

Infection Prevention and Control Practices Among Early Career Doctors in Georgia A Qualitative Study

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Abstract

Background: Healthcare-associated infections remain a major patient safety concern, and infection prevention and control (IPC) is a key component of safe care. Although undergraduate training aims to prepare students for IPC practice, gaps between knowledge and real-world implementation are frequently reported. This study explores how early-career doctors in Georgia perceive IPC preparedness and its application in clinical settings, within a broader mixed-methods KAP study.

Methods: A qualitative descriptive study was conducted using semi-structured interviews with early-career dentists (n=12), who constituted the primary analytic sample. Additional interviews with final-year dental students (n=12) and clinical managers/practice supervisors (n=8) were used for contextual triangulation only (32 interviews in total). Data was collected in Georgian, transcribed, and analysed using reflexive thematic analysis following an iterative coding process. Reporting followed established qualitative research standards.

Results: Five interrelated themes were identified: discontinuity between theoretical training and clinical practice; limited practical IPC skill development; resource and workflow constraints; influence of informal practices and hierarchy; and behavioural adaptation over time. Participants described variability across clinical environments, where IPC adherence depended on resources, supervision, and local norms. While training provided a conceptual foundation, practical competence was largely shaped by workplace experience.

Conclusions: IPC practices among early-career doctors in Georgia are influenced by the interaction between education, clinical environment, and organizational norms. Addressing gaps between training and practice may require earlier and repeated practical training, structured supervision, and clinical conditions that support consistent implementation of standard precautions. These findings may help contextualize quantitative KAP results and inform educational and system-level improvements.

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Introduction

HAI are commonly described as preventable harms linked to the processes of care, and IPC is positioned as a core component of patient safety and quality improvement. [1,2,8] A WHO summary accompanying its global IPC report states that, in acute-care hospitals, an estimated 7 of 100 patients in high-income countries and 15 of 100 patients in low- and middle-income countries acquire at least one HAI during hospitalization; the same summary notes that well-implemented IPC programs can prevent a substantial proportion of HAIs (reported as up to 70% in some contexts). [2] In Europe, the ECDC reported that 4.3 million

patients in EU/EEA hospitals acquire at least one HAI each year, based on its 2022–2023 point prevalence survey program. [3,4] These figures provide context for why health systems and training institutions emphasize IPC capability and adherence.

International guidance describes IPC through a set of minimum practices expected for all patient care. WHO's standard precautions aide-memoire defines standard precautions as the minimum IPC practices to be used by all healthcare workers for the care of all patients, at all times, in all settings, addressing both recognized and unrecognized infection sources. [5] The CDC's "Core Infection Prevention and Control Practices" similarly presents standard precautions as foundational, explicitly including hand hygiene, environmental cleaning and disinfection, risk assessment and appropriate PPE, and reprocessing of reusable equipment between patients, while also emphasizing the enabling roles of leadership support, education/training, and monitoring with feedback. [6] In dental settings, CDC guidance describes standard

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precautions as including hand hygiene, PPE, respiratory hygiene, sharps safety, sterile instruments/devices, and clean/disinfected environmental surfaces, and highlights that education/training is an enabling element. [7]

A recurring observation in the IPC education literature is that knowledge and positive attitudes do not necessarily translate into consistent practice. In a cross-sectional study of final-year medical students, self-reported hand hygiene compliance was most strongly associated with behavioral determinants such as habit and self-efficacy, and was not associated with knowledge—suggesting that the clinical environment and behavioral formation may be important targets for intervention. [11] In a concurrent mixed-methods study of final-year medical students, a gap between attitudes/knowledge and reported behavior was observed, and qualitative findings emphasized role modeling and feasibility barriers such as time constraints and workload pressure. [12] Within dental education, multiple surveys in different contexts report generally positive attitudes and partial adherence alongside persistent gaps in specific IPC elements (e.g. Sterilization/disinfection details, hand hygiene timing, or clinic workflow). [18–22] A Georgia-based survey among senior dental students reported variability in beliefs and practices related to universal/standard precautions and waste handling, underscoring the relevance of local educational and clinical context. [18]

Qualitative work is well suited to examining the “how” and “why” behind IPC practice patterns, including the influence of organizational norms and the “hidden curriculum” (implicit learning that occurs between designed and experienced curricula). A qualitative medical education study conceptualizes hidden curriculum as implicit learning that can shape professional behaviors and attitudes beyond formal teaching. [16,17] More broadly, qualitative syntheses of healthcare worker adherence to IPC guidance describe barriers and facilitators spanning clarity and feasibility of guidance, sufficient training, PPE and supply availability, time pressure, and organizational culture-factors that can interact in ways not easily captured by KAP instruments alone. [10]

Georgia provides a relevant setting to study these interactions because published facility-level assessments indicate ongoing IPC strengthening efforts alongside implementation challenges. An assessment of IPC core components at Georgian facilities described gaps and opportunities across programmatic components—providing a plausible systems backdrop for early-career clinicians’ experiences of workplace variation. [9] However, qualitative evidence focused on the transition from university IPC teaching to early-career clinical practice in Georgia remains limited in the international literature. This study addresses that gap by analyzing early-career doctors’ accounts of IPC preparedness, workplace feasibility, and the local norms shaping everyday practice, while situating these findings within a broader mixed-methods KAP project in final-year medical and dental students.

Aim: To explore how early-career doctors in Georgia describe IPC preparedness and implementation during

the transition to clinical work, and to develop themes that can contextualize—rather than substitute for—quantitative KAP findings derived from student questionnaires.

Methods

Study Design and Framework

This research employed a qualitative descriptive design utilizing semi-structured, in-depth interviews and reflexive thematic analysis. The primary objective was to explore the underlying causal relationships, perspectives, and experiences beyond quantitative data, providing a comprehensive understanding of Infection Prevention and Control (IPC) education, enforcement, and practical implementation within the Georgian dental landscape. The analytic process followed an iterative and recursive framework consistent with the principles established by Braun and Clarke, encompassing coding, theme development, refinement, and interpretive synthesis. Reporting is strictly aligned with COREQ and SRQR international guidelines to ensure transparency and rigor.

Target Groups and Participants

The study utilized purposive sampling to recruit participants across three distinct target groups to ensure contextual triangulation:

•**Group 1: Final-year Dental Students.** Twelve students from accredited Georgian higher education institutions were interviewed to capture the knowledge, attitudes, concerns, and expectations instilled during the formal educational process.

•**Group 2: Clinical Managers and Practice Supervisors.** Eight individuals responsible for IPC oversight in university or private clinics, including senior doctors and practice leads, provided systemic perspectives on institutional culture and student preparedness.

•**Group 3: Early-career Practitioners.** Twelve dentists who graduated within the last 1–3 years and are currently active in private or public sectors. This group offered a critical evaluation of educational quality based on real-world professional requirements.

Data Collection and Instrumentation

Semi-structured interview guides were tailored to each target group, focusing on key domains such as perceived discrepancies between undergraduate training and workplace realities, systemic challenges (e.g., financial constraints, time management), and the evolution of risk perception regarding blood borne pathogens like HIV and Hepatitis. Participants were also queried on specific observed behaviors, including the use of personal protective equipment (PPE), waste management, and the maintenance of sterile environments. Data collection continued until thematic saturation was reached within the core analytic sample of early-career doctors.

Data Analysis

Interviews were conducted and transcribed in Georgian. Data were analysed using line-by-line coding to develop candidate themes, which were subsequently refined to ensure internal coherence and external distinction. For this manuscript, selected excerpts were translated into academic English using a forward-translation method,

with linguistic fidelity verified by a second bilingual reviewer. Five major themes were identified: theory–practice discontinuity; insufficient practical IPC skill-building; resource and workflow constraints; informal practices and hierarchical normalization; and evolving professional risk awareness.

Ethics and Confidentiality

Ethical approval for this study was formally obtained from the Institutional Review Board (IRB) of the Georgian Dental Association. All participant data were de-identified to maintain anonymity (coded as ECD-1 to ECD-12), and participation was strictly voluntary. Researchers ensured that professional confidentiality was maintained throughout the transcription and analysis phases, adhering to established ethical standards for qualitative health research (table 1)

Results and discussion

The analysis of early-career doctors' narratives suggests that the transition from university training to clinical practice is characterized less by a direct application of acquired knowledge and more by adaptation to heterogeneous clinical environments. Participants consistently described variability across clinical settings, where infection prevention and control (IPC) practices were not uniformly implemented. While some environments were described as structured and adequately resourced, others were characterized by inconsistent adherence to IPC standards. As one participant noted, "Clinics did not economize on resources; sterilization processes were generally well controlled..," whereas another described a contrasting experience, stating that "Both sterilization and waste management practices were routinely compromised; protocols were not consistently followed."

This variability appears to contribute to a perceived discontinuity between theoretical education and clinical practice, which has been described in prior studies examining the gap between knowledge, attitudes, and behavior among healthcare trainees. [11,12] Participants frequently framed university-based IPC teaching as insufficiently connected to real clinical conditions. One respondent described the learning process as "Training consisted mainly of repeated slide-based instruction and abstract information, which differed substantially from real clinical practice," indicating that theoretical instruction did not adequately prepare them for the contextual demands of clinical environments.

Across interviews, there was a consistent emphasis on the limited role of structured practical training in undergraduate education. IPC-related competencies were often described as learned at a conceptual level, without repeated opportunities for skill application. This included limited exposure to core elements of standard precautions, such as PPE use, instrument handling, and sterilization workflows. One participant stated that "The main gap was in practical knowledge; we covered the material at a theoretical level through textbooks, but had no meaningful hands-on experience."

These accounts align with evidence suggesting that be-

havioral determinants such as self-efficacy and habit formation may influence adherence to IPC practices at least as much as factual knowledge. [11] Educational research further indicates that repeated, practice-oriented learning approaches, including simulation-based training, may support the development of procedural competence and confidence. [13,14]

In addition to educational gaps, participants described systemic constraints that shaped IPC-related behavior in clinical settings. These constraints were primarily related to resource availability and workflow pressures. Limited access to materials, instrument shortages, and time constraints between patients were described as conditions under which deviations from recommended practice could occur. One participant noted that "When there is a shortage of instruments and materials, deviations can occur, including during packaging and sterilization processes.," while another referred to time pressure, stating that "Limited time between patients often meant that proper preparation and infection control procedures were not fully completed."

Such accounts are consistent with qualitative evidence indicating that feasibility constraints, including supply limitations and workload, may influence adherence to IPC guidelines. [10] In some cases, these constraints were intertwined with hierarchical dynamics, where decision-making authority influenced whether protocols were followed. For example, one participant described being required to reuse a disposable item due to supply limitations and supervisory insistence: "At the insistence of a senior doctor, I had to reuse a clamp that was intended for single use."

Participants' narratives also suggest that deviations from recommended IPC practices may become normalized within certain clinical environments. In these contexts, practices that diverge from formal guidelines were not always perceived as exceptional but rather as part of routine workflow. One participant described a setting where "Protocols were consistently violated across multiple aspects of practice," indicating a pattern of consistent deviation from established standards.

This pattern appears to reflect broader organizational influences, including informal norms and implicit learning processes. The concept of hidden curriculum, which describes how professional behaviors are shaped through observation and socialization rather than formal instruction, may provide a useful interpretive framework for these findings. [16-20] In addition, contextual inputs from managerial perspectives pointed to uncertainty among trainees regarding routine IPC tasks, such as waste segregation, suggesting that everyday practices may require clearer guidance and reinforcement at the point of care.

At the same time, participants did not uniformly adopt these practices. Some described active resistance to environments perceived as unsafe, including leaving clinical settings where IPC standards were not maintained. One respondent noted that such conditions were "This was unacceptable to me, and I left the workplace shortly after-

ward,” indicating that individual decision-making may mediate exposure to suboptimal practices.

Over time, participants described a process of behavioral adaptation associated with increased awareness and perceived responsibility. This was often expressed as greater attentiveness and caution in patient care. One participant stated that “You become more attentive and cautious in your clinical practice,” while others emphasized a consistent approach aligned with standard precautions, including treating all patients as potentially infectious.

This adaptive process appears to reflect the interaction between individual learning and the clinical environment. Prior research suggests that adherence to IPC practices may be influenced by behavioral patterns formed during early clinical exposure, including habit formation and perceived risk. [5,11] In this context, adaptation was not solely a function of formal education but emerged through ongoing engagement with real-world clinical conditions.

Taken together, the findings suggest that IPC practices among early-career doctors are shaped through a dynamic interaction between educational preparation, structural constraints, and workplace culture. The data indicate that the gap between knowledge and practice is not solely attributable to deficits in training but may also reflect the influence of contextual factors that shape how IPC principles are applied in everyday clinical work. (Table 2)

This qualitative analysis suggests that early-career doctors in Georgia experience infection prevention and control (IPC) not as a fixed set of procedures derived from formal training, but as a context-dependent practice shaped by the interaction between education, workplace conditions, and social dynamics. Participants’ accounts indicate that the transition from university to clinical work involves adjustment to environments where IPC standards are variably implemented, and where formal knowledge does not consistently translate into practice. These findings are consistent with prior evidence indicating that knowledge alone is not a reliable predictor of IPC adherence, and that behavioral factors such as habit formation, perceived self-efficacy, and environmental context may play a more substantial role. [11,12]

From a systems perspective, the reported challenges related to reprocessing, sterilization, and waste management suggest that adherence to IPC standards is closely linked to the availability of structural and organizational support. Participants’ descriptions of resource limitations and time constraints indicate that deviations from recommended practice may emerge under conditions where infrastructure, supply chains, or workflow design do not support consistent implementation. This interpretation aligns with international guidance emphasizing that effective decontamination and reprocessing require not only technical knowledge but also appropriate facilities, defined processes, and quality assurance mechanisms. [6,23] In addition, qualitative evidence syntheses have shown that feasibility, workload, and organizational support are key determinants of adherence to IPC guidelines, supporting the patterns observed in this study. [10] National data from Georgia also suggest that gaps in knowledge

and preventive behaviors, including low hepatitis B vaccination uptake and frequent occupational exposures, remain relevant among dental professionals, reinforcing the contextual relevance of the present findings. [24]

The findings also highlight the role of informal practices and hierarchical dynamics in shaping IPC behavior. In several accounts, deviations from recommended protocols were described as embedded within routine clinical practice, suggesting that workplace norms may influence behavior independently of formal instruction. This observation is compatible with the concept of hidden curriculum, where implicit learning through observation and social interaction contributes to professional behavior formation. While this study does not directly measure organizational culture, participants’ narratives suggest that early-career clinicians may adopt or resist local practices depending on both perceived expectations and individual thresholds for acceptable risk.

Educational implications should be interpreted cautiously. Participants’ emphasis on limited practical training suggests that IPC education may benefit from earlier and more consistent integration of hands-on learning opportunities. Evidence from educational research indicates that simulation-based training may support the development of procedural skills and confidence, particularly in areas such as PPE use and infection control decision-making, although its effectiveness depends on alignment with clinical realities and reinforcement in practice settings. [13,14] These findings suggest that educational interventions alone may be insufficient unless they are supported by clinical environments that reinforce the same standards and behaviors.

Taken together, the results indicate that IPC adherence among early-career doctors is shaped by a combination of individual capability, environmental opportunity, and social influences. Rather than reflecting a simple deficit in knowledge, the observed patterns appear to emerge from the interaction between training structures and workplace conditions. This suggests that interventions aimed at improving IPC practices may need to address both educational design and health system factors, including supervision, resource availability, and organizational norms.

Limitations

Limitations of this study should be acknowledged. The sample size was relatively small and limited to a specific national context, which may affect the transferability of findings. As a qualitative study, results are based on self-reported experiences and may be subject to recall or social desirability bias. Additionally, while triangulation was used, the primary analysis focused on early-career doctors, which may not fully capture perspectives across all healthcare settings.

Conclusion

The findings of this study suggest that IPC practices among early-career doctors in Georgia are shaped by the interaction between formal education, clinical environment, and workplace norms. Participants’ narratives indicate that a perceived gap between theoretical training and practical application may influence how IPC principles are

implemented in routine care, particularly in settings where resource constraints and workflow pressures are present.

These qualitative insights may provide a useful context for interpreting the results of the quantitative KAP component, especially in cases where knowledge and attitudes appear misaligned with reported practices. The findings suggest that strengthening IPC education may require not only increased emphasis on practical skill development but also alignment between training environments and real clinical conditions.

Potential implications include the introduction of earlier and repeated hands-on IPC training, structured supervision and feedback during clinical placements, and improvements in facility-level conditions that support consistent application of standard precautions. [5, 6, 9, 10, 13] Such approaches may contribute to more consistent translation of IPC knowledge into practice, although their effectiveness is likely to depend on both educational and system-level factors.

Table 1. Participant characteristics (placeholders to complete from study metadata).

Characteristics	Data / Status	Note
Interviews conducted	32 total; 12 included in primary analysis	Primary analytic sample: early-career dentists (group3)
Years since graduation (experience)	[range/median- 1-3 years]	Inclusion criterion for primary analytic sample
Interview period	July–October 2025	
Interview language	Georgian	Selected experts forward- translated into academic English; linguistic fidelity verified by second bilingual reviewer
Participant coding	ECD-1 to ECD-12	Students coded ST-1 to ST-12; managers coded MG-1 to MG-8
Additional contextual interviews	Students (n=12) Managers/supervisors(n=8)	Used solely for triangulation; not used for primary theme identification

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Table 2. Theme summary mapped to IPC domains and determinants

Themes	Main IPC domains referenced in transcripts	Suggested determinant lens (interpretive)
Theory–practice discontinuity	cross-cutting; reprocessing and waste noted	training environment variability; organizational climate
Insufficient practical training	PPE, reprocessing/sterilization	capability (skills), supervision, competency reinforcement
Resource/workflow constraints	reprocessing; time between patients; PPE supply	opportunity/feasibility; workflow design; supply availability
Informal practices/hidden curriculum	reprocessing; waste segregation; role modelling	norms and hierarchy; tacit learning
Behavioral adaptation	vigilance, PPE attention, “treat all as infectious”	habit formation; self-efficacy; risk perception

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