interval of 95%.³⁶ However, some may not participate; therefore, all residents and practicing physicians were invited. Of the 722 surveys distributed, 500 were returned, and 249 complete responses were obtained, achieving an effective response rate of 49.8%.

Ethical Consideration

The Declaration of Helsinki was followed in the conduct of this study. Ethical approval was obtained from the Institutional Review Board of Imam Abdulrahman Bin Faisal University (IRB number-UGS-2018-1-246) to explore the mediation effect of burnout on the association between work conditions and the reported adverse events among residents and practising physicians. Approvals to adopt the study instruments were obtained from the original authors.

Operational Definitions and Instruments

Leadership support refers to the support and empowerment given by a supervisor in the workplace for career development and decision-making,³⁷ whereas physician engagement is a state of willingness, motivation, fulfilment, mental effectiveness and commitment to devote time and effort to healthcare improvement.³⁸ The Practice Environment Scale (PES) tool was used to measure the perceived leadership support (manager's ability, leadership and support subscale was

adopted) and physician engagement (staff participation in hospital affairs sub-scale was adopted).³⁹ This tool was developed originally to measure nurses' perception of the work environment and has been internationally validated.⁴⁰

Workload refers to the perceived physicians' adequacy and duty hours' length. Regarding workload, the Hospital Survey on Patient Safety Culture that the Agency for Health Care Research and Quality (AHRQ) developed was used.⁴¹ The staffing section was adopted. This scale in this study was regarded as considering the adequacy of professionals to handle the work and work hours to ensure the best patient care.⁴¹

Burnout is a combination of emotional exhaustion and interpersonal disengagement. While emotional exhaustion refers to a state of depletion in emotional resources, being fatigued and unable to cope with job demands, interpersonal disengagement (depersonalisation) refers to being emotionally and cognitively detached and disengaged with a cynical attitude toward others.^{42,43} The Stanford Physicians Performance (Professional Fulfilment Index (PFI) was adopted for measuring perceived burnout.⁴² This index includes burnout (emotional exhaustion and interpersonal disengagement) and professional fulfilment subscales.⁴² The burnout, emotional exhaustion and interpersonal disengagement subscales were adopted, while the professional fulfilment was not, as it was not the aim of the present study. The PFI was adopted as the Maslach Burnout Inventory (MBI), and Oldenburg Burnout Inventory (OLBI), and the one-item burnout measure all provide an imperfect picture of physician burnout concerning patient care. The MBI may not be the best tool for evaluating changes brought on by interventions or other factors during periods less than a year because it requires a respondent to count the frequency of a feeling going back as long as a year. Although no time frame is mentioned in the Oldenburg Burnout Inventory instructions that should be considered when answering questions on burnout, the lack of a period anchor may make it more difficult to understand how scores vary over time.⁴² The one-item burnout is a dichotomous measure and is likely to lack the sensitivity to change that may be attained with continuous scale measurement.

Patient safety is the extent to which the hospital and healthcare system efficiently prevent adverse events.⁴¹ Adverse events are defined as unanticipated, preventable harm or negative outcomes related to patient hospital stays unrelated to his disease process.⁴⁴ Incident reports, patient records, and the Global Trigger are the most often used instruments for quantifying and measuring adverse events in hospitals.⁴⁵ However, only 10–20% of adverse events are reported in hospitals, and of those, 90–95% do not seriously harm patients.⁴⁵ Additionally, the hospitals participating in our study did not grant access to their patient records or information system. Therefore, the current study employed a questionnaire, and physicians were asked to rate the frequency of coming across adverse events in their unit (eg, medical errors, patient falls, hospital-acquired infection and patient complaints). Responses were recorded using a 5-point Likert scale of the study instruments. The study items were adopted at the individual level of analysis.

Data Analysis Approach

Descriptive statistics, Cronbach's alpha test and exploratory factor analysis were conducted for participants' demographics and study questionnaire reliability and validity; respectively. Hayes Macro process regression analysis was performed to test for the mediation effect of burnout dimensions. Hayes Macro provides multiple mediation analyses of the burnout dimensions simultaneously and is superior to other approaches, such as Baron and Kenny's casual step approach and Sobel's test.⁴⁶ It provides the indirect effect (a x b) by generating thousands of samples (Bootstrapping) to evaluate multiple mediators.⁴⁷ A bootstrapping technique at 5000 (CI 95%) was used for statistical inference because it does not assume a normal distribution of responses as implied in Sobel's test. Mediation effects were interpreted using the classification developed by Zhao et al⁴⁸ Statistical significance was set at p-value ≤ 0.05 , and Statistical Package for Social Sciences (SPSS) software version 23 was used to perform the analysis.

Results

Participants' Demographics

Among the 249 physicians who responded to the questionnaire, 139 were males (55.8%), and 110 were females (44.2%) (Table 1). Most were 30 to 39 years old (44.2%), Saudi (67.5%), and married (80.7%). Furthermore, most participants were residents (37.8%) and consultants (34.9%), and nearly all of the respondents (99.2%) worked full-time. Practice

Table 1 Demographics of Studied Participants

Characteristic	Frequency (%)	Characteristic	Frequency (%)
Gender		Academic rank	
Female	110 (44.2%)	Assistant professor	45 (18.1%)
Male	139 (55.8%)	Associate professor	11 (4.4%)
Age		Professor	5 (2%)
20–29	65 (26.1%)	Others	195 (95.5%)
30–39	110 (44.2%)	Employment status	
40–49	41 (16.5%)	Full-time	247 (99.2%)
≥50	33 (13.2%)	Part-time	2 (8%)
Nationality		Years of practice	
Saudi	168 (67.5%)	<1	21 (8.4%)
Non-Saudi	81 (32.5%)	1–4	61 (24.5%)
Marital status		5–9	64 (25.7%)
Single	45 (18.1%)	10–14	44 (17.7%)
Married	201 (80.7%)	≥15	59 (23.7%)
Others	3 (1.2%)	Speciality	
Job title		General surgery	50 (20.1%)
Resident	94 (37.8%)	Internal medicine	49 (19.7%)
General practitioner	6 (2.4%)	Paediatric	28 (11.2%)
Specialist	31 (12.4%)	Obstetrics and Gynaecology	45 (18.1%)
Registrar	26 (10.4%)	Emergency medicine	27 (10.8%)
Consultant	87 (34.9%)	Anaesthesia	15 (6%)
Others	5 (2.0%)	Family medicine	35 (14.1%)

experience mostly ranged from 5 to 9 years (25.7%), followed by 1 to 4 years (24.5%), and ≥15 years (23.7%). Physicians from general surgery, internal medicine, obstetrics, and gynaecology departments comprised comparable proportions of the total respondents at 20.1%, 19.7%, and 18%, respectively.

Multivariate Assumptions, Cronbach's Alpha and Factor Analysis

Multivariate assumptions, Cronbach's alpha test for reliability and exploratory factor analysis for validity were performed.⁴⁹ Multivariate assumptions indicated that the data were normal, linear, and free of heteroscedasticity and multicollinearity issues. Cronbach's alpha results indicated a high level of internal consistency for survey items with a value of 0.85 for leadership support, 0.91 for physician engagement, 0.81 for workload, 0.88 for emotional exhaustion, 0.93 for Interpersonal disengagement and 0.89 for perceived patient safety. Further, factor analysis results with KMO (Kaiser Meyer Olkin) values of more than 0.90 and Bartlett's significance value of 0.000,^{49,50} indicate the study sample and instrument were adequate and valid to examine the mediation effect of burnout dimensions between the effect of leadership support, physician engagement, and workload on the perceived patient safety among physicians.

The Mediation Effect of Burnout

The results of “a path” revealed the effect of the independent variables on the mediator. The results, as shown in Table 2 and Figure 2, revealed that leadership support negatively affected burnout-emotional exhaustion (B=−0.53, t=−6.83, p<0.001) and burnout-interpersonal disengagement (B=−0.43, t=−6.16, p<0.001) and was statistically significant. Similarly, physician engagement had a significant negative effect on burnout-emotional exhaustion (B=−0.67, t=−8.36, p<0.001) and burnout-interpersonal disengagement (B=−0.50, t=−6.74, p<0.001). In contrast, workload positively affected both dimensions of burnout with a larger effect on emotional exhaustion (B=0.48, t=6.39, p<0.001) than on interpersonal disengagement (B=0.15, t=2.08, p<0.05). Leadership support and physician engagement decreased physician burnout, while workload increased the risk of burnout among physicians.

The results of “c paths” revealed the effect of the independent variables on the dependent variable. The results, as shown in Table 2, revealed that leadership support (B = 0.39, t= 6.24, p<0.001) and physician engagement (B=0.43, t=6.50, p<0.001) positively affected residents and practising physicians reported adverse events. Whereas workload (B=−0.23, t=−3.73, p<0.001) negatively affected residents and practising physicians reported adverse events.

The indirect effect (a x b paths) and the model summary of Hayes Macro regression analysis, as shown in Table 2, revealed that burnout dimensions mediate the relationships between the effects of leadership support (R²=0.26, F=27.50, p<0.001), physician engagement (R²=0.25, F=27.07, p<0.001) and workload (R²=0.23, F=24.23, p<0.001) on the perceived patient safety (residents and practising physicians reported adverse events). The indirect effect (a x b paths), as shown in Figure 2, revealed that burnout-emotional exhaustion (95% CI; 0.016, 0.169) and burnout-interpersonal disengagement (95% CI; 0.031, 0.161) significantly mediated the effect of leadership support on patient safety, where the confidence intervals do not straddle zero. Similarly, the mediation effects of burnout-emotional exhaustion (95% CI; 0.009, 0.200) and burnout-interpersonal disengagement (95% CI; 0.042,0.183) between the effect of physician engagement and patient safety are significant. Because the “a, b and c’ paths” point towards different directions,⁴⁸ burnout dimensions act as competitive variables in both relationships. Therefore,

Table 2 The Mediation Effect of Burnout Dimensions Between the Effect of Leadership Support, Physician Engagement and Workload on the Residents and Practising Physicians Reported Adverse Events

Independent Variables	Value	Burnout-Emotional Exhaustion		c	c'	Burnout-Interpersonal Disengagement		Model Summary		
		a	b			a	b	R ²	F	p
Leadership Support	B	−0.53***	−0.15**	0.39***	0.22***	−0.43***	−0.21***	0.26	27.50	0.000
	SE	0.08	0.05	0.06	0.06	0.07	0.06			
	t	−6.83	−2.81	6.24	3.36	−6.16	−3.35			
	p	0.000	0.005	0.000	0.000	0.000	0.001			
	a x b (LCI, UCI)	0.08 (0.016, 0.169)				0.09 (0.031, 0.161)				
Physician Engagement	B	−0.67***	−0.14*	0.43***	0.23**	−0.50***	−0.21***	0.25	27.07	0.000
	SE	0.08	0.06	0.07	0.07	0.07	0.06			
	t	−8.36	2.52	6.50	3.20	−6.74	3.41			
	p	0.000	0.013	0.000	0.002	0.000	0.001			
	a x b (LCI, UCI)	0.10 (0.009, 0.200)				0.10 (0.042, 0.183)				
Workload	B	0.48***	−0.16**	−0.23***	−0.12	0.15*	−0.26***	0.23	24.23	0.000
	SE	0.08	0.06	0.06	0.06	0.07	0.06			
	t	6.39	−2.74	−3.73	−1.91	2.08	−4.17			
	p	0.000	0.007	0.000	0.057	0.039	0.000			
	a x b (LCI, UCI)	−0.08 (−0.154, −0.015)				−0.04 (−0.093, −0.002)				

Notes: Significance: *, p<0.05, **, p<0.01 and ***, p<0.001. LCI, UCI: Lower and upper confidence intervals.

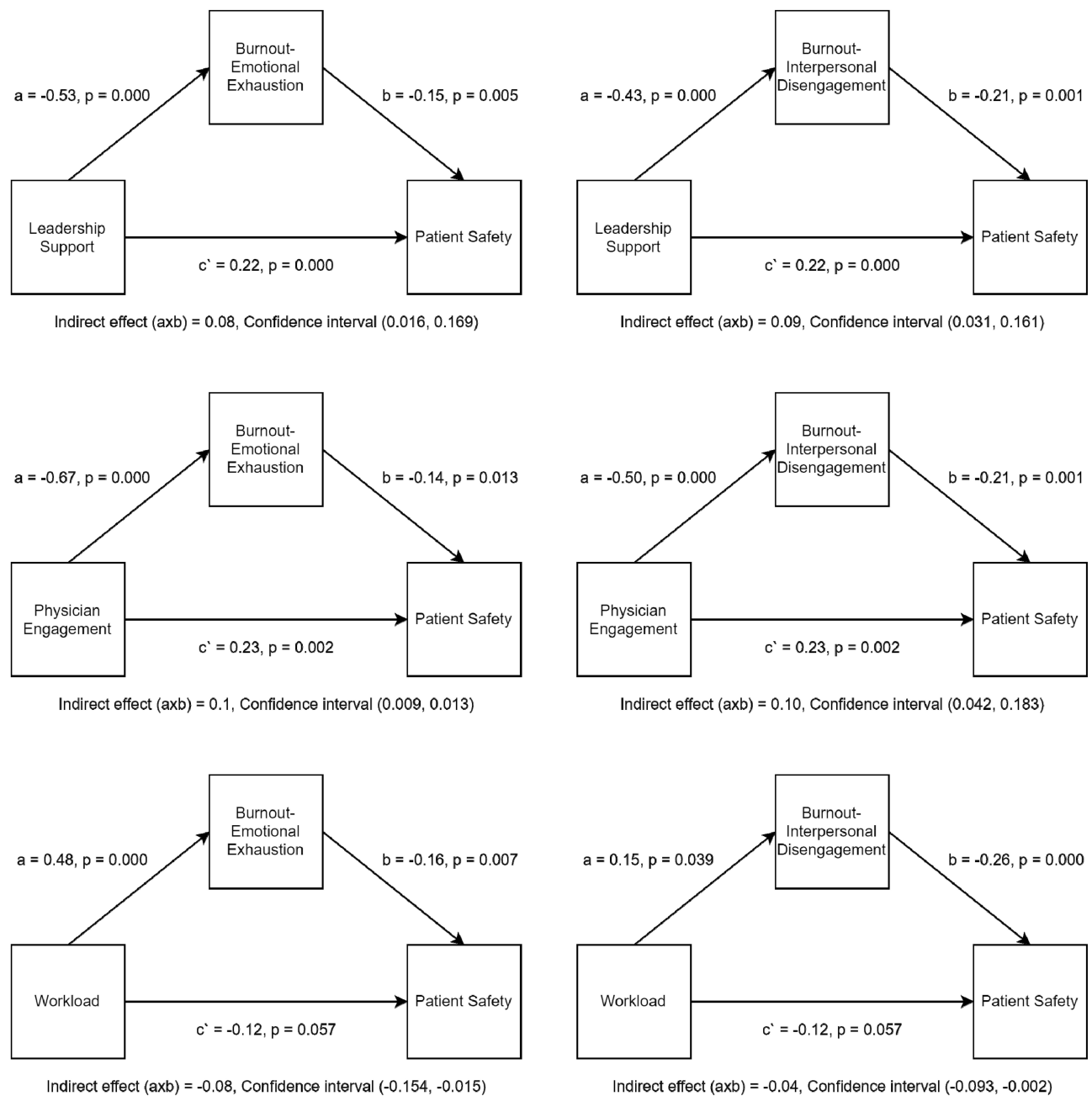


Figure 2 The mediation effect of burnout-emotional exhaustion and interpersonal disengagement in the relationship between work conditions and physicians reported adverse events. Provided in a separate file with 300 dpi.

resident and practising physician burnout suppressed the positive impacts of leadership support and physician engagement on perceived patient safety.

On the other hand, the results revealed that burnout-emotional exhaustion (95% CI; $-0.154, -0.015$) and burnout-interpersonal disengagement (95% CI; $-0.093, -0.002$) complement the relationship between workload and patient safety where “a, b and c’ paths” are all pointing towards the same direction.⁴⁸ Because the effect of the c’ path was insignificant ($p > 0.05$), the effect of workload on patient safety can be considered fully mediated through burnout dimensions. In other words, physicians with high workloads are more prone to burnout, affecting their perceived patient safety.

These results revealed a dual function of burnout dimensions, suppressing the positive impact of leadership support and physician engagement and complementing the effect of workload on the residents and practising physicians who reported adverse events. These findings support the study's claim that burnout dimensions mediate the relationship between physician work conditions on perceived patient safety.

Discussion

Improving the current work conditions for caregivers has gained international attention, and we found that physicians perceived patient safety (ie, reported adverse events) was directly affected by their work conditions (leadership support, physician engagement, and workload) and indirectly through mediators like burnout dimensions (ie, emotional exhaustion and burnout-interpersonal disengagement).

The findings of this study revealed that respondents perceived patient safety (ie, reported adverse events) as being directly affected by their work conditions (leadership support, physician engagement, and workload) and indirectly through mediators like burnout dimensions (ie, emotional exhaustion and burnout-interpersonal disengagement). To our knowledge, this study is the first to investigate the mediation effect of burnout dimensions between the association of work conditions and the perceived patient safety (ie, reported adverse events) among residents and practising physicians in the KSA. Furthermore, the first of its kind incorporating the model of SEIPS and the social exchange theory. Multiple significant associations and mediation relationships were found.

The direct associations in this study revealed that leadership support and physician engagement were significantly associated with better perceived patient safety. At the same time, physicians with high workloads reported lower patient safety perception ratings (more frequently came across adverse events) in their respective units.

These direct associations with patient safety are well established in previous studies. Leadership support has positive effects on patient safety perception.⁵¹ Leadership was found to improve the sense of empowerment, which decreased the rate of adverse events and improved patient safety.⁵² Health providers who received more support from their leaders had a higher rating of patient safety perception.⁵³ Therefore, physician engagement was found to positively affects patient safety by enabling the physicians to participate in hospital affairs.^{54–56} These findings were supported by the National Health Service (NHS), which reported a growing need to engage physicians in the planning, improvement and effective achievement of healthcare services.⁵⁷ Hence, enabled, and actively engaged physicians in planning and the improvement process are associated with their performance⁵⁸ and, Therefore, less likely to come across adverse events.

Furthermore, previous studies revealed that workload decreased patient safety scores, increased readmission rates, and reduced exposure to harm.^{59–62} In the current study, this significant association was observed through the indirect effect while not in the direct effect (c' path). One study demonstrated a similar finding in which increased workload was not found to impair patient safety.⁴³ Therefore, intervening factors can explain these inconsistencies by understanding the mediation role of burnout. Thus, patient safety is affected by a physician's work conditions and physician-manager interpersonal relationships and by intervening process factors such as physician burnout.

Several studies have explored the relationship between burnout and patient safety.^{63–65} However, burnout in the current study is a crucial mediator between work conditions and resident and practising physicians' perceived patient safety (ie, reported adverse events). The results revealed a significant mediation effect of burnout dimensions (ie, emotional exhaustion and burnout-interpersonal disengagement) between work conditions (ie, leadership support, physician engagement, and workload) and perceived patient safety. Hospital physician burnout suppresses the positive impact of leadership support and physician engagement on perceived patient safety and complements the relationship between workload and patient safety.

Even though limited studies have examined the mediation effect of physician burnout between work conditions and patient safety, previous research can justify these results. In the telecommunication industry, favourable work conditions reduce employee exhaustion and interpersonal disengagement, reducing their intention to leave.⁶⁶ Employees that have supportive leaders and pleasant work conditions have noticeably greater levels of job satisfaction.⁶⁷ Effective supervision and empowerment have been proven to enhance commitment to safety and reduce unfavourable outcomes.^{52,68–71} Studies have demonstrated that an increase in manager support decreases burnout^{72,73} by improving the work environment.⁵⁵ Likewise, physician engagement is increasingly viewed as a counteractive mechanism against burnout.⁷⁴ Less engaged

physicians have higher levels of burnout;²³ Actively engaged physicians rarely encounter adverse events.¹⁵ Leadership support and work engagement in the healthcare system are essential, especially for residents and practising physicians whose duty is to deliver direct care to achieve a desirable, safe and effective patient outcome.^{54,75,76}

Efforts and system reforms were initiated to transform the healthcare system in Saudi Arabia towards safer and higher quality care in conformity with Vision 2030.¹¹ However, the current study revealed that workload among physicians increases their perceived burnout, emotional exhaustion and interpersonal disengagement, which in turn significantly affects their perceived patient safety. Consistent with previous studies working long shifts and staffing inadequacy was found to be indirectly related to patient safety.^{77,78} Inadequate staffing increased the workload on individual workers and burnout.^{79,80} In turn, burnout was independently associated with a lower perceived patient safety.^{23,43,73} Therefore, burnout should be incorporated alongside work conditions when addressing the issue of patient safety. Leadership support and physician engagement improved perceived patient safety by reducing burnout, whereas increased workload decreased it through increasing burnout.

An important lesson from this study is that without focusing on human interactions in work systems, preventing patient harm and improving patient safety would not be possible. This study's model expands the social exchange theory and supports the SEIPS model. The social exchange theory concentrates on developing healthy workplace relationships between staff and their managers for mutual benefit,⁵⁸ and we expanded it by including physician's burnout as an intervening process variable. The third generation of the SEIPS model was focused on the patient journey, and it introduced the concept of human-centred design as a core concept for improving patient safety.²⁷ We support and expand this model. We can introduce the concept of a "person-centred journey" by focusing on both the staff and patient, ensuring healthy work conditions and providing appropriate support for engaging physicians to support mutual interactions (work system and patient-physician interactions). Human-centred design must focus on patient and staff journeys to improve patient safety.

Furthermore, integrating the SEIPS model into the social exchange theory can advance the knowledge of the human mutual benefits and interactions. High quality input (structures) does not necessarily lead to the provision of quality outcomes, as intervening factors could suppress or complement the relationships. In the current study hospital physician burnout suppresses the positive impact of leadership support and physician engagement on perceived patient safety and complements the relationship between workload and patient safety.

Furthermore, this study has practical implications for healthcare leaders as they encourage engaging the residents' physicians in hospital affairs and providing the necessary support. Considering the workload as a major concern to increase physician burnout, managers must restructure duty length and scheduling and maintain adequate staffing levels. Furthermore, continuous quality improvement by opening the discussion with healthcare workers must be routinely conducted; this will overcome job obstacles. Policymakers must devote resources to frequent audits and train future leaders to decrease adverse events and improve the quality of care provided by physicians.

Study Limitations

Although several findings could be added to the literature, this study has limitations. The study design was cross-sectional, and participants were sampled from a single university hospital and PHC, so a causal relationship and generalizability cannot be established. Although residents and practising physicians were involved, the participation of other healthcare workers would enable better conceptualisation of the interaction between different factors in the work environment. Moreover, the differences in the variables between those physicians from different departments might have influenced the overall value of the results. Furthermore, residents and practising physicians responded voluntarily, and 249 of the 722 were provided data for this study as complete responses. Thus, it is possible that selection bias may make their responses not truly representative. Importantly, patient safety was measured from a physician's perspective via a questionnaire (rate the frequency of coming across adverse events), which might introduce bias; therefore, objective data from the hospital records are needed to determine actual associations in the study model.

Future Directions

There are two directions for future research. First, there is a need to characterise the effect of burnout on patient safety using an objective measure for actual adverse event rates and the effect from the patient perspective. The second is to involve other outcome measures such as patient outcomes, care quality, job satisfaction, and intention to leave to understand the study model better and help optimise physician well-being. Furthermore, future patient safety studies must be influenced by dynamic work conditions within healthcare organisations, including other structural factors, such as collegial relations, task complexity, technologies, and physical environment. Multi-centred studies would be more generalisable. Longitudinal designs should also be considered to record changes in variables over time.

Conclusion

This study is the first of its kind incorporating the model of SEIPS and the social exchange theory to investigate the mediation effect of burnout dimensions between the association of work conditions and perceived patient safety. This study has provided new insights regarding the effect of burnout dimensions and their consequences on patient safety. Furthermore, this study sheds light on the effect of work conditions on patient safety and how burnout influences this relationship. Burnout dimensions have dual roles, and they suppress the positive impact of leadership support and physician engagement and complement the effect of workload on perceived patient safety. Supported and engaged physicians reported lower perceived burnout, which, in turn, increased their perceived patient safety. At the same time, physicians with high workloads are more prone to burnout, which decreases patient safety. It highlighted the importance of human interactions and introduced the concept of a person-centred journey to prevent patient harm and improve patient safety. A multifaceted approach between the individual and the healthcare organisation is required to optimise patient safety and the quality of care and improve physician well-being.

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