The Knowledge and Perceptions of Patient Safety and Patient Safety Culture During Dental Training: A Caribbean Perspective

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ABSTRACT

INTRODUCTION: Patient safety and the culture of keeping patients safe are not well-researched concepts in dentistry. Research is lacking on patient safety culture in dental teaching hospitals.

OBJECTIVE: This study examined the knowledge and perceptions of patient safety and patient safety culture in a Caribbean dental school among clinical faculty, dental surgery assistants and recent graduates.

METHOD: A qualitative research design using an anonymous online open-ended questionnaire, which underwent face validity by three subject matter experts, was used to acquire data to answer three developed research questions. Qualitative data was uploaded to QDA Miner and a five-stage thematic analysis using emergent coding was used to develop themes to answer the research questions.

RESULTS: Qualitative data was obtained from 28 respondents, 12 clinical faculty, 10 recent graduates, and 6 dental surgery assistants. Four participants graduated in 2020, 1 graduated in 2021, and 5 graduated in 2022. The ages of participants ranged from 23 to 74 years. Themes used to answer the research questions included: the application of a clinical knowledge-based framework for the understanding of patient safety, understanding the individual elements of patient safety culture, gatekeepers of patient safety, and understanding personal limitations.

CONCLUSION: Clinical and curriculum leaders at this dental school should consider the introduction of a patient safety curriculum given respondents understand patient safety from a clinical experiential perspective only and many respondents perceive patient safety culture as being guided predominantly by rules and policies with clinical faculty bearing the ultimate responsibility for keeping patients safe

KEYWORDS: Patient safety, patient safety culture, dental schools, dentistry

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Introduction

The issue of patient safety has been researched and highlighted in the medical literature for several years following the publication of the Institute of Medicine which concluded that over 90,000 persons died in hospitals in the United States because of preventable medical errors or mistakes, making it the eighth leading cause of death in the United States.[1] Patient safety is defined by the World Health Organization as the absence of avoidable injury to patients and the prevention of inadvertent harm by healthcare professionals.[2] Patient safety is a multi-dimensional concept ensuring patient well-being while in the care of institutionalized healthcare settings. Patient safety when originally discussed in the early research was concerned with reducing the incidence of serious patient morbidity and mortality in hospital settings. This concept, however, has progressed to include the prevention of adverse events and patient safety incidents in a variety of healthcare settings and across other health disciplines such as pharmacy practice, physiotherapy, and dentistry.[3–5]

Central to patient safety is patient safety culture, a subset of the organizational culture of institutions, which values and prioritizes a culture geared towards keeping patients safe.

Individual beliefs and values of members within any healthcare organization collectively can influence the culture of keeping patients safe.[5] However, organizational rules and regulations, procedures, and processes may start as the starting point and serve as the framework for the development of a positive patient safety culture.[5]

While patient safety and patient safety culture are well-researched concepts in hospital settings, research surrounding these concepts is still new to dentistry, and in particular dental teaching hospitals.[6] A recent systematic review suggested the appreciation of patient safety culture to be novel in dental school settings.[7] A Taiwanese study of dental teaching hospitals and dental practitioners concluded the knowledge of patient safety culture among dental healthcare professionals was low.[8]

Dental students are central to patient management in dental teaching hospitals, supervised by clinical faculty. Given the

novice status of dental students as clinical practitioners and supervisory models where students are not continuously supervised, the potential for patient harm exists.[9] Such supervisory models exist at dental schools in the English-speaking Caribbean as with many other schools worldwide. Research, however, is lacking on patient safety and the culture of keeping patients safe in these settings. This study aimed to determine the knowledge and perceptions of recent graduates, dental surgery assistants (DSAs), and clinical faculty of a dental school in the Caribbean on the concepts of patient safety and to understand the prevailing patient safety culture within the dental school. Three research questions guided this study. These were:

- What do patient safety and patient safety culture mean to recent dental graduates, dental faculty, and dental auxiliaries at a dental teaching hospital?
- How do the concepts of patient safety culture align with the management of patients to prevent patient safety incidents or errors?
- How do attitudes and behaviors related to patient safety develop as students progress through clinical training at a dental teaching hospital?

Methodology

Permission from the research site and ethical approval were obtained before data collection. Three research questions guided this study. A basic qualitative research design using an anonymous online open-ended questionnaire, in English, was used to acquire data to answer the research questions. A de-novo data collection instrument was developed based on current dental and medical literature with input from three subject matter experts. The subject matter experts improved the readability of the questionnaire, improving validity. The questionnaire consisted of three main sections: the first section dealt with informed consent, the second section collected demographic information and the third section included items mapped to the overall research questions on the knowledge and perceptions of patient safety and patient safety culture (Appendix A).

A purposive sampling framework, specifically criterion sampling was utilized to include graduates from the graduating years of 2020,2021 and 2022; clinical faculty, with a minimum of two years of teaching experience, and dental surgery assistants with a minimum of two years of employment at a dental school situated in the English-speaking Caribbean. The dental school is the only one in the English-speaking Caribbean with more than 20 years of clinical training and where most clinical dental training happens within a dedicated hospital setting. Dental graduates served as a proxy for dental students in this study given the supervisory and collegial relationship of the principal researcher with potential participants. Pre-clinical students, non-clinical faculty, auxiliary staff with less than two years of experience, and faculty in leadership positions were excluded from the sampling framework.

A recruitment letter, with an embedded link to the online questionnaire, was sent to all eligible participants using the institutional email addresses of the participants. The recruitment letter was sent anonymously by an administrative staff member. The principal investigator was not identified due to supervisory and collegial relationships and the nature of the research. The recruitment letter explained the aim of the study. The online questionnaire was deployed over two weeks from the 16th of February to the 1st of March 2023. After two weeks the link was disabled to prevent further responses. The link was only turned off after ensuring data saturation of the qualitative data set. In this instance, the data was determined to be saturated when there was recurring similarity in new participant responses. Twenty-eight persons responded to the questionnaire before the link was disabled.

Responses were transferred to a Word document, uploaded to QDA Miner and thematic analysis was used to analyze the qualitative data set.[10] Before thematic analysis the researcher reflected and recorded personal assumptions, biases, and knowledge on patient safety and the culture surrounding patient safety at **this** research site. This reflexivity was required given that the researcher is clinical faculty, involved in clinical teaching at the site. After thoroughly reading through the data set, initial codes were developed using both descriptive and interpretative emergent coding. This resulted in 56 initial codes. These initial codes were combined using interpretative coding only to give 27 codes. From these collapsed codes, 10 themes were developed in a continuous and iterative process. In the final stage of qualitative data analysis, 4 themes were finalized to answer each of the research questions. A narrative was written to describe each of the themes, supported by respondents' excerpts. **Table 1** shows a synopsis of the themes with sample respondent excerpts.

Results

Demographic profile of respondents

Of the 28 respondents, 12 were clinical faculty, 10 were recent graduates, and 6 were dental surgery assistants. Four participants graduated in 2020, 1 graduated in 2021, and 5 graduated in 2022. The ages of participants ranged from 23 to 74 years. Males accounted for 28.6% ($n = 8$) of total respondents while females accounted for 76.4% ($n = 20$) of respondents. Participant quotes in the next section are annotated by CF (clinical faculty), DSA (dental surgery assistant), and Gr (Graduate).

The meaning of patient safety and patient safety culture

Research question one, which explored the meaning of patient safety and patient safety culture for members of the dental team in the dental teaching hospital was answered by two themes-Application of a clinical knowledge-based framework for the

Table 1. Final developed themes with definitions and supporting respondent excerpts.

Final theme	Definition of theme	Supporting Respondent Excerpts
Clinical knowledge-based framework for understanding patient safety	Respondents understood the types of dental adverse events that could happen during the clinical management of patients	**CF 1**: "The methods of ensuring patient care in a manner that is beneficial to the patient while minimizing possible risk and adverse effects."
Understanding elements of patient safety culture	Respondents understood non-clinical factors, such as, institutional procedures and policies and norms and values that could cause or prevent harm in clinical dental settings	**DSA 1**: "The view or outlook dental staff places on patient safety and how they rank its importance." **DSA 2**: "Patient safety culture is the rules and regulations that need to be followed to develop habits which ensure the safe care of the patient." **CF 2**: "PSC is critical for ensuring safe and high-quality care and requires the active participation of all staff and leaders."
Gatekeepers of patient safety	All clinical stakeholders have the responsibility of speaking up and intervening to prevent instances of patient harm.	**Gr 8**: "Patient safety is fostered by having instructors supervise every stage of a clinical procedure." **Gr 9**: "We tend to encourage each other to practice safely, no one tends to be offended." **DSA 3:** " Instructors observe what the students are doing and this allows the instructors to correct any errors."
Understanding personal limitations	Recent graduates, as a proxy for dental students, understand personal limitations related to developing clinical competence in maintaining patient safety	**Gr 6**: "I have tried to get complete diagnostic radiographs in one go so as not to expose the patient unnecessarily to radiation." **Gr 4**: "I would say since the start of my clinical training I'm now more thorough in terms of ensuring that patients are medically fit to undergo procedures."

understanding of patient safety and understanding the individual elements of patient safety culture. When considering patient safety, respondents had an appreciation of keeping patients safe based on clinical experiential knowledge gained in the teaching environment. This is evidenced by the definition of patient safety given by one respondent (CF1) as, " The methods of ensuring patient care in a manner that is beneficial to patient while minimizing possible risk and adverse effects." Gr1 stated, "Patient safety involves the necessary measures that are taken to mitigate any avoidable complications that a patient may experience in the dental setting." Gr2 stated, "Patient safety includes practices to prevent, reduce, and mitigate negative outcomes as it pertains to patients under our care. Practices such as using a rubber dam, taking a thorough medical history, and obtaining medical clearance for certain patients."

Respondents appreciated that patient safety involved managing a myriad of complex tasks that could go awry in the clinical setting. This is evidenced by the response (CF2), "Patient safety may be related to infection control, materials, instruments, and drugs used in dental procedures." Inadequate treatment planning and poor clinical management of the patient were also perceived to be a patient safety issue. Gr 2 stated, "One must make sure clinical procedures will be of benefit to the patient treatment." Poor clinical management was emphasized by Gr3 who stated, "I have heard about poor treatment planning which resulted in the wrong tooth surface removal which led to pulpal exposure."

There was an understanding of patient safety culture (PSC) from an individual, team, or institutional perspective, however, most respondents believed patient safety to be an institutional-related concept driven by institutional policies and rules. DSA1 defined PSC as "The view or outlook dental staff places on patient safety and how they rank its importance." DSA2 stated, "PSC is the rules and regulations that need to be followed to develop habits which ensure safe care of the patient." A graduate respondent (Gr 5) stated, "PSC is learned in dental school and must be maintained throughout one's career of practicing dentistry." This latter response underscores an individual responsibility for promoting patient safety culture in dental settings.

Despite the varying perspectives on PSC from various respondents, patient safety culture was seen to be generally aligned with and required for favorable patient outcomes and quality dental care. This is evidenced by a respondent's (CF2) quote, "PSC is critical for ensuring safe and high-quality care and requires the active participation of all staff and leaders." The maintenance of patient well-being was mentioned several times when discussing the meaning of PSC in the context of favorable patient outcomes. This is evidenced by the quote (CF3), "PSC are the values and norms instituted and practiced by the organization in ensuring the well-being of the patients."

Results were varied on whether there was a perception of a prevailing patient safety culture at the teaching hospital. Eight respondents stated there was no culture of prioritizing patient safety at the clinical site, two respondents stated, "yes and no," and the remainder of respondents agreed there was a culture of prioritizing patient safety at the teaching hospital.

Patient safety culture and patient management

Research question two, which examined how the concepts of patient safety culture aligned with the management of patients from the perspectives of each of the research participants, was answered by one theme- Gatekeepers of patient safety. Clinical faculty, both core and adjunct faculty, were seen as the primary gatekeepers for maintaining patient safety given the novice status of the beginner dental student. Supervising clinical faculty are perceived, by all respondents, to have the role of recognizing potential and actual patient safety incidents and errors that could result in patient harm. DSA 3 stated, " Instructors observe what the students are doing and this allows the instructors to correct any errors." Gr 8 stated, "Patient safety is fostered by having instructors supervise every stage of a clinical procedure." An appropriate ratio of clinical supervising staff to clinical students is noted as the ultimate safeguard in the prevention of patient harm. CF8 stated, " Increasing staff members would ensure an adequate staff-to-student ratio to be able to more readily identify possible adverse situations and reinforce the correct protocols."

While dental surgery assistants have no supervisory role, they play an important observational role in preventing patient harm in dental school settings. This observational role may be considered a passive gatekeeper role, with DSAs being able to articulate proactively to clinical instructors observed patient safety incidents and errors. This in turn can lead to corrective action before actual patient harm exists. A quote by DSA 2 evidenced this, "Had it not been for the quick response of the dental surgery assistant more damage would have been done." When maintaining patient safety, novice clinical dental students acquire in part knowledge from DSAs. This is evidenced by the statement DSA 4, "Certain dental surgery assistants (auxiliaries) do tend to daily remind students about measures to achieve patient safety."

Students also played a peer gatekeeper role by analyzing errors with each other and actively talking about patient management that had not gone as planned. Students also brought observed instances of patient safety incidents to each other. This is evidenced by the statement (Gr 9), "We tend to encourage each other to practice safely, no one tends to be offended."

Development of students attitudes and behavior related to patient safety

Research question three explored how attitudes and behaviors related to patient safety develop as students progress through the various clinical years of clinical training. This question was answered by the theme of understanding personal limitations. Students are keenly aware of their limitations regarding the clinical management of patients and have internalized the structures and processes embedded in the clinical curriculum as the main mechanisms for keeping patients safe, inclusive of the supervision provided by competent clinical faculty.

There is evidence students equate the development of psychomotor skills and clinical knowledge as training progresses with maintaining individual patient safety and the practice of safe dentistry. For example, Gr 7 cited, "I have taken care not to extrude hypochlorite in a patient with internal resorption by measuring up to the coronal flaring length and bending the irrigating needle to that length." Gr 6 stated, "I have tried to get complete diagnostic radiographs in one go so as not to expose the patient unnecessarily to radiation."

Clinical training is associated with a developing *habit of mind*, related to all domains of learning, which improves overall clinical competence which, in turn, develops an appreciation for real clinical strategies for keeping patients safe while under care. This is evidenced by the response (Gr 4), "I would say since the start of my clinical training I'm now more thorough in terms of ensuring that patients are medically fit to undergo procedures." In another response linked to a developing habit of mind related to infection control a respondent stated, "I usually swab everything that I receive from the dispensary since (I feel) other students do not swab things properly or at all before returning them to the dispensary."

Discussion

Research participants generally appreciated patient safety based on clinical experiences. They understood clinical measures that could be taken to keep patients safe. Students could generally describe scenarios that could be considered patient safety incidents, errors, or patient harm without knowing patient safety jargon. This is in variance to a study conducted by Palmer et al where dental students in the United Kingdom were familiar with both jargon related to patient safety and could describe lapses in patient safety scenarios.[11] Inherent to ideas related to patient safety; respondents understood culture to be the prevailing factor influencing safe outcomes for patients, however, perceptions on the overall culture of patient safety as it relates to proactively having procedures and policies in place to prevent adverse events were mixed. This is aligned with previous work examining patient safety culture in dental school clinics, where less than half of respondents rated systems and processes in place to prevent patient problems as good.[6] Several papers have quantitatively assessed patient safety culture in clinical dental school settings, however, this work used a qualitative approach to understand the meaning of patient safety culture, as a starting point, for various cadres of the dental team, inclusive of students who are central to patient management in these settings.[6,12,13] Further research is planned to assess quantitatively, using a validated patient safety instrument, patient safety culture at this dental school.

The gatekeeper theme emanating from the qualitative data heavily relied on teamwork and communication in the clinical environment. Teamwork and communication in healthcare systems have been identified as core competencies related to patient safety.[14] Teamwork was seen in the gatekeeper role

adopted by clinical faculty, dental surgery assistants, and student peers in actively keeping patients safe in real-time and reflecting on clinical situations not going as planned which could adversely influence patient outcomes. Research regarding teamwork in dental clinical teaching settings concluded team members must be aware of the professional status and clinical abilities of others within the team.[15] Collaborative teamwork among varying professionals of varying abilities and duties to solve the shared task of keeping patients safe in the clinical setting has been cited as a marker of quality care.[16] Such collaborative work is required to keep patients safe in institutionalized settings.[16]

Speaking up and active inter-professional and intra-professional communication between various members of the dental team and between members of the same category of the dental team was essential for effective teamwork and gatekeeper roles at this school. This varies from medical settings where the awareness of the status of various categories of staff prevents speaking up about breaches or failures of patient safety.[14] Active communication of students' clinical abilities between dental surgery assistants and clinical faculty and among clinical faculty was critical to keeping patients safe. Lack of effective communication has been cited as one of the main factors in preventable healthcare errors and remains a serious challenge in institutionalized healthcare.[17] Literature from the discipline of nursing discussed the importance of dialogue to facilitate patient safety when issues with students were identified.[18] Ongoing dialogue and open communication by gatekeepers in this clinical setting formed the basis of keeping patients safe. Communication and teamwork should be considered an even more critical factor in training environments given the novice status of dental students as healthcare practitioners.

Nursing and medical literature discussed patient safety competence by nursing and medical students respectively.[18–20] While patient safety competence was not explicitly described by students as they progressed through clinical training, students equated overall competence, including procedural and psychomotor competence in the field of dentistry with general patient safety competence. Students were aware of individual personal limitations when it came to clinical competence but believed improving competence with progression through training improved competence in keeping patients safe. Such results should be interpreted with caution since research from academic clinical medicine concluded that clinical education alone was insufficient for the proactive prevention of medical errors by trainee students.[19] Specifically, patient safety competence requires a deep understanding and knowledge of the complexity of human and non-human factors within healthcare systems, the detection and prompt management of medical errors, and the application of ethical behaviors in the clinical environment where errors may be observed.[21,22] Researchers in the field of nursing have suggested that the implementation of robust strategies that implement patient safety approaches into clinical training be adopted.[23] This would mean discipline-specific training on common errors related to dentistry, identifying the intersections of human and non-human factors that could contribute to harm in clinical dentistry, and methods to prevent or mitigate such harm.

Rigor and limitations

Data triangulation and data saturation were used to establish credibility in this qualitative study.[24] Triangulation facilitated data acquisition on patient safety and patient safety from three distinct groups of research participants. Sampling for data saturation ensured sufficient data was obtained to answer the formulated research questions. Limitations include the use of only one research site and the purposive sampling framework which could limit the generalizability and transferability of these findings and conclusions. Participants, suspecting the principal researcher may be a colleague, may have avoided detailed responses to questions dealing with failures of patient safety in this dental school setting. This limitation may have resulted in more positive participant responses to the items dealing with patient safety failures on the research questionnaire.

Power analysis was not used to determine the sample size for this qualitative research. This work relied exclusively on data saturation to determine the further recruitment and final number of participants. This could be considered another limitation of the work. Further research could involve using the same research instrument as a script for interviews or focus group discussions with dental students of the program. This approach can validate the current study's findings by obtaining insights into the attitudes and behaviors of current students regarding the concepts of patient safety in dentistry and the patient safety culture while still enrolled in the professional program.

Conclusion

Based on the emerged themes where respondents understand patient safety from a clinical experiential perspective and many respondents perceive patient safety culture as being guided predominantly by rules and policies with clinical faculty bearing the ultimate responsibility for keeping patients safe there may be merit in introducing a patient safety curriculum where the multi-dimensional nature of keeping patients safe can be introduced to not only students, but other members of the dental team. Such a safety curriculum can foster in dental team members a personal responsibility to keep patients safe while working in a clinical training environment.

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Author contributions

The author conceptualized this work, completed the initial literature review, developed the research instrument, collected and analyzed the data, and was responsible for this work's initial and final drafts.

Consent

Informed consent was gained from all the study participants.

Data availability

The qualitative data associated with this work can be found at Harvard Dataverse. https://doi.org/10.7910/DVN/UGUPUM.

Ethics approval

This work was approved by the Institutional Review Board of the American College of Education and the Ethics Committee of the St. Augustine Campus of The University of the West Indies (CREC SA.1709/08/2022).

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Appendix A: Questionnaire Items Related to the Research Questions

1. What do you understand by the concept of patient safety?
2. What do you understand by the concept of patient safety culture?
3. Can you give some examples of what you consider preventable adverse patient events in dentistry?
4. Can you give some examples of adverse patient events with which you have been involved or observed or heard about while working in the clinics of this dental teaching hospital?
5. Have you ever had to communicate to someone about behavior that could result in an adverse patient outcome? How was this received by the peer or student?
6. Can you give an example of when you had to report or bring to the attention of a clinical administrator's someone's behavior or actions that resulted or could have resulted in harm to a patient? What was the result?
7. Is there a culture of patient safety at the school? How do you think the environment at this school fosters a culture of patient safety?