

Integrated Infection Control Strategies: Collaboration across Family Medicine, Nursing, Public Health, Dental, Laboratory, Medical Records, and Operation Room Specialties

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Abstract

Infection Control in modern times includes the protection of patients against infections with health workers in all settings of healthcare. Evidence-based best practice in family medicine, nursing, dental, laboratory medicine, and surgical specialties is the very foundation of an effective Infection Prevention and Control program. Explicit communication, protocols, education of patients, and vaccination to minimize the chances of infection are also part of this. The nurses are on the first line in the practice of IPC, and microbial labs provide the all-important diagnostic information in infection surveillance. Further training, monitoring for compliance, integrating medical records and technology will reduce health care-associated infections and improve patient outcomes.

Keywords: Infection Prevention and Control, Multidisciplinary collaboration, healthcare teams, patient safety, IPC compliance, patient education, surgical site infection.

Introduction

This is a situation where prevention and control of infection have to be used in all various settings for healthcare to ensure safety for the health worker along with the patient. Association with effective infection prevention and control programs has to include evidence-based practices, ongoing training, and multi-disciplinary collaboration (Storr et al., 2017; Weber et al., 2023). These rely on teams from IPC developing, implementing, and monitoring guidelines for infection control and maintaining compliance to developed protocols as stipulated (World Health Organization, 2011). Through coordination between family medicine, nursing, dentistry, laboratory medicine, medical records, and surgical specialties, infection risks can be targeted; this goes a long way in furthering the safety of both the patient and the worker (Alqahtani et al., 2022).

Another key component of this holistic approach to IPC involves interdisciplinary coordination through the different health care disciplines. In line with Manning et al. (2018) and Alqahtani et al. (2022), identification and control of risks for infection are considered on aligned perspectives among nurses, physicians, and other health professionals. There will be a minimization of risk in contamination or misusing personal protective equipment in this regard. As discussed by Kim & Hwang, 2020,. Environmental services and facilities management also contribute to hygienic maintenance and will assist in the surveillance of infection (Storr et al., 2017). Communication, shared objectives, and defined roles form prerequisites for effective collaboration across teams to achieve an all-rounded IPC strategy (Barrera-Cancedda et al., 2019).

Methodology

It provides a critical overview of areas where collaboration among health teams, representatives of the different teams involved in care, facilitates the realization of success regarding infection prevention and control programs in healthcare settings. Searches were conducted in the three major databases: PubMed, Google Scholar, and Scopus. For the period from 2000 to 2023. Specifically, these terms in the search-with quotes-were used:

"Multidisciplinary collaboration in IPC", "Infection prevention healthcare teams", "Nursing IPC adherence", and "Family medicine infection control."

This returned approximately 400 articles from the main search. Articles were then filtered by taking only those of relevance. Duplicates were discarded, and research related to the roles of a diverse range of health workers in infection prevention and control was given higher considerations. Articles then were further narrowed either to specific discipline or to locations outside of the hospital were excluded. These will include peer-reviewed articles, systematic reviews, meta-analysis, cohort studies, and practice of IPC across different disciplines, both in inpatient and outpatient settings.

After filtration, 85 articles were included and critically reviewed to meet the inclusion criteria. The synthesized findings presented the roles of the different health care teams in IPC, including family medicine, nursing, dentistry, microbiology, and surgery. Thus, the effectiveness of cooperative efforts in improving patient safety and reduction of healthcare-associated infections.

Literature Review

Literature reviews indicate that interdisciplinary collaboration for IPC across healthcare settings is of essence. In fact, studies in this line have shown that the professionals who handle the patients, including family medicine physicians, nurses, dentists, laboratory teams, and surgeons, have always played a very vital role in either the adoption or the adherence to such protocols. The front-line nurses are directly involved in the patient's care and maintain hand hygiene and are involved with the proper use of isolation procedures. Family medicine physicians will also be working closely with IPC teams in extending infection control practices into the community, while laboratory teams provide the diagnostic data about infection surveillance.

Good communication among health teams has always been very relevant to reducing infection risks and improving the condition of the patients. Interdisciplinary care does allow for early identifications of possible infection threats and supports necessary timely interventions, which also include proper use of antimicrobial therapies. More information is also being shared through technological integrations. To wit, electronic health records and diagnostic tools have also meant more decisions being taken in real time.

The breakdown in communication and professional priorities interfered with effective collaboration in IPC. Some of these could be improved by protocols, respect, and training on how to work in a team. To have any IPC function effectively, there needs to be clear roles, education, and responsibilities among the team members to provide safety for the patients and employees alike.

Overall, this review supports interdisciplinary collaboration in IPC, insisting that there is a need for interdisciplinary collaboration among healthcare disciplines for improved infection control practices, reduced healthcare-associated infections, and better patient care.

Discussion

The Contribution of Family Medicine

These providers must be taken as the champions of prevention from the spread of infectious diseases within communities at large outside the four walls of a hospital. These include standard precaution principles, patient education on the control of infection, timely vaccination, and proper antimicrobial stewardship. According to literature review, Khalid, 2019, This needs to be followed by the close collaboration between family medicine teams and IPC teams for best practice in infection control to be extended much beyond clinical settings.

Family medicine doctors usually act as gatekeepers for patients who might be presenting with infectious symptoms. The early detection and isolation of patients who could potentially be infectious also act as a prevention measure of spreading in outpatient settings (Khalid, 2019). Family medicine clinics should, therefore, have different protocols for triaging persons suspected of infections besides making available masks, segregating areas where patients wait, or minimizing exposure to other people and staff (Almasad et al. 2023). On every occasion of patient encounter, appropriate precautions like hand hygiene and personal protective equipment should be observed by physicians (Storr et al. 2017).

The mandate also goes on in teaching the patients infection prevention, the patients have to be taught step by step by physicians in family medicine regarding infection prevention measures such as hand hygiene, respiratory etiquette among others in the reduction of infection spread at home and within the community.

Khalid, 2019. The physician should discuss the self-isolation issues, the treatment, and when the patient must visit the clinician again for the confirmed or suspected infection patient (Almasad et al., 2023). Also, the involvement of patients and families as partners in infection prevention has shown improved adherence to IPC practices and reduced community transmission of the virus (Storr et al., 2017).

Family medicine physicians also play a critical role in the promotion of vaccination, which is the most effective preventive measure for infectious diseases (Khalid, 2019). During every visit, they must check the vaccination status of their patients and provide vaccines recommended by national guidelines (Almasad et al., 2023). The physician should make the patient aware of the benefits and risks of vaccination. The physician has to enlighten the patient about all misconceptions and concerns related to vaccination (Njovu 2016). Coordination with agencies and community-based organizations may achieve better access and coverage to vaccination, especially in the disadvantaged populations (Storr et al., 2017).

IPC and Nursing:

Nurses are usually at the very frontline of any infection prevention and control practices. Knowledge, workload, resources, and organizational culture are some of the variables affecting the compliance with IPC guidelines by nurses (Kim & Hwang, 2020; Njovu, 2016). As claimed by Barrera-Cancedda et al., (2019), there is evidence showing that IPC promotion strategies tailored for nurses may promote better compliance by educating, reminding, and giving feedback. Similarly, nurses also have an influence on the implementation of any antimicrobial stewardship programme (Gotterson et al., 2021).

The most relevant category nurses spend most of their time in the health profession in direct care for the prevention of infection. Their scope of practice involves a wide range of IPC practices such as starting with hand hygiene and aseptic technique, isolation of patients, and cleaning of the environment (Kim & Hwang, 2020). Nurses are essentially charged with the responsibility, first and foremost, of teaching patients and families about the measures against infections as well as monitoring them for signs and symptoms of infection (Barrera-Cancedda et al., 2019).

However, several factors have been identified to hinder nurses from implementing IPC guidelines. Heavy workload and time constraint with so many competing priorities often deter the implementation of best practices (Njovu, 2016). Secondly, lack of knowledge and inadequate training and resource provision including personal protective equipment always prevent compliance (Akagbo et al., 2017). The other organizational issue is the lack of support provided by the management for a no-punishing culture that would not want nurses to report any error or near-miss concerning infection control (Nofal et al., 2017).

Targeted approaches to improve IPC compliance amongst nurses should be carried out: Education and training will be developed based on the needs of the nurses to learn and delivered in approaches that meet their requirements for improved participation and retention. Barrera-Cancedda et al. (2019) providing regular feedback on IPC practice via audit/ direct observation will improve the ability of nurses to remember to practice to a gold standard. Njovu 2016. There can also be deepening of engagements and motivation if greater responsibility in IPC activities for nurses could be motivated at either a committee level or through quality improvement work, Kim and Hwang add in 2020. Organizational cultures promoting openness and learning could also contribute to the positive assurance of compliance with IPC continually, a factor considered to be important according to Nofal et al. in 2017.

Infection control in dentistry

Since dental procedures are in close contact, they expose the patients to droplets of respiratory secretion; hence, infection control is very important. The California Dental Association, 2020, explains that the standards of dental infection control are defined by regulatory bodies and professional associations. The central IPC practices in the dental field, according to Brody, 2020, include hand hygiene, personal protective equipment, instrument sterilization, surface disinfection, and safe injection practice. This implies that the dental teams must be informed about evolving guidelines of IPC.

Some infection risks deal with dentistry due to the nature of the treatments. AGPs include drilling and scaling, which produce droplets that become airborne and harbor infectious pathogens, Brody, 2020. Sterilization of dental instruments is important in order to prevent the transfer of bloodborne pathogens from one patient to another. Thus, proximity to oral cavities and even exposure to saliva and blood may place dental professionals at an infectious risk, Almasad et al., 2023.

Apart from this, dental practices should be equipped with appropriate infection control measures as well. As hand hygiene is the foundation of prevention of infection in dentistry, a dental professional should carry out hand hygiene before and after every patient contact. Brody, 2020 Dentists should wear gloves, masks, eye protection, and gowns while performing all the activities of patient care. By the year 2023, according to Almasad et al., all dental instruments were supposed to be cleaned and sterilized between patients using only validated methodologies, including autoclaving.

It is also essential to establish environmental infection control in the dental setting. High-touch or body-fluid exposed surfaces should be allowed to come into contact with the EPA-registered disinfectants for continuous disinfection (Brody, 2020). Anti-retraction valves and water line cleaners should be attached to dental units to impede bacterial growth (California Dental Association, 2020). Single dose vial would have no re-capping of the needle with proper safe injection practices to ensure that prevention of blood borne pathogens occurred (Almasad et al., 2023).

The Microbiology Laboratory

The microbiology laboratory is the heart of IPC efforts because it affords proper and timely and accurate testing for diagnosis with a proper guide to develop treatment plans and prevention programs (Khalid, 2019). Important collaboration needs to be placed between these laboratory and clinical teams as well. Also, detection of infectious diseases and also antimicrobial patterns is at the core level of such laboratories (Luz et al., 2020).

Microbiology laboratories are used in the identification of pathogens through various diagnostic approaches, including culture, microscopy, antigen test, and molecular tests (Khalid, 2019). Rapid diagnosis and accuracy in the testing process guide the clinical management, such as the right choice of antimicrobial drugs and infection control measures, respectively (Luz et al., 2020). Laboratories must have quality control processes in place to ensure the reliability and reproducibility of results (Almasad et al., 2023).

In properly delivering care to a patient, there should be proper communication between the laboratory and the clinical team. The laboratories must communicate the positive result immediately to both the ordering provider and the infection control team especially for the specimens or pathogens of concern as stated by (Khalid, 2019). The laboratories shall notify about collection, transportation, and interpretation of specimens as noticed by Luz et al., 2020. Multidisciplinary rounds and committees would help create teamwork, through which laboratory data could effectively feed into their clinical decision-making processes (Almasad et al., 2023).

Microbiology laboratories have an important role in infection surveillance and outbreak detection. By monitoring trends in the prevalence of pathogens and antimicrobial resistance patterns, there is the possibility of emerging infectious threats being picked out, which may inform targeted prevention efforts, including vaccination or environmental remediation. Policies regarding reporting to infection control personnel and public health authorities of reportable diseases or unusual findings should be developed (Luz et al., 2020; Khalid, 2019). According to Almasad et al. (2023), the regional or national network for infectious diseases surveillance traces the transmission of infections, thus guiding public health intervention.

Record keeping and infection control

Proper and accurate documentation of the medical records should be in place within the process of infection prevention and control. Medical records summarize history, identify trends and communicate to manage a patient stay by health care providers (Almasad et al., 2023). Machine learning tools such as EHRs can be blamed for outbreak detection and decision making at the clinical front (Luz et al., 2020; Peiffer-Smadja et al., 2020).

Information about infection prevention activities would most significantly emanate from the medical records. Properly recorded symptoms, exposure, and risk factors of a patient would guide the implementation of isolation precautions or targeted testing as recommended by Almasad et al. (2023). Recordation of the presence of an invasive device, such as a central line or urinary catheter, would guide the implementation of proposed device-associated infection prevention bundles by Luz et al. (2020). Accurate and timely documentation of infections, such as the causative pathogen and treatment, is required for surveillance and quality improvement efforts (Peiffer-Smadja et al., 2020).

With the implementation of EHR, avenues have been opened in order to improve infection prevention and control. EHRs standardize documentation and thus ensure that all infection-related information is well-documented. According to Almasad et al., 2023, this ensures that infection-related information is captured. Clinical decision support systems in EHRs, as highlighted in Luz et al., 2020, can be designed to provide real-time notifications and recommendations based on a patient's risk factors or test results. EHRs can also be developed in a way that they automatically generate infection-related reports, such as lists of patients on isolation precautions or healthcare-acquired infections for example Peiffer-Smadja et al., 2020.

However, new emerging technologies still promise even more in infection control through medical record data with insights from machine learning to artificial intelligence. These tools analyze volumes of structured and unstructured data for patterns and predict outcomes (Luz et al., 2020). For example, based on factors from a patient's profile and the details of their surgical procedures documented in an EHR, machine learning algorithms may be trained to predict risk for surgical site infections (Peiffer-Smadja et al., 2020). These models could inform targeted prevention and resource allocation efforts (Almasad et al., 2023). However, such analytics tool development and its implementation will require collaboration between infection control, informatics teams, and data science teams for both validity and clinical utility of it (Luz et al., 2020).

IPC in Surgical Specialties

Prevention of SSIs in the surgical pathway is very extensive (Sartelli et al., 2020). The major strategies include proper hair removal, skin antiseptics, antimicrobial prophylaxis, maintenance of normothermia, and postoperative wound care. The use of multidisciplinary bundles in SSI prevention has led to decreased infection rates. Interdisciplinary collaboration between surgery, anesthesia, nursing, pharmacy, and IPC teams is at the core of this.

These are a significant cause of morbidity, mortality, and costs in health care. The factors of risk for the patient include age, obesity, and comorbidities, while the surgical factors include the type and duration of the procedure (Sartelli et al., 2020). Evidence-based practices within the surgical pathway can avoid SSIs (Almasad et al., 2023).

Preoperative measures will include avoiding inappropriate hair removal and appropriate skin antiseptics. When indicated, hair removal should be done using clippers, not razors, to avoid any form of skin irritation or abrasion (Sartelli et al., 2020). Use an appropriate antiseptic agent for skin preparation-chlorhexidine or iodine-due allowance for drying before making the incision (Almasad et al., 2023). Prophylaxis with antimicrobials should

be started within sixty minutes before incision time and redosed according to the duration of procedures and half-life of antibiotics (Sartelli et al., 2020).

The practices that are related to intraoperative settings include some practices that may help in the prevention of SSIs, including normothermia, tissue oxygenation, and limitation of visitors to the OR. They may improve normothermia with active warming; using the forced-air warming blanket, for instance, is recommended by Sartelli et al., 2020. This can be achieved by maintaining appropriate tissue oxygenation with normal blood pressure, oxygen supplementation, and avoidance of fluid overinfusion. Reduction in the number of personnel and door entries may minimize the risk of air-borne contamination in the operating theatre (Almasad et al., 2023; Sartelli et al., 2020).

The cornerstones of effective IPC programs are education of health care workers and surveillance for compliance. Health care workers should be appropriately oriented to policies and practices on IPC. That forms the core competency and adherence to best practice (Storr et al., 2017; Almasad et al., 2023). It should thus be carried out at the time of orientation, annually, and on the introduction of a new procedure to the system, depending on the particular role and requirement felt for different health care professionals. A judicious mix and use of a whole range of strategies- classrooms and e-learning modules, simulations- aid in effective delivery of education. Involving front-line staff in curriculum design and education delivery enhances relevance and, therefore ownership of the course among the staff members serving in health services (Manning et al., 2018).

It is equally about monitoring compliance to identify gaps and hence promote continuous improvement. The gold standard will be direct observation, where the observer is trained on how to give real-time feedback on hand hygiene and on the proper use of personal protective equipment (Almasad et al., 2023; Storr et al., 2017). These self-assessment tools not only provide perception data, knowledge, and perceived barriers to compliance from the health worker and are combined with direct observation. Competency-based knowledge tests ensure the employee has knowledge and is able to apply the appropriate basic IPC practices. Routine audits that include assessment of environmental cleaning and infection prevention bundles help in a structured approach for monitoring progress and identifying system-wide opportunities for improvement (Manning et al., 2018). All these strategies together enhance the adherence to IPC, reduce healthcare-associated infections, and protect patients and healthcare professionals.

Conclusion

This also concerns involving all healthcare workers with multi-faceted and multi-discipline approaches in practicing infection prevention and control in an expanded continuum of care. In addition, such healthcare facilities must be able to do ongoing education and training in fostering the culture of safety and continuously monitor and improve their IPC practices. Infection prevention and control need to move with the times in relation to new challenges and opportunities the ever-changing environment creates in finding novel ways of keeping the threats from infectious diseases at bay from patients, workers, and the community.

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