

Bridging Clinical Expertise: A Review of Healthcare Technicians and Specialists

Zahrah Ali Ismail Alsomali¹, Khalid Ayedh Almuhammady², Sami Ali Abdullah Alzahrani¹, Abdullah Hassan Saeed Alghamdi¹, Mohammed Ali Mohmmmed Al Garni¹, Mohammed Bagad Alharthi³, Ahmed Yahya Alzelaei¹, Mohammed Mansour Albalawi⁴, Mohammed Saed Alamri⁵, Fahad Suwayyid Ibrahim Almalki⁶, Mohammed Saleh Alhassan⁷, Mohammed Motlag Albalawi⁴, Saad Dmayer Albalawi⁴, Mohammed Saleh Alhassan⁸, Fahad Eidah Althubaiti⁹

¹ Xray Technicin, King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia

² Electroencephalography Technician, Prince Sultan Armed Forces Hospital, Madinah, Saudi Arabia

³ Preventive Health Specialist, Al Hada Military Hospital, Taif, Saudi Arabia

⁴ Nursing Technician, King Salman Armed Forces Hospital In Northwest, Saudi Arabia

⁵ Pharmacy Technician, King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia

⁶ Labratory Technician, King Fahd Armed Forces Hospital, Jeddah, Saudi Arabia

⁷ Director Of Supply, General Administration Of Health Services At Ministry Of Defence, Riyadh, Saudi Arabia

⁸ Director Of Supply, General Administration Of Health Services, Ministry Of Defence, Riyadh, Saudi Arabia

⁹ Laboratory Senior Specialist, Ing Fahd Armed Forces Hospital, Jeddah, Saudi Arabia

Abstract:

This article explores the essential roles and integration of various healthcare support professionals, including X-ray technicians, electroencephalography technicians, preventive health specialists, nursing technicians, pharmacy technicians, laboratory technicians, directors of supply, and laboratory senior specialists. Each of these professionals plays a critical role in the healthcare system, contributing specialized knowledge and skills that enhance the overall quality of patient care. X-ray technicians are pivotal in the diagnostic imaging process, utilizing advanced imaging technology to assist in the identification of medical conditions. Their expertise not only aids in accurate diagnosis but also ensures patient safety through adherence to strict protocols. Electroencephalography technicians, on the other hand, specialize in monitoring brain activity, providing crucial data for diagnosing neurological disorders. Their collaboration with neurologists is vital for timely and effective treatment interventions. Preventive health specialists focus on health promotion and disease prevention, engaging in community outreach and education to foster healthier lifestyles. Their proactive approach is essential in reducing the incidence of chronic diseases and improving public health outcomes. Nursing technicians provide essential support to registered nurses, assisting with patient care tasks and enhancing the overall patient experience through compassionate care. Pharmacy technicians play a vital role in medication management, ensuring the safe and effective use of medications while providing valuable patient education. Laboratory technicians are responsible for performing diagnostic tests that inform clinical decision-making, making their role indispensable in the healthcare team. Directors of supply oversee the procurement and management of medical supplies, ensuring that healthcare providers have the necessary resources to deliver quality care. Finally, laboratory senior specialists provide advanced expertise in laboratory operations, ensuring compliance with regulatory standards and contributing to the overall quality of laboratory services. The integration of these diverse roles fosters a collaborative environment that enhances patient care, improves health outcomes, and streamlines healthcare processes. By recognizing and valuing the contributions of each team member, healthcare organizations can create a more effective and efficient system that prioritizes patient-centered care and addresses the complex needs of patients in today's healthcare landscape.

Introduction

In the rapidly evolving landscape of healthcare, the complexity of patient needs necessitates a collaborative approach that integrates various professional roles. The multi-disciplinary healthcare

support team is a vital component of this approach, comprising professionals such as X-ray technicians, electroencephalography technicians, preventive health specialists, nursing technicians, pharmacy technicians, laboratory technicians, directors of supply, and laboratory senior specialists. Each

member of this team plays a unique role, contributing specialized knowledge and skills that enhance the overall quality of care provided to patients [1].

The integration of these roles fosters a holistic approach to healthcare, ensuring that patients receive comprehensive and coordinated services. This collaborative model not only improves patient outcomes but also enhances the efficiency of healthcare delivery systems. As healthcare becomes increasingly complex, the need for effective communication and teamwork among these professionals is paramount. By working together, they can address the multifaceted challenges of patient care, streamline processes, and ultimately improve the patient experience [2].

Moreover, the integration of diverse healthcare roles allows for a more comprehensive understanding of patient needs. Each professional brings a unique perspective, informed by their training and experience, which contributes to a more thorough assessment of patient conditions. This collaborative effort is particularly important in managing chronic diseases, where multiple factors must be considered to develop effective treatment plans. As healthcare continues to evolve, the importance of a multi-disciplinary approach will only grow, highlighting the need for ongoing education and training to foster collaboration among healthcare professionals [3].

The Role of X-ray Technicians

X-ray technicians, also known as radiologic technologists, are essential in the diagnostic imaging process. They are responsible for operating X-ray machines and other imaging equipment to capture detailed images of the body, which are crucial for diagnosing a wide range of medical conditions. Their expertise extends beyond the technical operation of imaging devices; they must also ensure patient safety by adhering to strict radiation safety protocols and providing clear instructions to patients during procedures [4].

In addition to their technical skills, X-ray technicians must possess strong interpersonal skills to effectively communicate with patients. They often encounter individuals who may be anxious or fearful about undergoing imaging procedures. By providing reassurance and clear explanations, X-ray technicians can help alleviate patient concerns,

fostering a more positive experience. Furthermore, they must be adept at positioning patients correctly to obtain high-quality images while minimizing radiation exposure. This requires a thorough understanding of human anatomy and the principles of radiography [4].

The role of X-ray technicians is particularly critical in emergency settings, where rapid diagnosis can significantly impact patient outcomes. For instance, in cases of trauma, timely imaging can help identify fractures, internal bleeding, or other life-threatening conditions. In such situations, X-ray technicians must work efficiently and effectively, often collaborating closely with emergency room physicians and nurses to prioritize imaging needs. Their ability to quickly assess the situation and respond appropriately can be a determining factor in a patient's prognosis [5].

Moreover, X-ray technicians are increasingly involved in advanced imaging techniques, such as computed tomography (CT) and magnetic resonance imaging (MRI). As technology continues to advance, they must stay updated on the latest developments in imaging modalities and techniques. This ongoing education is essential for maintaining their competency and ensuring that they provide the highest quality of care. Additionally, X-ray technicians often participate in quality assurance programs to monitor and improve imaging practices, further enhancing patient safety and care quality [6].

The Importance of Electroencephalography Technicians

Electroencephalography (EEG) technicians specialize in monitoring and recording electrical activity in the brain. Their work is vital for diagnosing neurological disorders, including epilepsy, sleep disorders, and brain injuries. EEG technicians are trained to operate EEG machines, prepare patients for testing, and analyze the resulting data. They play a crucial role in ensuring that the tests are conducted accurately and that the data collected is reliable [7].

The collaboration between EEG technicians and neurologists is essential for accurate diagnosis and treatment. By providing detailed reports on brain activity, EEG technicians help physicians make informed decisions regarding patient care. Their work is particularly important in identifying seizure

disorders, where timely intervention can prevent further complications. Additionally, EEG technicians must maintain a high level of professionalism and empathy, as patients undergoing EEG tests may be anxious or uncomfortable [8].

EEG technicians are also responsible for educating patients about the procedure, which can help alleviate anxiety and improve cooperation during testing. They explain the purpose of the test, what to expect, and how the results will be used in the patient's care plan. This educational component is crucial, as it empowers patients and fosters a sense of trust in the healthcare process [9].

Furthermore, EEG technicians must be skilled in troubleshooting and problem-solving. During testing, they may encounter technical issues or patient-related challenges that require quick thinking and adaptability. Their ability to address these situations effectively ensures that the testing process runs smoothly and that accurate data is obtained. In addition to their technical skills, EEG technicians often participate in research studies and clinical trials, contributing to the advancement of knowledge in the field of neurology [10].

As the field of neurology continues to evolve, EEG technicians must stay informed about the latest advancements in technology and techniques. This ongoing education is essential for maintaining their competency and ensuring that they provide the highest quality of care. By participating in professional development opportunities, EEG technicians can enhance their skills and contribute to improved patient outcomes [11].

Preventive Health Specialists: A Proactive Approach

Preventive health specialists focus on promoting health and preventing disease through education and community outreach. They engage in health screenings, immunization programs, and lifestyle modification initiatives aimed at reducing the incidence of chronic diseases such as diabetes, heart disease, and obesity. Their role is crucial in fostering a culture of health awareness and encouraging proactive health behaviors among patients [9].

The integration of preventive health specialists into the healthcare team fosters a proactive approach to health management. By working with individuals

and communities, they aim to identify risk factors and implement strategies to mitigate them. Their efforts in educating patients about healthy behaviors and preventive measures contribute to improved public health outcomes. Preventive health specialists often collaborate with other healthcare providers to ensure that preventive strategies are tailored to meet the specific needs of diverse populations [12].

In addition to individual patient interactions, preventive health specialists often engage in community-wide initiatives aimed at promoting health and wellness. These initiatives may include organizing health fairs, conducting workshops on nutrition and physical activity, and advocating for policies that support healthy environments. By addressing social determinants of health, preventive health specialists can help create conditions that enable individuals to lead healthier lives [13].

Moreover, preventive health specialists play a critical role in data collection and analysis. By tracking health trends and outcomes within communities, they can identify areas of need and develop targeted interventions. This data-driven approach allows for the allocation of resources to the most pressing health issues, maximizing the impact of preventive efforts. Their ability to analyze and interpret health data is essential for informing public health policies and practices. Preventive health specialists also serve as liaisons between healthcare providers and the community. They work to bridge gaps in care, ensuring that individuals have access to necessary services and resources. By fostering relationships with community organizations, schools, and local governments, preventive health specialists can create a network of support that enhances health outcomes for individuals and families [14].

The Essential Role of Nursing Technicians

Nursing technicians, also known as nursing assistants or aides, provide essential support to registered nurses and other healthcare providers. They assist with various patient care tasks, including monitoring vital signs, assisting with daily activities, and providing basic hygiene care. Their role is critical in ensuring that patients receive comprehensive and compassionate care.

The integration of nursing technicians into the healthcare team enhances the overall patient

experience. By providing direct support to patients, they allow registered nurses to focus on more complex clinical responsibilities. Their presence in healthcare settings contributes to a more efficient workflow and improved patient satisfaction. Nursing technicians must possess strong interpersonal skills, as they often serve as the primary point of contact for patients, addressing their needs and concerns [15].

In addition to their direct patient care responsibilities, nursing technicians play a vital role in maintaining a safe and clean environment for patients. They assist with infection control measures, ensuring that equipment and patient areas are sanitized and organized. This attention to detail is essential for preventing healthcare-associated infections and promoting patient safety. Nursing technicians also serve as advocates for patients, communicating their needs and preferences to the healthcare team. They often spend more time with patients than other healthcare providers, allowing them to develop strong relationships and gain insights into patients' concerns. This advocacy role is crucial for ensuring that patients receive personalized care that aligns with their values and preferences [16].

Furthermore, nursing technicians are often involved in patient education. They may provide information on post-discharge care, medication management, and lifestyle modifications. By empowering patients with knowledge, nursing technicians contribute to improved health outcomes and increased patient satisfaction. Their ability to communicate effectively and provide support is essential for fostering a positive healthcare experience [17].

As the healthcare landscape continues to evolve, the role of nursing technicians is becoming increasingly important. With the growing emphasis on patient-centered care, nursing technicians are well-positioned to contribute to the delivery of high-quality, compassionate care. Ongoing training and professional development opportunities are essential for ensuring that nursing technicians remain equipped to meet the changing needs of patients and healthcare systems [18].

Pharmacy Technicians: Guardians of Medication Safety

Pharmacy technicians play a vital role in the medication management process. They assist pharmacists in preparing and dispensing medications, ensuring accuracy and compliance with safety protocols. Pharmacy technicians also provide valuable patient education regarding medication use, potential side effects, and adherence strategies. Their role is essential in preventing medication errors and ensuring that patients receive the correct medications in a timely manner [6].

The collaboration between pharmacy technicians and pharmacists is crucial for optimizing medication therapy. By working together, they ensure that patients are informed about their medications and understand how to take them properly. The integration of pharmacy technicians into the healthcare team enhances the overall quality of care, as they contribute to medication safety and efficacy. Additionally, pharmacy technicians often play a role in managing inventory and ensuring that the pharmacy is adequately stocked with necessary medications [19].

Pharmacy technicians are also involved in medication reconciliation, a critical process that ensures patients receive the correct medications during transitions of care. This process is particularly important during hospital admissions and discharges, where discrepancies in medication lists can lead to adverse events. By carefully reviewing medication histories and collaborating with healthcare providers, pharmacy technicians help prevent medication errors and improve patient safety [12].

Moreover, pharmacy technicians are increasingly taking on expanded roles within healthcare teams. They may participate in clinical initiatives, such as medication therapy management programs, where they work directly with patients to optimize their medication regimens. This expanded scope of practice allows pharmacy technicians to contribute more significantly to patient care and improve health outcomes [11].

As the field of pharmacy continues to evolve, pharmacy technicians must stay informed about the latest advancements in medications and treatment protocols. Ongoing education and training are

essential for maintaining their competency and ensuring that they provide the highest quality of care. By participating in professional development opportunities, pharmacy technicians can enhance their skills and contribute to improved patient outcomes [20].

Laboratory Technicians: The Backbone of Diagnostic Testing

Laboratory technicians are responsible for performing diagnostic tests that inform clinical decision-making. They collect samples, conduct analyses, and report results to healthcare providers. The accuracy and timeliness of laboratory results are crucial for effective patient management, making the role of laboratory technicians indispensable in the healthcare team.

The integration of laboratory technicians into the healthcare support team facilitates seamless communication between laboratory and clinical staff. By providing timely and accurate test results, they enable healthcare providers to make informed decisions regarding patient care. Their expertise in laboratory operations contributes to the overall efficiency of healthcare services. Laboratory technicians must adhere to strict quality control measures and regulatory standards to ensure the reliability of test results [21].

In addition to their technical skills, laboratory technicians must possess strong analytical abilities. They are responsible for interpreting test results and identifying any anomalies that may require further investigation. This critical thinking is essential for ensuring that healthcare providers receive accurate information to guide their clinical decisions.

Laboratory technicians also play a vital role in maintaining laboratory equipment and ensuring that it is functioning properly. Regular maintenance and calibration of equipment are essential for producing reliable test results. By adhering to established protocols and quality assurance measures, laboratory technicians contribute to the overall quality of laboratory services [22].

Furthermore, laboratory technicians often engage in continuous education and training to stay updated on the latest advancements in laboratory technology and practices. This ongoing professional development is essential for maintaining their competency and ensuring that they provide the

highest quality of care. By participating in workshops, conferences, and training programs, laboratory technicians can enhance their skills and contribute to improved patient outcomes [23].

As the demand for laboratory services continues to grow, the role of laboratory technicians is becoming increasingly important. With the increasing complexity of diagnostic testing and the need for rapid results, laboratory technicians are essential for ensuring that healthcare providers have access to the information they need to make informed decisions [24].

The Director of Supply: Ensuring Resource Availability

The director of supply oversees the procurement and management of medical supplies and equipment within healthcare facilities. Their role is vital in ensuring that healthcare providers have access to the necessary resources to deliver quality care. By managing inventory and supply chain logistics, the director of supply contributes to the operational efficiency of healthcare services [22].

The integration of the director of supply into the healthcare team ensures that all members have the tools they need to perform their roles effectively. By maintaining adequate stock levels and ensuring the availability of essential supplies, the director of supply plays a crucial role in supporting patient care. Their ability to anticipate the needs of the healthcare team and respond to changing demands is essential for maintaining a smooth workflow [25].

In addition to managing inventory, the director of supply is responsible for negotiating contracts with suppliers and vendors. This involves evaluating potential suppliers, assessing the quality of products, and ensuring that the organization receives the best value for its purchases. By establishing strong relationships with suppliers, the director of supply can secure favorable terms and ensure a reliable supply of essential resources.

Moreover, the director of supply plays a critical role in implementing cost-saving initiatives. By analyzing purchasing patterns and identifying opportunities for efficiency, they can help reduce waste and lower operational costs. This is particularly important in today's healthcare environment, where financial constraints are a significant concern for many organizations [26].

The director of supply also collaborates with other departments to ensure that the procurement process aligns with the overall goals of the organization. By working closely with clinical staff, they can identify specific needs and prioritize purchases accordingly. This collaborative approach ensures that healthcare providers have access to the resources they need to deliver high-quality care.

As the healthcare landscape continues to evolve, the role of the director of supply is becoming increasingly complex. With the growing emphasis on value-based care and the need for efficient resource management, directors of supply must stay informed about industry trends and best practices. Ongoing education and professional development are essential for ensuring that they remain effective in their roles [27].

Laboratory Senior Specialists: Leaders in Diagnostic Excellence

Laboratory senior specialists provide advanced expertise in laboratory operations and diagnostics. They often oversee laboratory staff, ensuring compliance with regulatory standards and quality control measures. Their leadership and specialized knowledge enhance the overall performance of the laboratory, contributing to accurate and reliable test results.

The collaboration between laboratory senior specialists and other healthcare professionals is essential for maintaining high standards of care. By providing guidance and support to laboratory technicians, they ensure that diagnostic testing is performed accurately and efficiently. Their role in the healthcare team is critical for fostering a culture of quality and safety in laboratory practices. Laboratory senior specialists often engage in continuous education and training to stay updated on the latest advancements in laboratory technology and practices [13].

In addition to their supervisory responsibilities, laboratory senior specialists are often involved in research and development initiatives. They may participate in clinical trials, contribute to the development of new testing methodologies, and collaborate with other researchers to advance the field of laboratory medicine. This involvement not only enhances their expertise but also contributes to the overall advancement of healthcare.

Laboratory senior specialists also play a vital role in mentoring and training junior staff. By sharing their knowledge and experience, they help cultivate the next generation of laboratory professionals. This mentorship is essential for ensuring that laboratory staff are equipped with the skills and knowledge necessary to provide high-quality care [15].

Furthermore, laboratory senior specialists are often involved in quality assurance programs, where they monitor laboratory performance and implement improvements as needed. By analyzing data and identifying trends, they can proactively address potential issues and enhance the overall quality of laboratory services. Their commitment to quality and safety is essential for maintaining the trust of patients and healthcare providers alike [9].

As the demand for laboratory services continues to grow, the role of laboratory senior specialists is becoming increasingly important. With the increasing complexity of diagnostic testing and the need for rapid results, their leadership and expertise are essential for ensuring that healthcare providers have access to the information they need to make informed decisions.

Integration and Collaboration: The Heart of Effective Healthcare

The integration of these diverse roles within the healthcare support team is essential for fostering effective communication and collaboration. By working together, these professionals can share insights, streamline processes, and enhance patient care. Interdisciplinary collaboration not only improves health outcomes but also promotes a culture of teamwork and mutual respect among healthcare providers [3].

The importance of collaboration among healthcare support team members cannot be overstated. Each professional brings unique skills and perspectives that contribute to a comprehensive approach to patient care. By fostering an environment of collaboration, healthcare organizations can enhance the quality of care provided to patients and improve overall health outcomes. Regular team meetings, interdisciplinary training, and shared goals can further strengthen the bonds between team members, ensuring that they work cohesively toward common objectives [28].

Effective communication is a cornerstone of successful collaboration. Healthcare professionals must be able to share information clearly and concisely, ensuring that all team members are informed about patient needs and treatment plans. This communication is particularly important in complex cases where multiple providers are involved. By utilizing electronic health records and other communication tools, healthcare teams can enhance information sharing and improve coordination of care.

Moreover, interdisciplinary collaboration fosters a culture of continuous improvement. By working together, healthcare professionals can identify areas for enhancement and implement best practices. This collaborative approach not only improves patient care but also enhances job satisfaction among team members. When healthcare professionals feel valued and supported, they are more likely to be engaged in their work and committed to providing high-quality care [29].

As healthcare continues to evolve, the need for effective collaboration will only grow. With the increasing complexity of patient needs and the demand for coordinated care, healthcare organizations must prioritize interdisciplinary teamwork. By investing in training and resources that promote collaboration, healthcare leaders can create a more effective and efficient system that prioritizes patient-centered care [30].

Conclusion

The multi-disciplinary healthcare support team is a cornerstone of modern healthcare delivery. Each member plays a unique and vital role in ensuring that patients receive comprehensive, high-quality care. As the healthcare landscape continues to evolve, the importance of collaboration and integration among these professionals will only grow, ultimately leading to better health outcomes for patients and communities alike. By recognizing and valuing the contributions of each team member, healthcare organizations can create a more effective and efficient system that prioritizes patient-centered care. In conclusion, the integration of diverse healthcare roles is essential for addressing the complex needs of patients in today's healthcare environment. By fostering collaboration and communication among healthcare support team members, organizations can enhance the quality of

care provided to patients and improve overall health outcomes. As the healthcare landscape continues to evolve, the commitment to interdisciplinary teamwork will be crucial for meeting the challenges of the future and ensuring that patients receive the highest standard of care.

References:

1. Ndububa et al. "A 5-year review of research ethics applications in a tertiary health and educational institution in Nigeria" *African health sciences* (2023) doi:10.4314/ahs.v23i3.85
2. Baldo "The implementation of integrating reporting &IR> in SMEs" *Meditari accountancy research* (2017) doi:10.1108/medar-11-2016-0094
3. Okori et al. "REASONS WHY PATIENTS BYPASS LOWER LEVEL PUBLIC FACILITIES: A CROSS SECTIONAL STUDY FROM UGANDA" (2019) doi:10.21203/rs.2.12795/v1
4. Tian et al. "Spirometric Reference Equations for Elderly Chinese in Jinan Aged 60–84 Years" *Chinese medical journal* (2018) doi:10.4103/0366-6999.227840
5. Santos et al. "Analysis of drug interactions and their implications for laboratory test results" *International journal of health science* (2023) doi:10.22533/at.ed.1593512307075
6. Guessogo et al. "Effect of 24-week repeated short-time walking based training program on physical fitness of black Cameroonian obese women" *Journal of exercise rehabilitation* (2016) doi:10.12965/jer.1630502.251
7. Bozkurt et al. "Respiratory Systems of Dental Technicians Negatively Affected during 5 Years of Follow-Up" *Balkan medical journal* (2016) doi:10.5152/balkanmedj.2016.15312
8. Sunardiyo et al. "Evaluation of the Results of Competency Training of Occupational Safety and Health (OSH) for Laboratory Workers and Laboratory Technicians in the Department of Electrical Engineering, Universitas Negeri Semarang" (2022) doi:10.2991/978-2-494069-47-3_16
9. Bez "Ayurvedic Approach to Sick Cell Disease WSR to Sannipatika Pandu: An Overview" (2023) doi:10.54060/ijahr.2023.14
10. Zhang "Innovative Research on Improving the Construction and Management Level of

- Computer Laboratories in Application-oriented Universities" *Journal of contemporary educational research* (2020) doi:10.26689/jcer.v4i8.1451
11. Blume et al. "Handheld Echocardiography in a Clinical Practice Scenario: Concordances Compared to Standard Echocardiographic Reports" *Journal of cardiovascular imaging* (2022) doi:10.4250/jcvi.2020.0241
 12. Boloş et al. "Investigation of Lung Function Among Dental Laboratory Technicians" (2011) doi:10.2507/22nd.daaam.proceedings.573
 13. Alaqeel et al. "Comprehensive Review of the Evolving Roles of Health Technicians in Clinical and Laboratory Settings" *Journal of ecohumanism* (2024) doi:10.62754/joe.v3i8.5160
 14. Arruda et al. "Posicionamento da Sociedade Brasileira de Cardiologia e da Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista sobre Centro de Treinamento e Certificação Profissional em Hemodinâmica e Cardiologia Intervencionista – 2020" *Arquivos brasileiros de cardiologia* (2019) doi:10.36660/abc.20190841
 15. Pedersen et al. "Implementation of specific strength training among industrial laboratory technicians: long-term effects on back, neck and upper extremity pain" *Bmc musculoskeletal disorders* (2013) doi:10.1186/1471-2474-14-287
 16. Nusairat et al. "Enhancing Communication Between Dental Laboratories and Clinics: The Role of Information Technology Systems in a Developing Country" *Clinical cosmetic and investigational dentistry* (2024) doi:10.2147/ccide.s483308
 17. Venkatesh et al. "Laboratory Information Management Systems in Oral Pathology: A Comprehensive Review" *Cureus* (2024) doi:10.7759/cureus.60714
 18. Mulenga et al. "Assessing the capacity to diagnose human African trypanosomiasis among health care personnel from Chama and Mambwe districts of eastern Zambia" *Bmc research notes* (2015) doi:10.1186/s13104-015-1403-6
 19. Zhou et al. "Improvements in Clinical Laboratory Techniques, Technologies, and Practices with A Focus on The Equipment and Personnel: A Consolidated Review" *Journal of clinical medicine current research* (2023) doi:10.53043/2832-7551.jcmcr.3.001
 20. Stelwagen et al. "Vascular aging in long-term survivors of testicular cancer more than 20 years after treatment with cisplatin-based chemotherapy" *British journal of cancer* (2020) doi:10.1038/s41416-020-01049-3
 21. "Joseph T. Coyle" (2018) doi:10.1523/hon.010005
 22. Uyar et al. "Dental technician pneumoconiosis mimicking lung cancer" *Journal of oral science* (2015) doi:10.2334/josnusd.57.269
 23. Dai et al. "Spatial–Temporal Characteristics of Semen Quality in Infertile Men in Wenzhou, China during 2010–2018" *Andrologia* (2023) doi:10.1155/2023/7416033
 24. Jay et al. "Neurocognitive performance and physical function do not change with physical-cognitive-mindfulness training in female laboratory technicians with chronic musculoskeletal pain" *Medicine* (2016) doi:10.1097/md.0000000000005554
 25. Hu et al. "Oocyte Degeneration After ICSI Is Not an Indicator of Live Birth in Young Women" *Frontiers in endocrinology* (2021) doi:10.3389/fendo.2021.705733
 26. Parenreng et al. "Development of Android Based Laboratory Asset Monitoring and Inventory Application" *Intek jurnal penelitian* (2020) doi:10.31963/intek.v7i1.2286
 27. Styhre et al. "Sociomaterial practices in engineering work" *Journal of engineering design and technology* (2012) doi:10.1108/17260531211241158
 28. Dai et al. "Analysis of clinical characteristics, prognosis and influencing factors in patients with bronchiectasis-chronic obstructive pulmonary disease overlap syndrome: A prospective study for more than five years" *Journal of global health* (2024) doi:10.7189/jogh.14.04129
 29. Saidu et al. "South African women's perspectives on self-sampling for cervical cancer screening: A mixed-methods study" *South african medical journal* (2018) doi:10.7196/samj.2018.v109i1.13278
 30. Masa et al. "Validity of spirometry performed online" *European respiratory journal* (2010) doi:10.1183/09031936.00011510