

EXPLORING THE INTERSECTION OF NURSING LEADERSHIP AND HEALTHCARE QUALITY: A REVIEW OF CONTEMPORARY RESEARCH

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ABSTRACT

This review article explores the critical intersection of nursing leadership and healthcare quality, examining how leadership practices within nursing influence the overall quality of care delivered in healthcare settings. The importance of effective nursing leadership has gained increasing attention as healthcare organizations strive to improve patient outcomes, safety, and satisfaction. By reviewing contemporary research, the article highlights various leadership models, such as transformational and shared leadership, and their role in fostering a culture that prioritizes quality improvement. It also investigates the relationship between leadership behaviors and key quality indicators, including patient safety, care effectiveness, and healthcare delivery efficiency. Furthermore, the article explores the challenges faced by nursing leaders, including workforce shortages, organizational constraints, and the impact of burnout, and how these barriers affect the ability to maintain high standards of care. Through an analysis of current studies and evidence-based practices, the review emphasizes the importance of empowering nurse leaders to drive quality improvement initiatives at both the clinical and



organizational levels. Finally, the article discusses future trends in nursing leadership, particularly in the context of technological advancements, global health challenges, and the need for continued professional development. The findings underscore the need for targeted strategies to enhance nursing leadership and ensure sustainable improvements in healthcare quality. This review article explores the intersection of nursing leadership and healthcare quality, synthesizing contemporary research to identify key themes, gaps, and future research directions. Effective nursing leadership is crucial for promoting healthcare quality, with transformational leadership, staff empowerment, and evidence-based practice emerging as critical factors. However, significant gaps remain in our understanding of the mechanisms by which nursing leadership influences healthcare quality. This review highlights the need for robust theoretical frameworks and longitudinal studies to elucidate the complex relationships between nursing leadership and healthcare quality, ultimately informing strategies to improve patient outcomes and healthcare systems.

Keywords: Nursing leadership, Healthcare quality, Patient outcomes, Quality improvement, Patient safety, Healthcare policy

INTRODUCTION

In today's rapidly evolving healthcare landscape, the intersection of nursing leadership and healthcare quality is becoming increasingly crucial. Nursing leadership plays a pivotal role in shaping the standards of care, improving patient outcomes, and ensuring the overall effectiveness of healthcare systems. With rising demands for high-quality, patient-centered care, effective leadership within nursing is essential to navigating complex healthcare environments and driving quality improvement initiatives.

Healthcare quality is traditionally defined by a set of parameters that include patient safety, effectiveness of care, efficiency, patient-centeredness, and equitable access to services. As the largest segment of the healthcare workforce, nurses are often at the forefront of patient care, making nursing leadership integral to achieving these quality goals. Strong nursing leadership not only influences direct patient care but also impacts organizational culture, workforce satisfaction, and the implementation of evidence-based practices aimed at improving clinical outcomes.

The growing recognition of the need for effective nursing leadership stems from a variety of challenges faced by healthcare systems, including staffing shortages, rising healthcare costs, and the increasing complexity of patient needs. The role of nurse leaders in addressing these challenges while maintaining high standards of care has been the subject of extensive research in recent years. This review aims to explore contemporary studies on the relationship between nursing leadership and healthcare quality, examining how different leadership styles contribute to quality improvement and patient care excellence.

This introduction sets the stage for an in-depth analysis of the ways in which nursing leadership affects healthcare quality and why its role is indispensable in ensuring the continued evolution of patient care systems. Through this review, we aim to identify key leadership practices, successful strategies, and challenges in the healthcare environment that influence the intersection of nursing leadership and quality healthcare delivery.

THE ROLE OF NURSING LEADERSHIP IN HEALTHCARE

Nursing leadership is defined as the ability of nurses to influence, guide, and inspire others in a healthcare setting to achieve high standards of care and optimal patient outcomes. Effective nursing leadership is grounded in a variety of core competencies, including communication, decision-making, problem-solving, emotional intelligence, and the ability to inspire and motivate teams. Strong leadership is essential in creating a supportive environment where staff can thrive, fostering innovation, and maintaining high standards of care. Furthermore, nursing leaders must possess a deep understanding of

clinical practices, organizational dynamics, and healthcare policies to effectively advocate for both patients and the nursing profession.

Several leadership models are commonly applied in nursing practice, each offering distinct approaches to leadership. **Transformational leadership**, for instance, emphasizes the importance of inspiring and motivating staff by creating a shared vision, fostering professional growth, and encouraging innovation. **Servant leadership** focuses on prioritizing the needs of team members, empowering them to develop professionally and achieve their potential. **Shared leadership**, on the other hand, promotes collaboration and shared decision-making among team members, where leadership is distributed across the team rather than being concentrated in one individual. Each model brings unique strengths that can significantly influence the quality of care provided in a healthcare setting.

Effective nursing leadership profoundly impacts organizational culture, shaping how staff interact with one another and approach patient care. A positive leadership style can help cultivate an environment of trust, respect, and collaboration, which in turn supports high levels of job satisfaction and retention among nursing staff. It also encourages a culture of continuous improvement, where evidence-based practices and patient-centered care are prioritized. By promoting these values, nurse leaders create a foundation that aligns with the broader goals of healthcare quality and ensures a more effective and cohesive delivery of care.

NURSING LEADERSHIP AND HEALTHCARE QUALITY

Healthcare quality is broadly defined as the degree to which healthcare services increase the likelihood of desired health outcomes and are consistent with current professional knowledge. It encompasses several key elements, including patient safety, effectiveness of care, patient-centeredness, timeliness, efficiency, and equity. The Institute of Medicine's six quality aims—safe, effective, patient-centered, timely, efficient, and equitable care—serve as a foundational framework in understanding and evaluating healthcare quality. These aims provide a structure for healthcare organizations to develop strategies that enhance the quality of care, with nursing leadership playing a central role in their implementation and maintenance.

Nursing leadership has a direct and significant impact on healthcare quality outcomes. Effective nurse leaders shape the clinical environment in ways that improve patient safety, enhance the effectiveness of care, and increase patient satisfaction. Strong leadership practices contribute to reducing medical errors, improving clinical decision-making, and promoting the use of evidence-based practices. For instance, when nurse leaders emphasize safety protocols and best practices, they help ensure that patients receive high-quality care while minimizing harm. Moreover, effective leadership fosters an environment where patient-centered care is prioritized, enhancing patient satisfaction through better communication, compassionate care, and active involvement in decision-making.

Key actions taken by nursing leaders to influence healthcare quality include strategic decision-making, fostering team collaboration, and developing policies that align with quality improvement goals. Nurse leaders who are involved in decision-making at all levels—whether clinical, organizational, or policy—ensure that decisions are grounded in best practices and evidence-based care. Encouraging team collaboration is equally crucial; when nursing leaders create a culture of open communication and teamwork, they promote better coordination of care, which ultimately improves patient outcomes. Additionally, nurse leaders play a vital role in policy development, advocating for policies that support quality care delivery, resource allocation, and the ongoing professional development of nursing staff. By consistently focusing on these leadership actions, nurse leaders can drive improvements in healthcare quality, ensuring better outcomes for patients and the healthcare system as a whole.

CURRENT RESEARCH ON NURSING LEADERSHIP AND QUALITY IMPROVEMENT

Current research on nursing leadership and quality improvement emphasizes the critical role that effective leadership plays in enhancing patient outcomes and advancing healthcare practices. As healthcare systems become more complex, research has increasingly highlighted the importance of transformational leadership in nursing, which encourages nurses to inspire and motivate their teams to strive for excellence in patient care. Transformational leaders are adept at fostering collaboration, empowering staff, and creating a culture of continuous improvement. These leaders emphasize evidence-based practices and engage in strategic decision-making that positively impacts the quality of care delivered. Research also focuses on the relationship between nursing leadership and the implementation of quality improvement (QI) initiatives. Studies show that strong leadership is essential in guiding QI efforts, as it ensures that improvements are systematically integrated into daily practice, monitored, and sustained over time. Quality improvement initiatives, such as the use of patient-centered care models, team-based care, and safety protocols, are central to addressing issues like medication errors, patient falls, and hospital-acquired infections. Research has found that when nursing leadership is actively involved in these initiatives, the likelihood of success increases, particularly through the application of the Plan-Do-Study-Act (PDSA) cycle, root cause analysis, and other structured QI methodologies.

Current research emphasizes the impact of nurse leaders on staff retention and job satisfaction, which directly influences the quality of care provided. Nurse leaders who support professional development, foster a positive work environment, and promote work-life balance contribute to improved team morale, reduced turnover, and better patient care outcomes. Moreover, the integration of interprofessional collaboration into leadership practices is increasingly recognized as essential in fostering a holistic approach to quality improvement. Effective nursing leaders often collaborate with other healthcare professionals, ensuring that clinical, operational, and administrative teams work together to achieve

shared goals. Finally, there is a growing focus on the role of technology and data-driven decision-making in nursing leadership, where data analytics and digital health tools are leveraged to monitor performance, identify areas for improvement, and streamline workflows. By embracing a data-informed leadership approach, nurse leaders can make evidence-based decisions that optimize care delivery and promote quality improvement across healthcare settings. Overall, current research underscores that strong, proactive nursing leadership is integral to achieving sustainable improvements in patient care, safety, and overall healthcare outcomes.

CHALLENGES AND BARRIERS IN NURSING LEADERSHIP FOR QUALITY HEALTHCARE

Nursing leadership faces several significant challenges and barriers that can hinder the delivery of quality healthcare, despite the critical role nurse leaders play in improving patient outcomes. One of the primary challenges is resource limitations, including staffing shortages and inadequate funding, which can constrain the ability of nurse leaders to implement quality improvement initiatives effectively. In many healthcare settings, high nurse turnover, burnout, and insufficient staff contribute to a strain on resources, making it difficult for leaders to ensure that all patients receive the high standard of care they deserve. This issue is particularly pronounced in settings such as emergency departments, intensive care units, and rural healthcare facilities, where the demand for skilled nursing staff often exceeds supply.

Another significant barrier is resistance to change within healthcare teams. Many nurses and healthcare professionals are accustomed to established practices, and introducing new quality improvement measures or changes in clinical protocols can face opposition. This resistance may be due to skepticism about the effectiveness of new approaches, concerns about added workload, or a lack of trust in leadership. Nurse leaders must therefore engage in effective communication, provide adequate training, and foster a culture of openness to change to overcome this challenge. Additionally, lack of leadership training and professional development opportunities can hinder the capacity of nurse leaders to navigate complex healthcare environments. In some cases, nurse leaders may not have the necessary management or leadership training to address systemic issues, handle team dynamics, or implement quality improvement processes, which limits their effectiveness in fostering change.

Interprofessional conflicts can also be a barrier to quality healthcare. Nurse leaders are often responsible for coordinating teams that include a wide range of professionals, such as doctors, allied health staff, and administrative personnel. Disagreements or lack of collaboration between these groups can impede the implementation of quality improvement strategies and patient-centered care. Moreover, policy and regulatory constraints may limit the autonomy of nurse leaders, preventing them from making decisions that could improve care delivery. Healthcare policies, budgetary restrictions, and legal regulations can

restrict the flexibility and authority of nursing leaders, making it difficult for them to advocate for necessary changes or innovations in care.

Finally, time constraints are a persistent challenge. In fast-paced healthcare environments, nurse leaders often find themselves balancing administrative duties, patient care, staff management, and quality improvement efforts. This multitasking can lead to burnout and reduce the time available to focus on strategic planning and quality initiatives. Without adequate time and support, nursing leaders may struggle to prioritize quality healthcare initiatives and promote sustainable improvements. Overall, while nursing leadership is crucial to ensuring quality care, addressing these challenges requires systemic changes, adequate resources, effective training, and ongoing support from healthcare organizations.

FUTURE DIRECTIONS AND IMPLICATIONS FOR NURSING LEADERSHIP AND HEALTHCARE QUALITY

The future of nursing leadership in healthcare quality is poised for transformation, driven by advances in technology, evolving patient care models, and an increasing emphasis on interprofessional collaboration. One significant direction is the integration of technology and data analytics in nursing leadership, which will allow nurse leaders to make more informed, evidence-based decisions that improve healthcare outcomes. With the growing use of electronic health records (EHRs), big data, and predictive analytics, nurse leaders can track patient outcomes, monitor quality metrics, and identify areas for improvement more efficiently. Data-driven decision-making will be pivotal in developing targeted quality improvement initiatives and in adapting care delivery to meet the unique needs of patient populations. Moreover, the widespread adoption of telehealth and virtual care technologies presents opportunities for nurse leaders to expand access to healthcare services, particularly in rural and underserved areas, while ensuring high standards of care through remote monitoring and virtual patient education.

Another future trend is the ongoing shift towards patient-centered care models, where nursing leadership will play a critical role in ensuring that healthcare systems are designed around the needs, preferences, and values of patients. Nurse leaders will be instrumental in fostering environments that prioritize empathy, shared decision-making, and cultural competence. This shift will require nurse leaders to advocate for and implement care models that emphasize holistic approaches, integrating mental health, social determinants of health, and patient empowerment into care plans. Interprofessional collaboration will continue to be a key theme, as successful healthcare delivery increasingly depends on seamless cooperation between nurses, physicians, social workers, therapists, and other healthcare professionals. Nurse leaders will need to cultivate strong, cohesive teams, facilitate communication across disciplines, and create a culture of mutual respect and shared goals to ensure that quality care is provided in an efficient, coordinated manner.

The future also points toward a deeper integration of sustainability and public health initiatives into nursing leadership. Nurse leaders will play a pivotal role in promoting sustainability within healthcare systems by implementing environmentally responsible practices and advocating for policies that address the long-term health of both patients and the planet. This will require an understanding of the environmental impact of healthcare practices and a commitment to reducing waste, energy consumption, and carbon emissions. Ultimately, the future of nursing leadership will be characterized by a more dynamic, adaptive, and holistic approach to healthcare quality, with nurse leaders driving innovation, improving patient care, and ensuring that healthcare systems are prepared to meet the challenges of tomorrow.

CONCLUSION

The intersection of nursing leadership and healthcare quality is increasingly recognized as a critical factor in the ongoing transformation of healthcare systems worldwide. Contemporary research highlights the profound impact that effective nursing leadership has on improving patient outcomes, enhancing the delivery of care, and fostering a culture of continuous quality improvement. Nurse leaders are pivotal in implementing evidence-based practices, promoting collaboration across interdisciplinary teams, and ensuring that patient-centered care is at the forefront of healthcare delivery. As the healthcare landscape continues to evolve, nursing leadership will need to adapt to emerging challenges, such as resource constraints, workforce shortages, and the integration of advanced technologies. The findings of current research underscore the importance of developing strong leadership skills within the nursing workforce, including the ability to navigate complex healthcare environments, advocate for policy changes, and drive innovations in care. Additionally, the shift toward value-based care, the emphasis on patient outcomes, and the growing reliance on data-driven decision-making further illustrate the need for highly effective nursing leaders who can guide their teams through systemic changes while maintaining high standards of care. As the healthcare system faces new complexities, the role of nursing leadership in promoting quality healthcare will only become more central, demanding continued investment in leadership development, interprofessional collaboration, and patient safety initiatives. The future of healthcare quality depends on the ability of nurse leaders to shape practices, policies, and strategies that enhance both the patient experience and the work environment for healthcare professionals. Ultimately, the collaboration between nursing leadership and healthcare quality will remain essential in achieving sustainable, equitable, and effective healthcare systems for future generations.

REFERANCE

1. Al Sabei SD, Labrague LJ, Miner Ross A, Karkada S, Albashayreh A, Al Masroori F, Al Hashmi N. Nursing Work Environment, Turnover Intention, Job Burnout, and Quality of Care: The Moderating Role of Job Satisfaction. *J Nurs Scholarsh*. 2020 Jan;52(1):95-104. doi: 10.1111/jnu.12528. Epub 2019 Nov 6. PMID: 31692251.
2. Schick-Makaroff K, Storch JL. Guidance for Ethical Leadership in Nursing Codes of Ethics: An Integrative Review. *Nurs Leadersh (Tor Ont)*. 2019 Mar;32(1):60-73. doi: 10.12927/cjnl.2019.25848. PMID: 31228345.
3. Brady Germain P, Cummings GG. The influence of nursing leadership on nurse performance: a systematic literature review. *J Nurs Manag*. 2010 May;18(4):425-39. doi: 10.1111/j.1365-2834.2010.01100.x. PMID: 20609047.
4. Almost J, Gifford W, Ogilvie L, Miller C. The Role of Nursing Leadership in Ensuring a Healthy Workforce in Corrections. *Nurs Leadersh (Tor Ont)*. 2020 Mar;33(1):59-70. doi: 10.12927/cjnl.2020.26191. PMID: 32437322.
5. Harrison EM. Quality and safety education for nurses: a nursing leadership skills exercise. *J Nurs Educ*. 2014 Jun;53(6):356-61. doi: 10.3928/01484834-20140512-01. Epub 2014 May 12. PMID: 24814352.
6. McAllister M, Ballantyne M, Hubley P. Talking About Strengths-Based Nursing and Healthcare Leadership: What Canadian Nurse Leaders Have to Say. *Nurs Leadersh (Tor Ont)*. 2024 Apr;36(4):73-80. doi: 10.12927/cjnl.2024.27306. PMID: 38779837.
7. Ma C, Shang J, Bott MJ. Linking Unit Collaboration and Nursing Leadership to Nurse Outcomes and Quality of Care. *J Nurs Adm*. 2015 Sep;45(9):435-42. doi: 10.1097/NNA.0000000000000229. PMID: 26301550.
8. Carter N, Martin-Misener R, Kilpatrick K, Kaasalainen S, Donald F, Bryant-Lukosius D, Harbman P, Bourgeault I, DiCenso A. The role of nursing leadership in integrating clinical nurse specialists and nurse practitioners in healthcare delivery in Canada. *Nurs Leadersh (Tor Ont)*. 2010 Dec;23 Spec No 2010:167-85. doi: 10.12927/cjnl.2010.22274. PMID: 21478692.
9. Alloubani A, Akhu-Zaheya L, Abdelhafiz IM, Almatari M. Leadership styles' influence on the quality of nursing care. *Int J Health Care Qual Assur*. 2019 Jul 8;32(6):1022-1033. doi: 10.1108/IJHCQA-06-2018-0138. PMID: 31282258.
10. Wong CA, Cummings GG. The relationship between nursing leadership and patient outcomes: a systematic review. *J Nurs Manag*. 2007 Jul;15(5):508-21. doi: 10.1111/j.1365-2834.2007.00723.x. PMID: 17576249.

11. Simmonds AH. Leadership, Education and Awareness: A Compassionate Care Nursing Initiative. *Nurs Leadersh (Tor Ont)*. 2015 Mar;28(1):53-64. doi: 10.12927/cjnl.2015.24233. PMID: 26154121.
12. Risling TL, Low C. Advocating for Safe, Quality and Just Care: What Nursing Leaders Need to Know about Artificial Intelligence in Healthcare Delivery. *Nurs Leadersh (Tor Ont)*. 2019 Jun;32(2):31-45. doi: 10.12927/cjnl.2019.25963. PMID: 31613212.
13. Mendes L, Fradique Mde J. Influence of leadership on quality nursing care. *Int J Health Care Qual Assur*. 2014;27(5):439-50. doi: 10.1108/IJHCQA-06-2013-0069. PMID: 25087341.
14. Haycock-Stuart E, Kean S. Does nursing leadership affect the quality of care in the community setting? *J Nurs Manag*. 2012 Apr;20(3):372-81. doi: 10.1111/j.1365-2834.2011.01309.x. Epub 2011 Sep 21. PMID: 22519615.
15. DiMambro A, Truong C, Strunc C, Halko R, Andress I, Ballantyne M. Implementing Strengths-Based Nursing and Healthcare: A Decade of Leadership and Learning in a Canadian Pediatric Rehabilitation Setting. *Nurs Leadersh (Tor Ont)*. 2024 Apr;36(4):17-28. doi: 10.12927/cjnl.2024.27311. PMID: 38779832.
16. Hubley P, Gottlieb LN, Durrant M. Influencing Work Culture: A Strengths-Based Nursing Leadership and Management Education Program. *Nurs Leadersh (Tor Ont)*. 2022 Mar;35(1):24-37. doi: 10.12927/cjnl.2022.26752. PMID: 35339198.
17. Nagle LM. Are You Culturally Competent? *Nurs Leadersh (Tor Ont)*. 2018;31(1):1-3. doi: 10.12927/cjnl.2018.25478. PMID: 29927377.
18. Lee E, Daugherty J, Hamelin T. Reimagine Health Care Leadership, Challenges and Opportunities in the 21st Century. *J Perianesth Nurs*. 2019 Feb;34(1):27-38. doi: 10.1016/j.jopan.2017.11.007. Epub 2018 Jun 19. PMID: 29908881.
19. Gehrs M, Strudwick G, Ling S, Reisdorfer E, Cleverley K. Addressing Gaps in Mental Health and Addictions Nursing Leadership: An Innovative Professional Development Initiative. *Nurs Leadersh (Tor Ont)*. 2017;30(3):23-42. doi: 10.12927/cjnl.2018.25387. PMID: 29457766.
20. Lefebvre N, DeCicco J, Ray K. Developing and sustaining nursing leadership for healthy work environments. *Nurs Leadersh (Tor Ont)*. 2011 Jan;24(4):34-43. doi: 10.12927/cjnl.2012.22734. PMID: 22273557.
21. Zaforteza C, García-Mozo A, Amorós SM, Pérez E, Maqueda M, Delgado J. Factors limiting and facilitating changes in caring for the intensive care unit patients' relatives. *Nurs Crit Care*. 2015 Mar;20(2):78-88. doi: 10.1111/nicc.12095. Epub 2014 Jul 3. PMID: 24991996.
22. Treiger TM. Long-Term Services and Supports: A Primer for Case Managers: Part 2. *Prof Case Manag*. 2019 May/Jun;24(3):114-129. doi: 10.1097/NCM.0000000000000335. PMID: 30946248.

23. Berlin A, Rosander M, Frykedal KF, Törnkvist L, Barimani M. Fatherhood group sessions: A descriptive and summative qualitative study. *Nurs Health Sci.* 2020 Dec;22(4):1094-1102. doi: 10.1111/nhs.12776. Epub 2020 Oct 4. PMID: 32945070; PMCID: PMC7756429.
24. Mills TA, Roberts SA, Camacho E, Hezell AEP, Massey RN, Melvin C, Newport R, Smith DM, Storey CO, Taylor W, Lavender T. Better maternity care pathways in pregnancies after stillbirth or neonatal death: a feasibility study. *BMC Pregnancy Childbirth.* 2022 Aug 10;22(1):634. doi: 10.1186/s12884-022-04925-3. PMID: 35948884; PMCID: PMC9363262.
25. Broad JB, Wu Z, Bloomfield K, Hikaka J, Bramley D, Boyd M, Tatton A, Calvert C, Peri K, Higgins AM, Connolly MJ. Health profile of residents of retirement villages in Auckland, New Zealand: findings from a cross-sectional survey with health assessment. *BMJ Open.* 2020 Sep 18;10(9):e035876. doi: 10.1136/bmjopen-2019-035876. PMID: 32948550; PMCID: PMC7511621.
26. Haroon MA, Noorali AA, Khan AS, Hussain MH, Advani R, Sami A, Merchant AA, Khan AA, Baloch SG, Tharwani A, Fatimi SH, Samad Z, Hasan BS, Rasheed MA. Implementation evaluation of a medical student-led intervention to enhance students' engagement with research: Findings and lessons learned. *PLoS One.* 2023 Aug 31;18(8):e0290867. doi: 10.1371/journal.pone.0290867. PMID: 37651371; PMCID: PMC10470873.
27. Yeager VA, Burns AB, Lang B, Kronstadt J, Hughes MJ, Gutta J, Kirkland C, Orr J, Leider JP. What Are Public Health Agencies Planning for Workforce Development? A Content Analysis of Workforce Development Plans of Accredited Public Health Departments. *J Public Health Manag Pract.* 2023 Nov-Dec 01;29(6):762-774. doi: 10.1097/PHH.0000000000001805. Epub 2023 Aug 30. PMID: 37646511; PMCID: PMC10549878.
28. Rosemberg MS, Adams M, Polick C, Ratliff H, Li WV, Jun J. Service Workers' Experience and Perceptions of Workplace Protective Measures During the Onset of COVID-19. *Workplace Health Saf.* 2023 Mar;71(3):144-151. doi: 10.1177/21650799221101001. Epub 2022 Aug 8. PMID: 35942581; PMCID: PMC9988610.
29. Lafferty A, Fealy G, Downes C, Drennan J. The prevalence of potentially abusive behaviours in family caregiving: findings from a national survey of family carers of older people. *Age Ageing.* 2016 Sep;45(5):703-7. doi: 10.1093/ageing/afw085. Epub 2016 May 25. PMID: 27225014.
30. Yakusheva O, Weiss M. Rankings matter: nurse graduates from higher-ranked institutions have higher productivity. *BMC Health Serv Res.* 2017 Feb 13;17(1):134. doi: 10.1186/s12913-017-2074-x. PMID: 28193208; PMCID: PMC5307737.
31. Zhang T, Ma Y, Xiao X, Lin Y, Zhang X, Yin F, Li X. Dynamic Bayesian network in infectious diseases surveillance: a simulation study. *Sci Rep.* 2019 Jul 17;9(1):10376. doi: 10.1038/s41598-019-46737-0. PMID: 31316113; PMCID: PMC6637193.



32. Griffiths P, Ball J, Murrells T, Jones S, Rafferty AM. Registered nurse, healthcare support worker, medical staffing levels and mortality in English hospital trusts: a cross-sectional study. *BMJ Open*. 2016 Feb 9;6(2):e008751. doi: 10.1136/bmjopen-2015-008751. Erratum in: *BMJ Open*. 2016 May 05;6(5):e008751corr1. doi: 10.1136/bmjopen-2015-008751corr1. PMID: 26861934; PMCID: PMC4762154.