

Enhancing Infection Control Practices through the Collaboration of Nursing, Nutrition, Physical Therapy, Laboratory, and Radiology Teams

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ABSTRACT

Introduction: Infection control as a critical area of practice and delivery of care is inherent to improving client, staff and overall health system outcomes. Although in recent years there have been innovations in medicine and treatment, healthcare-associated infections (HAIs) are still an issue that complicates hospitalization, augments the length of hospital stay and the costs of treatment, increases morbidity and mortality rates. Therefore, the onset of this problem requires the application of a multiprofessional approach, using the experience of nursing, nutrition, physical therapy, laboratory sciences, and radiology. Interdisciplinary cooperation between such teams can greatly improve communication and effectiveness of all infection prevention and control measures, as well as promote a culture of safety within the healthcare organizations.

Aim of work: To explore how the synergy among nursing, nutrition, physical therapy, laboratory, and radiology teams enhances infection control practices, focusing on their roles, challenges, and the benefits of teamwork.

Methods: We conducted a comprehensive search in the MEDLINE database's electronic literature using the following search terms: Enhancing, Infection Control, Practices, Collaboration, Nursing, Nutrition, Physical Therapy, Laboratory, and Radiology Teams. The search was restricted to publications from 2016 to 2024 in order to locate relevant content. We performed a search on Google Scholar to locate and examine academic papers that pertain to my subject matter. The selection of articles was impacted by certain criteria for inclusion.

Results: The publications analyzed in this study encompassed from 2016 to 2024. The study was structured into various sections with specific headings in the discussion section.

Conclusion: Infection control is a concept that can be described as a complex process that requires concerted effort. Such a nursing care plan of work with clients, involving integration of nursing, nutrition, physical therapy, laboratory services, and radiology significantly defines the possibility to prevent infection, and improve the patient's outcome. Every specialization brings its own experience, primary with the patients, improvement of their nourishment, diagnostics, and rehabilitation. Multi-disciplinary approach can therefore be recommended as a way through which various healthcare teams can address these infections due to the fact that they have a huge complexity. These factors include misunderstandings, lack of common purpose, and lack of formal learning, are detrimental to the smooth running of groups. Over time perhaps due to the constant changes in the health care delivery system, the interconnection between these disciplines will continue to be the bedrock of quality health care delivery especially with a focus on the patient.

Keywords: Enhancing, Infection Control, Practices, Collaboration, Nursing, Nutrition, Physical Therapy, Laboratory, and Radiology Teams

INTRODUCTION

Infection prevention and control are a fundamental clinical practice that determines the health of patients, the safety of healthcare workers, and general healthcare standards (Assiri et al., 2021). Despite improvements in medical practice equipment and guidelines, healthcare-associated infections (HAIs) continue to be a major issue, substantially impacting the length of hospital stays, healthcare costs and overall sufferance and mortality rates. To address this problem, it is necessary to use the interdisciplinary approach that would involve nursing, nutrition, physiotherapy, laboratory and radiology (Zaha et al., 2019). Collective working among these teams can improve organizational infection prevention and control measures and promote a safety culture throughout care delivery establishments (Aziz, 2016).

Nurses are the main health providers who are involved in the prevention of the spread of infection to patients. Some of the things that nurses do include hand washing, use of aseptic procedures, and identification of any early signs of infections. In addition to the direct nursing care, nurses promote patients' knowledge about measures needed to implement hygiene practices in the healthcare setting as well as after discharge. Through interdisciplinary work, nurses can incorporate their patient-oriented observations into more general infection prevention frameworks, enhancing collaboration and cohesiveness in care provision (Carter et al., 2018).

Proper diet plays an important role in boosting of immune system and expediting the healing process. Clinicians should involve nutritionists and dietitians to develop specific and targeted nutrition plans that help enhance the immune system in patients. In cooperation with the nursing staff, they make sure that the proposed nutrition interventions are appropriate and realistic depending on the patient's health state (Obeagu et al., 2024). Moreover, the nutritional risk can be individualized to cater to specific risks such as the immunocompromised patient, thus providing a comprehensive approach to infection prevention control (Obeagu et al., 2024).

The specific roles of physical therapists (PTs) involve helping patients out of bed to decrease their infection risk, working on breathing exercises to minimize risks such as pneumonia or developing pressure ulcers in bedbound patients. PTs also ensure that patients learn proper hygiene when undergoing physical rehabilitation since many of them may be sharing therapy gyms with other patients. This coordination means that PTs work hand in hand with other caregivers to ensure that any interventions carried out with the patient adhere to infection control standards thus ensuring a cohesive approach towards patients (Copanitsanou, 2018).

Laboratory staff plays a crucial role in detection of pathogens, constant surveillance of emerging antimicrobial resistance and in setting up effective evidence based treatment regimens. Effective diagnostic technologies make it possible to quickly identify infected persons and, therefore, isolate individuals who pose a potential risk of spreading the virus. Information sharing between laboratory teams and clinicians guarantees the accurate interpretation of results and implementation into clinicians' working pattern and decision making regarding infections concern (Simões et al., 2016).

Radiology assists laboratory diagnostics in that it offers imaging techniques that assist in diagnosing infections, including pneumonia, abscess, or osteomyelitis. Excluding infections in patients with clinical symptoms or identifying them in patients with unknown status, radiologic changes can help clinicians decide on invasive interventions, including bacteriology from specimens for culture, and isolation measures. Radiology teams also play their part by practicing proper sterilization of the equipment to minimize chances of transmission when taking images (Zheng et al., 2020).

The integration of the areas such as nursing, nutrition, physical therapy, laboratory, and radiology provide a strong base for the infection control. It is now required for members of these teams to meet on a routine basis, to be trained together and to communicate effectively. By breaking down silos and promoting mutual understanding, healthcare institutions can ensure that every team member contributes their expertise to a shared goal: by reducing infections and improving the quality of care to the patients. The concurrent use of the two theories highlights the fact that teamwork is a decisive component of today's health care systems as infection control is not an issue to be managed isolated from other professionals.

AIM OF WORK

To explore how the synergy among nursing, nutrition, physical therapy, laboratory, and radiology teams enhances infection control practices, focusing on their roles, challenges, and the benefits of teamwork.

METHODS

A thorough search was carried out on well-known scientific platforms like Google Scholar and Pubmed, utilizing targeted keywords such as Enhancing, Infection Control, Practices, Collaboration, Nursing, Nutrition, Physical Therapy, Laboratory, and Radiology Teams. The goal was to collect all pertinent research papers. Articles were chosen according to certain criteria. Upon conducting a comprehensive analysis of the abstracts

and notable titles of each publication, we eliminated case reports, duplicate articles, and publications without full information. The reviews included in this research were published from 2016 to 2024.

RESULTS

The current investigation concentrated on the synergy among nursing, nutrition, physical therapy, laboratory, and radiology teams enhances infection control practices, focusing on their roles, challenges, and the benefits of teamwork between 2016 and 2024. As a result, the review was published under many headlines in the discussion area, including: The Role of Nursing in Infection Control, Nutrition's Contribution to Infection Control, Physical Therapy's Role in Reducing Infection Risks, Laboratory Services: The Backbone of Infection Diagnosis and Control, Radiology's Contribution to Infection Control, Interdisciplinary Collaboration: A Key to Enhanced Infection Control and Challenges and Opportunities in Interdisciplinary Infection Control

DISCUSSION

Infectious diseases prevention and control are widely recognized as the foundations of high-quality, safe patient care, and protection of healthcare employees. Each form of infection control cannot be accomplished in the modern healthcare environment in which no single profession can handle it. There should be a coalescing of effort to implement nursing, nutrition, physical therapy, laboratory services, and radiology professionals in order to control the infections that have taken the lives of many people, enhance healthcare outcomes, and foster the general health of people (Alotaibi et al., 2022). This piece of work seeks to explain how the collaboration with these disciplines improves infection control practices with emphasis on roles, challenges, and relevance of working as a team.

Dec lasting commt from others reduces friction: impact of an educational nursing intervention in infection control

In particular, nurses are the primary health care officials who deal directly with the affected patients so they have a pivotal role when it comes to infection control. Their duties entail practicing the universal precautions like hand washing, wearing of a PPE, and a clean environment. Nurses also play a huge role in reinforcing patients and families on measures of preventing infection (Peter et al., 2018).

Particularly, the involvement of the nursing team in the process of infection surveillance is essential. In particular, they can observe symptoms of emerging new epidemic diseases, for example temperature or pus formation in the wound. Also, nurses monitor patient compliance with hospital procedures like removal of catheters on the right time, appropriate changing of the dressing, and following correct procedure on dealing with patients on isolation if needed. However, their responsibilities are not only clinical because, in addition to providing care to patients, they also work with other practitioners in dealing with all the associated factors that define infections (Bowler & Brown, 2024).

One of the greatest issues that nurses struggle with is the conflict between massive workloads and proper IP practices. This paper establishes that staffing shortages are associated with failure in infection control measures, hence the need for a coordinated approach. As for the measures mentioned above, it is essential to emphasise that close cooperation with nutritionists, physical therapists, laboratory personnel, and radiology teams may help nurses strengthen the existing infection control system (Lam et al., 2018).

Nutrition's Contribution to Infection Control

Proper feeding is a core principle of infection as well as healing process. The body is able to fight diseases better when it's nourished properly and therefore such diseases as flu are avoided. Whereas, malnutrition undermines the immune system, meaning patients get to spend more time in hospitals developing HAIs (Zaikina et al., 2021).

Nutritionists and dietitians analyze a patient's intake of nutrients and prescribe appropriate healthy diets to boost immunity. Adequate protein is also essential for wound healing; and vitamins A, C, and E help fight infection as they are antioxidants. Moreover, for the healthy immune response both zinc and selenium in adequate amounts are essential (Adams et al., 2020).

In infection control one must make nutritionists and nurses efficient partners. Patients' food and fluid requirements are supervised by nurses and information is passed to nutritionists where patients develop appetite alterations, gastrointestinal problems or where they necessitate special feeding procedures. Other examples included; in enteral or parenteral nutrition, the underlying risk of infection through feeding tubes or catheters requires adherence to the principles of asepsis again highlighting the inter-professional practice of infection control (Meehan et al., 2019).

Further, nutritionists also involve themselves in training the patients and the carers on aspects of handling foods safely especially at outpatient or home environment. This education minimises the chances of food borne diseases and speeds up the healing process. The inclusion of nutrition into infection control measures are possible when they are put into a combined approach this will help healthcare teams tackle short-term infection risks as well as the overall general health of the patient (Batchelor-Murphy et al., 2019).

Physical Therapy's Role in Reducing Infection Risks

The physical therapy (PT) has a great role in the infection prevention, with activities that include mobilising patients and preventing complications that arise from immobility, for instance; pressure ulcers, pneumonia and deep vein thrombosis (DVT). Stress and immobility in hospitalized patients are depicted as major risk factors for these conditions that predispose patients to secondary infection. These PTs prescribe exercise regimes to ensure adequate blood flow, proper functioning of the lungs and to overall strengthen the body (Jefferson et al., 2023).

Equipped hygiene also appears to be one of the chief infection control concepts in physical therapy. Mats, bands and parallel bars that are used in physical therapy are prone to harbour pathogens if not cleaned. PTs are also bound to clean environment and also ensure that the patients understand measures to avoid getting infections during therapy (Rutala& Weber, 2019).

Cross referrals of patients from other healthcare workers polish teamwork since PTs work together with other health practitioners. For example, the mobilization and the pressure sore concerns can be handled by the nurse and the PT in parallel with parenteral nutrition. Likewise, nutritionists play a significant role to physical therapy aim by providing enough nutrients that are required to enable the patient undergo physical exercises and recoveries (Prelock et al., 2017).

Physical therapists also help patients and their families understand, for instance, the task of washing and cuddling a child during rehabilitation in case of the use of a walker or a wheelchair. Incorporation of PT into infection controls would help decrease the occurrence of adverse effects and enhance the treatment results of a medical team (Winstein et al., 2016).

Laboratory Services: The Backbone of Infection Diagnosis and Control

Infection diagnosis and management, as well as the evaluation of infection control measures depend on laboratory services. One learns that microbiologists and laboratory technologists diagnose pathogens through tests including blood culture, urine analysis and molecular analysis. Detection of pathogens within short time means that necessary actions are taken to stop spread of diseases within health facilities (Orozco et al., 2018).

Other stakeholders involved in antimicrobial stewardship programs include laboratory staff who generate information on pathogen drug resistance patterns. These details help clinicians select the right antibiotics and thereby minimize antibiotic resistance. In outbreak situations, laboratories are indispensable for defining the source and prevalence of infections, support to the containment initiatives (Morency-Potvin et al., 2017).

There should be an effective record of correspondence between the laboratory staff and the nurses in regard to specimen collection and management. Unappropriate ways can give a wrong evidence or the sample may be contaminated, thus hampering the infection control. Likewise, laboratory teams cooperate with specialists in infection control so as to evaluate general trends towards HAIs and coordinate measures in prevention (Hejles, 2023).

The other area of focused control measure in laboratories is the health of the staff that works in the laboratory environment. Practicing proper working wear and disposal of waste reduces the chances of exposure to the pathogens of record. It is emphasized that the laboratory is not only used for diagnosis since the data and knowledge obtained by such a facility are used to develop comprehensive approaches to preventing infections in healthcare facilities (Cornish et al., 2021).

Radiology's Contribution to Infection Control

Consequently, radiology teams provide indirect but highly significant contributions when it comes to infection control. Various imaging techniques like X-rays, CT scans, MRI are used in imaging of conditions that might be associated or might have infections as their comorbid. For instance, chest X-ray may be used to diagnose pneumonia while CT scan may be used to diagnose abscesses or osteomyelitis (Niu et al., 2020).

Radiology poses a special infection control concern. Students mobility and his or her use of the same equipment as others are dangerous as they would spread cross contamination. Radiology technicians are required to adhere to stringent sanitization procedures where radiological machines and surfaces touched by the patients are sanitized after every interaction. Furthermore, compliance with the use of PPE and washing hands is important especially when imaging a patient (Hubble et al., 2016).

There is a continuous care between radiology and other related fields, which makes cooperation important. For example, radiologists and nurses can arrange imaging for patients confined to their rooms to reduce the probability of being infected. Likewise, the radiology findings inform the treatment strategies of the different professionals, including infectious disease physicians, surgeons, and physiotherapists (John-Paul et al., 2018).

In this regard, education assimilated within radiology departments is oriented towards the understanding of administrative, technical, and medical measures aimed at prevention of infections, specific measures of cleaning and maintenance of the environment and equipment as well as staff formation. The use of radiology as an effective component of infection control strategies can enhance diagnostic outcomes while reducing the possibility of infections for healthcare personnel (Ilyas et al., 2019).

Interdisciplinary Collaboration: A Key to Enhanced Infection Control

The cross-disciplinary characteristics shown by the integration of nursing, nutrition, physical therapy, laboratory services, and radiology into infection control practices is a prime example where interdisciplinary co-operation is put to the test. Each of these contributions brings in a unique specialty that complements the collective approach toward infection prevention and management (Thakur & Rao, 2024).

Effective co-operation is based on clear communication, shared goals, and mutual respect. This can be achieved by regularly organizing interdisciplinary meetings, case discussions, and joint training sessions so that the infection control enthusiasts get to build a partnership among themselves. For example, a multidisciplinary team might manage the nursing intervention that is associated with a surgical site infection patient with nutritional support, physiotherapy, laboratory diagnostics, and radiology view to achieve better outcomes (Peter et al., 2018).

Technology plays a massive role in the facilitation of collaboration. Electronic health records (EHRs) enrich cross-field merges by adding real-time records that facilitate coordination and decision-making. For instance, analysis from the laboratory may lead to some nursing intervention, while radiology findings lead to physical therapy modification (Senbekov et al., 2020).

Leadership support is one thing required for embedding a culture of collaboration. Hospital administrators who make joint initiatives possible resources-wise; recognize contributions from relevant disciplines; and ensure that all staff gain access to training in infection control will bolster interdisciplinary teamwork (Bornman & Louw, 2023).

Challenges and Opportunities in Interdisciplinary Infection Control

Despite the numerous benefits that interdisciplinary cooperation in infection control would present, quite serious challenges face this cooperation, such as communication problems, conflicting priorities of departments as well as limited resources. To conquer these problems, there should be a commitment to open conversation, rights understanding, and continuous education among the parties (p. 1) (Tsioutis et al. 2020).

Investing in interdisciplinary training programs would be another method of promoting collaboration. The workshops, simulation exercises, and seminars on infection control that will include multiple disciplines will help raise a common understanding of roles and responsibilities among all stakeholders. Creating the champions for infection control within each discipline will also develop responsibility and leadership (Thakur & Rao, 2024). Opportunities for interdisciplinary infection control practice are research and innovation. Studies looking into the effectiveness of collaborative approaches can be a source of evidence for the best practices. New technologies, like automated disinfection systems and predictive analytics, would enhance prevention efforts (Birgand et al., 2022).

CONCLUSION

Infection control is basically one of the most vital aspects in health care which ensures patient safety, reduces the spread of diseases, and enhances recovery. It requires addressing the complex multifactorial nature of infection prevention in a coordinated and collaborative way, involving the respective expertise and skills of nursing, nutrition, physical therapy, laboratory services, and radiology. Bringing all these professions together would build a comprehensive defense against healthcare-associated infections (HAIs) and would prove the worth of teamwork in turning patient outcomes around and creating a much safer health care environment.

Implementation of standard precautions by the nurses, who serve as the front line caregivers, patient education regarding infection prevention, are the two cornerstones of infection control. Immunological defenses are strengthened by nutritionists through building a direct link between proper nutrition and a lower risk of infection. Patients mobilized by physical therapists prevent complications such as pressure ulcers and pneumonia. In addition, hygiene is considered in their rehabilitation practices, while rates set laboratories provide the diagnostic backbone, identifying pathogens and providing precise guidance on treatment strategies. Radiology professionals provide imaging diagnostics while keeping a vigorous protocol-non-invasive, under a shared environmental setup.

Such an integrated effort among these disciplines strengthens infection control endeavors. With clear communicating practices, mutual respect, and shared goals, interdisciplinary collaboration lets healthcare teams address the patient holistically, aligning the interventions necessary for comprehensive care. However, overcoming barriers such as communication challenges and the limited resources requires an investment in education, leadership support, and innovative technology.

As healthcare systems evolve to address complex challenges, the synergy among nursing, nutrition, physical therapy, laboratory, and radiology teams will remain a cornerstone of infection control. By embracing a multidisciplinary approach, healthcare organizations can not only mitigate the risks of infection but also deliver patient-centered, high-quality care that supports recovery and enhances overall health outcomes.

REFERENCES

1. Adams, S. H., Anthony, J. C., Carvajal, R., Chae, L., Khoo, C. S. H., Latulippe, M. E., ... & Yan, W. (2020). Perspective: guiding principles for the implementation of personalized nutrition approaches that benefit health and function. *Advances in nutrition*, 11(1), 25-34.
2. Alotaibi, M. H., Lrouwaily, A. M. G., Alsuheiman, N. K., Albanagi, G. M., Ahazimy, M. O., & Lhazmi, T. H. (2022). Effective Strategies For Reducing Healthcare-Associated Infections: A Comprehensive Review For Nursing Practice. *Neuropsychopharmacologia Hungarica*, 20(4).
3. Assiri, H., Almutairi, M., Alotaibi, A. M., & Al Ameer, A. (2021). Progressing Infection Control Practices: Strategies For Healthcare Professionals. A New Appraisal. *Journal of Namibian Studies: History Politics Culture*, 30, 188-206.
4. Aziz, A. M. (2016). Infection prevention and control practitioners: improving engagement. *British Journal of Nursing*, 25(6), 297-302.
5. Batchelor-Murphy, M. K., Steinberg, F. M., & Young, H. M. (2019). Dietary and feeding modifications for older adults. *AJN The American Journal of Nursing*, 119(12), 49-57.
6. Birgand, G., Ahmad, R., Bulabula, A. N., Singh, S., Bearman, G., Sánchez, E. C., & Holmes, A. (2022). Innovation for infection prevention and control—revisiting Pasteur's vision. *The Lancet*, 400(10369), 2250-2260.
7. Bornman, J., & Louw, B. (2023). Leadership development strategies in interprofessional healthcare collaboration: A rapid review. *Journal of healthcare leadership*, 175-192.
8. Bowler, S., & Brown, J. (2024). Diagnostic stewardship: establishing the role of the hospital nurse to inform local engagement strategies. *Infection Prevention in Practice*, 100381.
9. Carter, E. J., Greendyke, W. G., Furuya, E. Y., Srinivasan, A., Shelley, A. N., Bothra, A., ... & Larson, E. L. (2018). Exploring the nurses' role in antibiotic stewardship: a multisite qualitative study of nurses and infection preventionists. *American journal of infection control*, 46(5), 492-497.
10. Copanitsanou, P. (2018). Mobility, remobilisation, exercise and prevention of the complications of stasis. *Fragility Fracture Nursing: Holistic Care and Management of the Orthogeriatric Patient*, 67-83.
11. Cornish, N. E., Anderson, N. L., Arambula, D. G., Arduino, M. J., Bryan, A., Burton, N. C., ... & Campbell, S. (2021). Clinical laboratory biosafety gaps: lessons learned from past outbreaks reveal a path to a safer future. *Clinical microbiology reviews*, 34(3), 10-1128.
12. Hejles, R. A. (2023). Review of Literature. *Review of Contemporary Philosophy*, 22, 209-235.
13. Hubble, W. L., Turner, J. A., & Heuertz, R. (2016). Effectiveness of current practices for disinfecting medical equipment in a radiology department. *Radiologic Technology*, 87(3), 250-260.
14. Ilyas, F., Burbridge, B., & Babyn, P. (2019). Health care-associated infections and the radiology department. *Journal of medical imaging and radiation sciences*, 50(4), 596-606.
15. Jefferson, T., Dooley, L., Ferroni, E., Al-Ansary, L. A., van Driel, M. L., Bawazeer, G. A., ... & Conly, J. M. (2023). Physical interventions to interrupt or reduce the spread of respiratory viruses. *Cochrane database of systematic reviews*, (1).
16. John-Paul, J. Y., Spieler, B. M., Chan, T. L., Johnson, E. M., Gulani, V., Sandler, K. L., ... & Hardy, P. A. (2018). Promoting collaborations between radiologists and scientists. *Academic Radiology*, 25(1), 9-17.
17. Lam, S. K., Kwong, E. W., Hung, M. S., Pang, S. M., & Chiang, V. C. (2018). Nurses' preparedness for infectious disease outbreaks: A literature review and narrative synthesis of qualitative evidence. *Journal of clinical nursing*, 27(7-8), e1244-e1255.
18. Meehan, A., Partridge, J., & Jonnalagadda, S. S. (2019). Clinical and economic value of nutrition in healthcare: a nurse's perspective. *Nutrition in Clinical Practice*, 34(6), 832-838.
19. Morency-Potvin, P., Schwartz, D. N., & Weinstein, R. A. (2017). Antimicrobial stewardship: how the microbiology laboratory can right the ship. *Clinical microbiology reviews*, 30(1), 381-407.
20. Niu, Y., Xian, J., Lei, Z., Liu, X., & Sun, Q. (2020). Management of infection control and radiological protection in diagnostic radiology examination of COVID-19 cases. *Radiation medicine and protection*, 1(02), 75-80.
21. Obeagu, E. I., Obeagu, G. U., Odo, E. O., Igwe, M. C., Ugwu, O. P. C., Alum, E. U., & Racheal, P. (2024). Nutritional Approaches for Enhancing Immune Competence in HIV-Positive Individuals: A Comprehensive Review. *IDOSR Journal of Applied Sciences*, 9(1), 40-50.
22. Orozco, J. D., Greenberg, L. A., Desai, I. K., Anglade, F., Ruhangaza, D., Johnson, M., ... & Farmer, P. E. (2018). Building laboratory capacity to strengthen health systems: the partners in health experience. *Clinics in Laboratory Medicine*, 38(1), 101-117.
23. Peter, D., Meng, M., Kugler, C., & Mattner, F. (2018). Strategies to promote infection prevention and control in acute care hospitals with the help of infection control link nurses: a systematic literature review. *American journal of infection control*, 46(2), 207-216.
24. Prelock, P. A., Melvin, C., Lemieux, N., Melekis, K., Velleman, S., & Favro, M. A. (2017, November). One Team—patient, family, and health care providers: An interprofessional education activity providing

- collaborative and palliative care. In *Seminars in speech and language* (Vol. 38, No. 05, pp. 350-359). Thieme Medical Publishers.
25. Rutala, W. A., & Weber, D. J. (2019). Best practices for disinfection of noncritical environmental surfaces and equipment in health care facilities: A bundle approach. *American journal of infection control*, 47, A96-A105.
 26. Senbekov, M., Saliev, T., Bukeyeva, Z., Almabayeva, A., Zhanaliyeva, M., Aitenova, N., ...&Fakhradiyev, I. (2020). The recent progress and applications of digital technologies in healthcare: a review. *International journal of telemedicine and applications*, 2020(1), 8830200.
 27. Simões, A. S., Couto, I., Toscano, C., Gonçalves, E., Póvoa, P., Viveiros, M., &Lapão, L. V. (2016). Prevention and control of antimicrobial resistant healthcare-associated infections: the microbiology laboratory rocks!. *Frontiers in microbiology*, 7, 855.
 28. Thakur, H., &Rao, R. (2024). Emphasis of infection prevention and control: a review. *J PopulTherapClinPharmacol*, 31, 2238-49.
 29. Tsioutis, C., Birgand, G., Bathoorn, E., Deptula, A., Ten Horn, L., Castro-Sánchez, E., ...& Mutters, N. T. (2020). Education and training programmes for infection prevention and control professionals: mapping the current opportunities and local needs in European countries. *Antimicrobial Resistance & Infection Control*, 9, 1-12.
 30. Winstein, C. J., Stein, J., Arena, R., Bates, B., Cherney, L. R., Cramer, S. C., ... &Zorowitz, R. D. (2016). Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*, 47(6), e98-e169.
 31. Zaha, D. C., Kiss, R., Hegedűs, C., Gesztelyi, R., Bombicz, M., Muresan, M., ...&Micle, O. (2019). Recent Advances in Investigation, Prevention, and Management of Healthcare-Associated Infections (HAIs): Resistant Multidrug Strain Colonization and Its Risk Factors in an Intensive Care Unit of a University Hospital. *BioMed research international*, 2019(1), 2510875.
 32. Zaikina, I. V., Komleva, N. E., Mikerov, A. N., Chekhonatsky, A. A., Chernyshkova, E. V., &Karpov, S. M. (2021). Importance of actual nutrition in the prevention of non-infectious diseases. *МедицинскийвестникСеверногоКавказа*, 16(2), 227-232.
 33. Zheng, Z., Yao, Z., Wu, K., &Zheng, J. (2020). The diagnosis of pandemic coronavirus pneumonia: A review of radiology examination and laboratory test. *Journal of clinical virology*, 128, 104396.