



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## Emergency trauma care during the COVID-19 pandemic: A phenomenological study of nurses' experiences

Mohammed Al-Sheikh Hassan<sup>\*</sup>, Kay De Vries, Jane Rutty

Faculty of Health and Life Sciences, De Montfort University, Gateway House, Leicester LE1 9BH, United Kingdom

### ARTICLE INFO

#### Keywords:

Trauma  
Emergency  
Nursing  
COVID-19  
Pandemic  
Saudi Arabia  
Phenomenology

### ABSTRACT

**Objective:** This study aimed to explore nurses' experiences in delivering emergency trauma care during the COVID-19 pandemic at a level I trauma centre in Saudi Arabia.

**Methods:** A qualitative, descriptive phenomenological design was utilised, in which face-to-face, unstructured interviews were carried out with emergency and trauma nurses at a level I trauma centre in Saudi Arabia. The study included nine registered emergency and trauma nurses who were interviewed twice from February to April 2021. The collected data were analysed using Colaizzi's descriptive phenomenological method.

**Results:** The analysis of the data revealed an overarching theme that was about the inevitable change on the ground due to the pandemic and two primary themes, each containing two subthemes: 1 dealing with an interrupted path of care; 1.1 experiencing additional complexity; 1.2 encountering extra demands; 2 optimising the path of care; 2.1 modifying the steps; and 2.2 transforming the system.

**Conclusion:** The COVID-19 pandemic imposed change on how trauma patients would be handled and treated. Nurses took an active and critical role in creating another form of change, which helped optimise the path of trauma care and accommodate urgent treatment needs of the injured patients.

### 1. Introduction

The global transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) led the World Health Organization (WHO) to declare the phenomenon a 'pandemic sparked by a coronavirus' [1]. Consequently, the coronavirus disease 2019 (COVID-19) pandemic dramatically impacted healthcare systems across the globe. As a result, changes had to be incorporated into or imposed on healthcare delivery systems. However, modifications were unequal across different healthcare specialities, such as trauma care [2]. Although the demands for healthcare services dropped by one-third for mild to moderate health conditions [3], including trauma cases [4], the nature of trauma cases did not align with restrictions imposed on other, non-urgent conditions. Such restrictions for non-urgent conditions included cancellations or deferrals. Trauma care providers responded to the pandemic by upgrading and modifying the trauma care infrastructure. The changes impacted the trauma triage systems and the management of patients in the trauma centres, as well as in other areas such as operating theatres (OR), intensive care units (ICU), trauma team dynamics, and models of trauma care [5].

Saudi Arabia is a high-income country with an estimated population of 35 million as of 2020, of which 70% are less than 40 years old [6]. The country recorded its first case of COVID-19 in March 2020 and continued to experience multiple waves of infection throughout 2020 to 2021 [7]. Saudi Arabia also has a high rate of traumatic injuries, the majority of which are caused by road accidents and falls. Such traumatic conditions are classified as being leading causes of death [8]. In 2018, the global status report on road safety from WHO estimated that Saudi Arabia's rate of road accident deaths to be 28.8 per 100,000. This rate was remarkably higher than both the Eastern Mediterranean region rate of 18 per 100,000 and the global rate of 18.2 per 100,000 [9].

Trauma care is provided in unpredictable circumstances and requires trauma teams to run multiple interventions simultaneously and make decisions with limited time and information available, where the consequence of making a wrong decision is potentially severe [10]. Since the early development of the trauma care concept, nurses have played substantial roles in injured patient care. The direct care patients with traumatic injuries receive from nurses positively influences their outcomes. Moreover, the role of trauma nurses is not only defined by the delivery of direct nursing care to injured patients but includes a diverse

<sup>\*</sup> Corresponding author.

E-mail addresses: [P17236771@my365.dmu.ac.uk](mailto:P17236771@my365.dmu.ac.uk), [msheikh.has@gmail.com](mailto:msheikh.has@gmail.com) (M. Al-Sheikh Hassan).

<https://doi.org/10.1016/j.ienj.2022.101147>

Received 6 September 2021; Received in revised form 10 December 2021; Accepted 26 January 2022

Available online 31 January 2022

1755-599X/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

range of other tasks such as coordinating and managing patient flow and facility access, education, and data collection [11]. Given the critical role of nurses in trauma care environments, within the context of the high volume of traumatic conditions in Saudi Arabia, and the interruptions of care caused by the COVID-19 pandemic, this study aimed to explore the experiences of trauma care nurses during the COVID-19 pandemic at one of the largest and busiest trauma centres in the Middle East.

## 2. Methods

A qualitative research design was employed. A descriptive phenomenological approach was used to explore the experiences of nurses working at a level I trauma centre during the COVID-19 pandemic. The idea of descriptive phenomenology was first conceived by Edmund Husserl (1859–1938) and is characterised by describing phenomena as they appear without adding to or subtracting from their meanings [12]. Integrating phenomenological approaches with health and nursing research provides possibilities to gain insight into the lived experiences of others. In addition, phenomenological inquiry can help to expand knowledge on complex phenomena [13].

### 2.1. Study setting

The study was conducted at King Saud Medical City (KSMC) in Riyadh, Saudi Arabia. KSMC is a tertiary medical institution with 1500 beds and is regarded as a top-tier medical institution providing critical care, orthopaedics, burns care, trauma, and emergency care [14]. KSMC is the largest referral medical institution in Saudi Arabia and operates one of the only two level I trauma centres in the country [15]. The trauma centre is placed within a larger emergency department. Selecting a Saudi Arabian study site added more weight to the current study due to the magnitude and complexity of traumatic conditions [16], which the nurses have needed to attend to, both before and during the pandemic.

### 2.2. Study participants and sampling

A purposive homogeneous sampling technique was used in this study. The purposive homogeneous strategy limits variations found in non-homogeneous groups and guides data collection and analysis at later steps in the research [17]. The study enrolled nine nurses, out of 20 who expressed interest in participating, all of whom were working at the trauma centre for at least one year before the pandemic and had continued to work during the pandemic. Emergency and trauma nurses at KSMC are rotated between the general emergency department and the trauma centre; therefore, the nine nurses in the study represented both areas. No dropouts occurred during the study. The concept of data saturation was applied to determine the point when no more participants would contribute additional input to the collected data [18].

### 2.3. Data collection procedure

Unstructured, one-to-one interviews that lasted from 60 to 90 minutes were conducted in English by the first author from February to April 2021. In addition to the field notes, interviews were used as the primary method of data collection in order to enhance the role of the participants in providing detailed and comprehensive descriptions of their experiences of providing emergency trauma care during a pandemic. In phenomenological interviews, the researcher studies participants own experiences by collating the outcomes of purpose-based, in-depth conversations [19]. The nurses were asked to provide real-life examples and stories of their own experiences, and these shared examples and stories were used to generate the findings. A pre-set interview guide assisted the conduction of the interviews [20]. The interviews began with a broad, open-ended question, ‘*what is your experience of taking care of trauma patients in the time of the COVID-19*

*pandemic?*’. Following that, probing follow-up questions were asked to increase the in-depth exploration of the phenomenon. All participants were interviewed twice. During the second interview, participants were given the opportunity to check the transcription of the first interview and provide feedback on any critical aspects. The interviews took place in a quiet, private room at the trauma centre without having any additional person present.

### 2.4. Data analysis

In qualitative research studies, researchers must stay close to and be immersed in the generated data [21]. Therefore, the participants’ audio-recorded interviews were transcribed verbatim and analysed by the first author according to Colaizzi’s (1978) approach for analysing descriptive phenomenological data [22]. The analysis procedures, including the coding framework, were verified by all authors. The process of data analysis followed a set sequence: familiarisation with all transcripts; identification of significant statements and responses; identification of the significant statements’ meanings; categorising of labels, theme clustering, and theme creation; description of the phenomenon; fundamental structure production; and verification of the fundamental structure. No themes were identified before the data analysis. Qualitative data management software NVivo, version 12, was used to manage the data.

### 2.5. Trustworthiness

Qualitative research utilises non-conventional methods and strategies to maintain the quality of studies [12]. The credibility of this study was maintained by using member checking and searching for alternative explanations or negative cases. Additionally, the results were peer-reviewed by JER and KDV, who are experts in qualitative research, to confirm the study’s credibility. Data triangulation was achieved by conducting two interviews with each participant at different points in time. The dependability and reliability of the study were both examined to ensure that the findings were accurate and consistent. This was achieved by a non-involved researcher examining the process and findings. An audit trail was kept while the research team interpreted the results. Similarly, a detailed description of the processes that formed the study was provided in order to ensure transferability. Finally, the conformability of the study was met by not producing any biased findings based on the preferences of the research team. Reflexivity was achieved by clarifying and examining the primary researchers’ own roles, assumptions, and relationships with the participants, who did not have any prior knowledge about the research team before attending the interviews, and how they related to the study. Although none of the authors had any key preconceptions about the same phenomenon, Husserl’s concept of reduction was considered by bracketing all pre-conceived knowledge to obtain the nurses’ natural accounts and describe the essence of the phenomenon under study [23].

### 2.6. Ethical considerations

The necessary ethical approvals were obtained before recruiting participants and conducting the interviews. The participants were informed about the purpose of the study and given an appropriate amount of time to consider their participation decision. Additionally, all participants had signed a consent form before undertaking the interviews and were aware of their right to withdraw from the study at any time.

## 3. Results

The study included nine registered nurses working at a level I trauma centre within one of the largest and busiest emergency departments in both Saudi Arabia and the Middle East. The nurses had a mean work

experience in the same emergency department and trauma centre of 6.2 years (SD 3.2). The mean age of the participants was 32.5 years (SD 3), and the majority were female (78%). Table 1 shows the demographic characteristics of the participants. The data analysis revealed one overarching theme of 'inevitable change', which indicates the change happened on the ground in multiple aspects of the nurses' life and daily routine. The change was inevitable and occurred in a cyclic way due to two main factors; first, the imposed change by the pandemic itself, which included all forms of interruptions to the path of care, and secondly, the created change that the nurses took part in, which included the optimising efforts in response to the imposed interruptions. Additionally, two primary themes were identified: 'dealing with an interrupted path of care' and 'optimising the path of care'. The findings of the study, including the sequence of actions adopted on the ground, are detailed in Fig. 1 and Table 2.

### 3.1. Dealing with an interrupted path of care

COVID-19 drastically impacted the everyday life of the nurses at the trauma centre. The usual path of care included steps such as the trauma triage, scoring, assessment and initiation of appropriate treatment or referral. The nurses described that path of care as becoming more complicated, in which this complexity imposed additional requirements on both them and the wider trauma team. The pandemic interrupted the typical sequence of trauma care, exacerbating the existing complexity of the ordinary course of treatment. Prior to the interruption caused by COVID-19, the nurses only dealt with patients according to their traumatic conditions. However, the pandemic introduced more discrepancies into their roles compared to what was normal.

Before COVID-19, everything was equal. I am not that much cautious with the surrounding environment. So, I always treated the patient as what he was, like trauma, he had broken ribs. But nowadays, with this COVID-19, it is not only about him, but it is also about me. (P1)

#### 3.1.1. Experiencing additional complexity

The first aspect of the nurses' experiences was related to the additional complexity caused by the COVID-19 pandemic. The nurses described the new situation as 'complicated', and one in which they could not control or manage the sequence of trauma care appropriately, including the unique procedures required in treating injured patients.

This COVID-19 affected all, but in dealing with the trauma patients, it affected much more because for me, if I deal with level one and level two patients, especially if you do the suctioning, the medications, and going to the PAN CT [whole body computed tomography scan]. With the social distancing order, it is hard to deal with the whole situation now. (P3)

The imposed changes brought on by the pandemic impacted the path of care by adding other on-ground measures. Consequently, the nurses had to adapt and learn to deal with the context of trauma differently.

**Table 1**  
Demographic characteristics of the participants.

ID	Age	Gender	Saudi trauma years of experience	Other years of experience	Total years of experience
P1	33	Female	11	2	13
P2	34	Male	7	4	11
P3	27	Female	5	1	6
P4	35	Male	6	7	13
P5	37	Female	12	3	15
P6	30	Female	5	2	7
P7	31	Female	3	5	8
P8	34	Female	5	5	10
P9	32	Female	2	3	5

The experience now is far more difficult than before. You need to put the patient in isolation, but before, once the patient is being triaged, for example, RTA [Road Traffic Accident] or RTC [Road Traffic Collision], he will be directed to the resuscitation. So, the experience is a bit challenging now. (P1)

#### 3.1.2. Encountering extra demands

The increased work demand for the trauma nurses constituted the second element that indicated a significant change in the path of care. The trauma centre recognised all trauma patients as suspected COVID-19 cases. Therefore, the nurses had to apply additional effort to use a greater level of Personal Protective Equipment (PPE). The new measures also meant that fewer staff were able to be present inside treatment and resuscitation rooms at any given time, due to social distancing. The new phenomenon required the nurses to provide extra effort towards trauma care and the additional infection control measures.

Nowadays, we are considering all patients as infectious [COVID-19 positive], so we are wearing more PPE. Before COVID-19, not all PPE were required, but with COVID-19, we are wearing all PPE, and we are minimising the number of staff and crowding inside the rooms. We are maintaining our social distancing. (P5)

The nurses felt that classifying all trauma cases as potential COVID-19 cases negatively affected their ability to effectively do their jobs, describing it as 'more work and more stress.' The nurses felt that their workload was doubled and included additional demands due to the measures imposed because of the pandemic.

It is more work and more stress. So, you will handle two things, or you will treat him or her twice the trauma patient, as a trauma patient, and as a COVID-19 patient. (P6)

The nurses struggled with the additional demands, as the nature of trauma care requires close involvement with patients. In addition, the pandemic necessitated the use of more PPE by the nurses during the care of trauma patients. However, in urgent situations, the nurses sometimes rushed to manage and intervene with injured patients without wearing all the required PPE. These types of situations were considered stressful experiences.

Sometimes, you will forget that you are not using full PPE, because, in your mind, you say, I will take care of my patient. With COVID-19, it is hard. Like, I do not know how to explain that type of situation, you become mentally stressful. (P6)

The trauma care dynamics were interrupted when the nurses lost the ability to freely move in and out of patient rooms. Although the nurses agreed that there were benefits to using additional protection, they also felt it was difficult and restraining.

Right now, because of the precautionary for the COVID-19, it is very difficult. Now, we have to protect ourselves. You wear full PPE, so it will take time to put it on, and then remove them again and then when you enter again you will put them back. So, it is very difficult, but it is for the protection of us and the patients. (P9)

### 3.2. Optimising the path of care

This theme has two primary components. First, it describes the modifications applied on the ground to the steps of care. Second, it describes the transforming actions undertaken within the trauma care system in response to the sudden interruptions. Consequently, the nurses built unique experiences due to their active participation in optimising the path of trauma care.

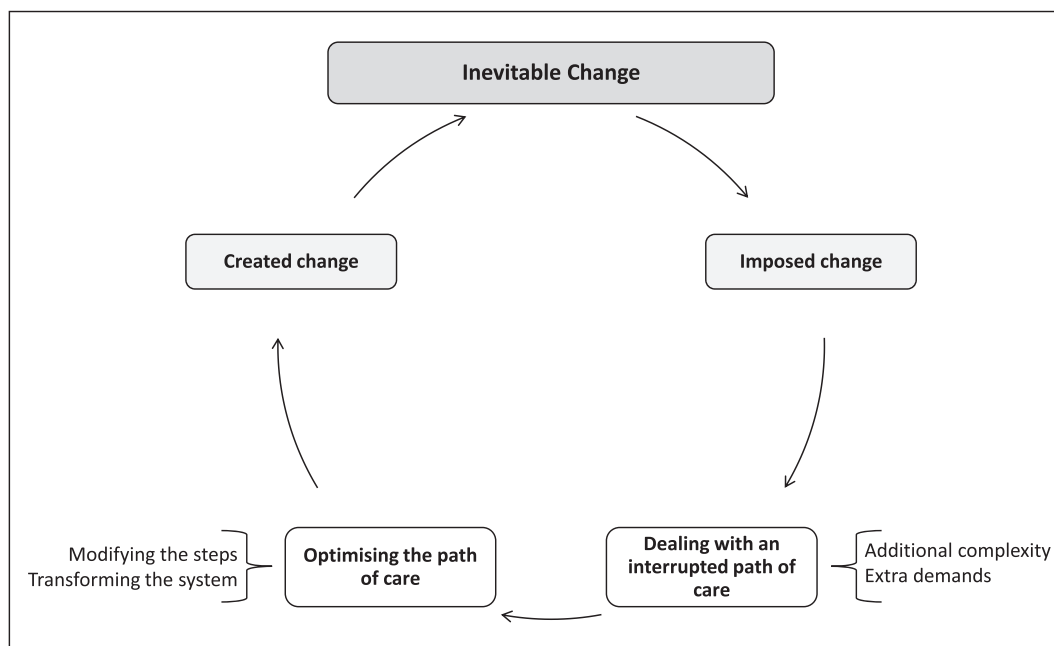


Fig. 1. Thematic structure of participants' experiences and adopted actions.

Table 2

Thematic structure of participants' experiences.

Overarching theme	Primary themes	Sub-themes
Inevitable change	Dealing with an interrupted path of care	Experiencing additional complexity Encountering extra demands
	Optimising the path of care	Modifying the steps Transforming the system

3.2.1. Modifying the steps

The nurses described the changes in their care of trauma patients as having imposed an additional workload on them, but at the same time, as necessary for protecting the patients and themselves. For example, the nurses became more aware of when they got near patients. However, practising this awareness was seen as a limiting step.

I always think twice before I touch the patient. I always think twice before I speak to patients. So, the encounter with your patient is now limited not like before you get enough in and out. Now, once the patient is isolated you have to count the times how many contacts you have with the patients. (P1)

Furthermore, the modified steps required incoming trauma patients to be isolated, and the nurses were required to run additional COVID-19 risk assessments for each incoming trauma patient. All intubated or unconscious patients upon arrival were considered positive for COVID-19 until such time as they were proven to be negative. However, having clear policies and procedures helped the nurses proceed forward with the newly applied modifications in the system.

When receiving a patient, initially, it is the assessment of the symptoms of the patients. So, if ever the patient has COVID-19 symptoms, and their score is four and above, we have to keep the patient in isolation. Then, we have to take care of ourselves, and we cannot go in and out the room as before. Everything is clear here in our policies and procedures. (P8)

The nurses described how some specific procedures were modified in response to the COVID-19. They also all emphasised the changes that

were seen in infection control and prevention practices.

We are considering all trauma cases as suspected COVID-19, so for intubation we will not use the laryngoscope, we will go for the glidescope instead, and we will follow the standard international protocol for the intubation, and all the procedures will be done wearing full PPE. (P4)

Alongside the changes in policies and procedures, modifications were also made to the physical structure of the trauma centre. For example, negative pressure systems were added in every patient room. Although the nurses were able to deal with and manage such modifications, they still felt that they created additional difficulties.

It is a bit difficult, but we can manage it. There is a change in the old structure of our resuscitation rooms. All rooms are made now as a single cubicle and completely covered with glass. So that all rooms have a negative pressure system or a HEPA [High-efficiency Particulate Air] filter. (P4)

3.2.2. Transforming the system

The nurses in the study had provided regular trauma care until the pandemic hit in early 2020. Consequently, the trauma care system had to undergo upgrades and modifications as the pandemic continued to surge. The concept of social distancing was introduced in the physical spaces surrounding patient care areas. However, the nature of trauma care environments made it challenging for the nurses to maintain physical spaces while participating in transforming the system of care.

At the beginning of each shift all staff will be instructed regarding social distancing and how to minimise the number of staff inside patient rooms. All unnecessary things are eliminated now. All staff are required to do regular and frequent screening and PCR testing. (P5)

The system considered patients who either arrived intubated or required intubation upon arrival to the trauma centre as potential high-risk cases of COVID-19. Therefore, such patients were isolated immediately. This created an additional burden on the nurses who were required to administer nursing trauma care within these isolation environments.



If trauma patients arrive intubated or for intubation, they are classified as isolation, because they are for query COVID-19. So, we must put our full PPE, and then at the same time care for them as trauma and COVID-19. (P9)

A new scoring and triage system was incorporated within the existing trauma care system. The nurses took part in the new systems by applying additional scoring and risk assessment efforts.

We score patients according to their presentation. Higher scores will go into precautionary isolation. Those patients will be isolated until we confirm the opposite. (P2)

The response to receiving a trauma patient was also modified. The additional requirement of using complete set PPE changed how the nurses and the trauma team received the patient and initiated their care. Specifically, the new phenomena meant that new roles and responsibilities were created and assigned regarding infection control practices and simultaneous trauma treatment practices. However, the modifications did not create additional risks, such as the delay of required urgent care.

One of our staff will be ready immediately to receive the patient and initiate the care, and the rest of us will be preparing our PPE at the same time. The ready person will start the compression for example until we all get ready, but we will not delay the patient care. (P4)

#### 4. Discussion

This study aimed to answer the question ‘what are the experiences of nurses working at a level I trauma centre during the COVID-19 pandemic?’ at a loaded level I trauma centre. The nurses described the experience of providing emergency trauma care nursing during a pandemic as highly complex and demanding. The pandemic led to additional steps into their usual trauma care, which was viewed as adding more work to a field of practice known to have an already high workload. However, a set of responses and transforming actions in the trauma care system that were applied on the ground made treating critically injured patients possible in the middle of a pandemic.

The COVID-19 pandemic led to ‘inevitable change’; this was in two forms, the first was imposed by the restrictions, and the second was created by the trauma care providers, including the nurses, in response to the pandemic. The overall change impacted how the nurses dealt with urgent trauma conditions and the actions applied on the ground to provide proper trauma care. The impact of COVID-19 on trauma care has been widely presented in the literature from an epidemiological viewpoint [24–28]. However, our findings provide a different perspective beyond other reports, focusing on the nurses lived experiences of providing trauma care in the middle of a pandemic. Similar to our study, Palinkas et al. [29] utilised a qualitative research approach and summarised all types of change in trauma care attributed to the COVID-19 pandemic, which included changes at the procedural, providers and patients’ levels. As reported by the nurses in our study, Palinkas et al. [24] found that those changes had a minimal impact on the quality of trauma care service. However, the nurses in our study showed ability in adapting to the imposed changes and complying with the created changes, which contributed to the quality of care being minimally affected.

The system’s modifications, in which the nurses in this study actively created and applied, were consistent with The Royal College of Emergency Medicine’s (RCEM) position statement on resetting emergency department (ED) care in response to COVID-19, which focuses on improving infection control practices, reducing crowding and improving safety, continuing the care of patients under specialist teams, re-designing ED’s physical environments and rapid COVID-19 testing [30]. However, the trajectory of changes was accompanied by additional challenges that the nurses in our study had to invest more time and effort

in adapting to. Equally, other studies reported similar challenges imposed by the pandemic, such as using full set PPE, new methods of staffing and assignments of personnel and modified communication methods and styles [31].

The COVID-19 pandemic interrupted the usual path of trauma care due to the imposed additional restrictions and demands such as the order of social distancing, the new patients triaging and scoring system, and the need to isolate suspected COVID-19 positive patients and the need to apply full PPE. On the other hand, the nurses in our study had to deal with and adapt to new experiences and system modifications that assisted them in meeting the treatment demands of injured trauma patients while minimising the potential and additional risks imposed by COVID-19.

Similar modifications applied in the system of treating trauma patients were found in the literature, such as introducing a new triage strategy for dealing with incoming trauma patients and classifying them as potential positive COVID-19. Additionally, other modifications included removing medical supplies from storage shelves and covering other equipment to minimise contamination; dividing the trauma and resuscitation area into three levels (hot, warm and cold) where the hot zone is the area with the highest risk of infection; minimising the number of treating staff by deploying personnel according to the severity of cases; creating a clean pathway of non-COVID-19 patients, including trauma directly from outside the ED and allocating specific CT room for COVID-19 patients only. [32–33].

Other studies suggested that tasks carried out by the nurses in the ED be arranged to reduce the times the nurses access the patient room, which would reduce unnecessary contacts [34]. The nurses in the present study experienced similar involvement in modifying the trauma care system due to the pandemic. They agreed that although the modifications in the system created a heavier workload, they were necessary and beneficial for minimising the risk of infection being passed to other patients or the wider trauma team.

As the change was found to be inevitable in treating emergency trauma cases during the pandemic, trauma treating facilities, including our study’s centre, expanded their efforts to meet the new demands. Other trauma care modifications experience is highlighted in Coleman et al [35] who described how the care system at a level I trauma centre in the United States had to introduce modifications due to the pandemic. The changes included a new COVID-19 recognition and patient allocation system; enhanced communication and leadership tools; strict rules regarding PPE use during a trauma activation; minimising the number of treating staff in a trauma bay; installing negative pressure equipment in all trauma bays; and updated policies and procedures. The current study illustrates how the nurses’ experienced similar changes in the trauma system and continued to provide quality trauma care nursing while adapting to a reconfigured care system.

#### 5. Limitations

The study was conducted at a single centre, making the nurses’ experiences in this study uniquely related to that specific trauma centre. In addition to that, the interviews took place a year after the pandemic was first declared in March 2020, which means the nurses had time to adapt to life in the presence of a pandemic, and as a consequence, may have led to their responses in the interviews being dampened compared to if they were interviewed at the beginning or in the middle of the pandemic.

#### 6. Practice and future research implications

In providing implications for practice development, our study leverages the shared standard features of emergency and trauma care facilities. The real-life experiences offered by the nurses in our study can be applied or replicated on the ground at other facilities. The sequence of response and modifications in the trauma care system can be further developed or tailored to fit the context of other trauma centres. Our

study provides specific strategies that can be applied to deal with external impacts imposed on the trauma path of care and different response strategies directed towards ensuring the proper care and actions are obtained. Furthermore, future research that considers the experiences and the level of involvement of other emergency trauma care professionals about the interruptions and the changes in the path of trauma care will provide an enhanced understanding of the phenomenon. In addition, other studies of measuring the effectiveness of the created changes in trauma centres concerning patients' outcomes are recommended

## 7. Conclusion

While facing the imposed change by the pandemic, the emergency and trauma nurses adapted to the consequences of the imposed changes. However, the process of adaptation was stressful and challenging. In addition to that, the nurses continued to provide quality trauma care despite the extreme changes in the path of care in response to the pandemic. Overall, the nature of urgent trauma meant that cancellation or deferral of care was not possible during the pandemic. Consequently, in a reliable way, the nurses co-directed the efforts of adaptation and response to ensure the continuity and efficiency of trauma care.

## Data availability statement

Due to the confidentiality nature of qualitative research data, the participants' data are not shared publicly. The data included in this published article are the only available public data.

## CRedit authorship contribution statement

**Mohammed Al-Sheikh Hassan:** Conceptualization, Methodology, Project administration, Data curation, Formal analysis, Software, Writing – original draft, Writing – review & editing. **Kay De Vries:** Methodology, Supervision, Validation. **Jane Rutty:** Methodology, Supervision, Validation.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgement

The authors would like to thank all the participants who contributed their time and effort in attending the interviews and the Research Centre staff at King Saud Medical City.

## Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Ethical Statement

The study obtained double ethical approval, one from the Institutional Review Board (IRB) at KSMC (ref: HIRI-30-Jan19-02) as the study's site, and another from De Montfort University Faculty of Health and Life Sciences Research Ethics Committee (ref: 3175) as the academic institution with which all authors were affiliated.

## References

- [1] World Health Organisation. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. 2020; . Accessed 29/07/, 2021.
- [2] Haut E, Leeds I, Livingston D. The effect on trauma care secondary to the COVID-19 pandemic: collateral damage from diversion of resources. *Ann Surg* 2020 Sep;272(3):e204–7.
- [3] Moynihan R, Sanders S, Michaleff ZA, Scott AM, Clark J, To EJ, et al. Impact of COVID-19 pandemic on utilisation of healthcare services: a systematic review. *BMJ Open* 2021;11(3):e045343. <https://doi.org/10.1136/bmjopen-2020-045343>.
- [4] Waseem S, Nayar SK, Hull P, Carrothers A, Rawal J, Chou D, et al. The global burden of trauma during the COVID-19 pandemic: A scoping review. *J Clin Orthopaed Trauma* 2021;12(1):200–7.
- [5] Sawhney C, Singh Y, Jain K, Sawhney R, Trikha A. Trauma care and COVID-19 pandemic. *J Anaesthesiol Clin Pharmacol* 2020;36(5):115. [https://doi.org/10.4103/joacp.JOACP\\_272\\_20](https://doi.org/10.4103/joacp.JOACP_272_20).
- [6] Population Estimates. Saudi General Authority for Statistics. 2015; . Accessed Jul 27, 2021.
- [7] Saudi Ministry of Health. Ministry Of Health Saudi Arabia. 2020; . Accessed Jul 29, 2021.
- [8] Alghnam S, Alkelya M, Al-Bedah K, Al-Enazi S. Burden of traumatic injuries in Saudi Arabia: lessons from a major trauma registry in Riyadh, Saudi Arabia. *Ann Saudi Med* 2014;34(4):291–6.
- [9] World Health Organisation. Global status report on road safety 2018. Geneva, Switzerland: World Health Organization; 2018.
- [10] Murphy MM, Edwards CM, Seggie JZJ, Curtis K. Emergency department trauma redesign in a level 1 trauma centre. *Australasian Emerg Nurs J* 2011;14(1):50–8.
- [11] Curtis K, Donoghue J. The trauma nurse coordinator in Australia and New Zealand: a progress survey of demographics, role function, and resources. *J Trauma Nurs* 2008 Apr-Jun;15(2):34–42.
- [12] Holloway I, Galvin K. *Qualitative research in nursing and healthcare*. 4th ed. Wiley; 2017.
- [13] Neubauer BE, Witkop CT, Varpio L. How phenomenology can help us learn from the experiences of others. *Perspect. Med Educ* 2019;8(2):90–7.
- [14] The Business Year. Check up. 2020; . Accessed Jul 29, 2021.
- [15] Alharbi RJ, Lewis V, Mosley I, Miller C. Current trauma care system in Saudi Arabia: A scoping literature review. *Accid Anal Prev* 2020;144:105653. <https://doi.org/10.1016/j.aap.2020.105653>.
- [16] Alsenani M, A Alaklobi F, Ford J, Earnest A, Hashem W, Chowdhury S, et al. Comparison of trauma management between two major trauma services in Riyadh, Kingdom of Saudi Arabia and Melbourne, Australia. *BMJ Open* 2021;11(5):e045902. <https://doi.org/10.1136/bmjopen-2020-045902>.
- [17] Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health* 2015;42(5):533–44.
- [18] Saunders B, Sim J, Kingstone T, Baker S, Waterfield J, Bartlam B, et al. Saturation in qualitative research: exploring its conceptualisation and operationalisation. *Qual Quant* 2018 Jul;52(4):1893–907.
- [19] Höföding S, Martiny K. Framing a phenomenological interview: What, why and how. *Phenomenology and the Cognitive Sciences* 2016;15(4):539–64.
- [20] Turner DW, III. Qualitative interview design: a practical guide for novice investigators. *Qualitative report* 2010 May 1;15(3):754–760.
- [21] Halcomb EJ, Davidson PM. Is verbatim transcription of interview data always necessary? *Appl Nurs Res* 2006;19(1):38–42.
- [22] Colaizzi PF. Psychological research as the phenomenologist views it. In: Valle RS, King M, editors. *Existential-phenomenological alternatives for psychology*. Oxford University Press; 1978. p. 6.
- [23] Finlay L. A dance between the reduction and reflexivity: explicating the "Phenomenological Psychological Attitude". *J Phenomenol Psychol* 2008;39(1):1–32.
- [24] Park C, Sugand K, Nathwani D, Bhattacharya R, Sarraf KM. Impact of the COVID-19 pandemic on orthopedic trauma workload in a London level 1 trauma center: the "golden month": The COVid Emergency Related Trauma and orthopaedics (COVERT) Collaborative. *Acta Orthopaedica* 2020;91(5):556–61.
- [25] Vaishya R, Vaish A, Kumar A. Impact of COVID-19 on the practice of orthopaedics and trauma—an epidemiological study of the full pandemic year of a tertiary care centre of New Delhi. *Internat Orthop* (SICOT) 2021;45(6):1391–7.
- [26] Kamine TH, Rembisz A, Barron RJ, Baldwin C, Kromer M. Decrease in Trauma Admissions with COVID-19 Pandemic. *The western journal of emergency medicine* 2020 May 22;21(4):819–822.
- [27] Morris D, Rogers M, Kissmer N, Du Preez A, Dufourq N. Impact of lockdown measures implemented during the Covid-19 pandemic on the burden of trauma presentations to a regional emergency department in Kwa-Zulu Natal, South Africa. *Afric J Emerg Med* 2020;10(4):193–6.
- [28] Hakeem FF, Alshahrani SM, Ghobain MA, Albabtain I, Aldibasi O, Alghnam S. The Impact of COVID-19 Lockdown on Injuries in Saudi Arabia: Results From a Level-I Trauma Center. *Front. Public Health* 2021;9. <https://doi.org/10.3389/fpubh.2021.704294>.
- [29] Palinkas LA, Whiteside L, Nehra D, Engstrom A, Taylor M, Moloney K, et al. Rapid ethnographic assessment of the COVID-19 pandemic April 2020 'surge' and its impact on service delivery in an Acute Care Medical Emergency Department and Trauma Center. *BMJ Open* 2020;10(10):e041772. <https://doi.org/10.1136/bmjopen-2020-041772>.
- [30] Royal College of Emergency Medicine. COVID-19: resetting emergency department care. 2020; . Accessed Aug 22, 2021.
- [31] Walton H, Navaratnam AV, Ormond M, Gandhi V, Mann C. Emergency medicine response to the COVID-19 pandemic in England: a phenomenological study. *Emerg Med J* 2020;37.
- [32] Livingston DH, Bonne S, Morello C, Fox A. Optimising the trauma resuscitation bay during the covid-19 pandemic. *Trauma Surg Acute Care Open* 2020;5(1):e000488.

- [33] Gamberini L, Coniglio C, Cilloni N, Semeraro F, Moro F, Tartaglione M, et al. Remodelling of a regional emergency hub in response to the COVID-19 outbreak in Emilia-Romagna. *Emerg Med J EMJ* 2021;38(4):308–14.
- [34] Sangal RB, Scofi JE, Parwani V, Pickens AT, Ulrich A, Venkatesh AK. Less social emergency departments: implementation of workplace contact reduction during COVID-19. *Emerg Med J* 2020;37(8).
- [35] Coleman J, Burlew C, Platnick K, Campion E, Pieracci F, Lawless R, et al. Maintaining trauma care access during the COVID-19 pandemic: An urban, level-1 trauma center's experience. *Ann Surg* 2020;272(2):e58–60.