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ABSTRACT

Background: Triple-negative breast cancer (TNBC) is defined as breast cancer that is negative for estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor-2 (HER-2) in cancer tissue. The lack of specific biomarkers makes the diagnosis and prognosis of TNBC challenging.

Method: A comprehensive literature review and bibliometric analysis was performed using CiteSpace, VOSviewer and Scimago Graphica.

Results: TNBC biomarker research has been growing rapidly in recent years, reflecting the enormous academic interest in TNBC biomarker research. A total of 127 journals published relevant studies and 1749 authors were involved in the field, with developed countries such as the United States, France, and the United Kingdom contributing greatly to the field. Collaborative network analysis found that the research in this field has not yet formed good communication and interaction, and the partnership should be strengthened in the future in order to promote the in-depth development of TNBC biomarker research. A comprehensive analysis of keywords and co-cited literature, etc. found that TNBC biomarker research mainly focuses on immune checkpoint markers, microenvironment-related markers, circulating tumor DNA, metabolic markers, genomics markers and so on. These research hotspots will help to better understand the molecular characteristics and biological processes of TNBC, and provide more accurate biomarkers for its diagnosis, treatment and prognosis.

Conclusions: The bibliometric analysis highlighted global trends and key directions in TNBC biomarker research. Future developments in TNBC biomarker research are likely to be in the direction of multi-omics integration, meticulous study of the microenvironment, targeted therapeutic biomarkers, application of liquid biopsy, application of machine learning and artificial intelligence, and individualized therapeutic strategies. Young scholars should learn and collaborate across disciplines, pay attention to new technologies and methods, improve their data analysis skills, and continue to follow up on the latest research trends in order to meet the challenges and opportunities in the field of TNBC biomarkers.

ABSTRACT

When clinician-educators and medical education researchers use and discuss medical education research, they can advance innovation in medical education as well as improve its quality. To facilitate the use and discussions of medical education research, we created a prefatory visual representation of key medical education research topics and associated experts. We conducted one-on-one virtual interviews with medical education journal editorial board members to identify what they perceived as key medical education research topics as well as who they associated, as experts, with each of the identified topics. We used content analysis to create categories representing key topics and noted occurrences of named experts. Twenty-one editorial board members, representing nine of the top medical education journals, participated. From the data we created a figure entitled, Medical Education Research Library. The library includes 13 research topics, with assessment as the most prevalent. It also notes recognized experts, including van der Vleuten, ten Cate, and Norman. The key medical education research topics identified and included in the library align with what others have identified as trends in the literature. Selected topics, including workplace-based learning, equity, diversity, and inclusion, physician wellbeing and burnout, and social accountability, are emerging. Once transformed into an open educational resource, clinician-educators and medical education researchers can use and contribute to the functional library. Such continuous expansion will generate better awareness and recognition of diverse perspectives. The functional library will help to innovate and improve the quality of medical education through evidence-informed practices and scholarship.

Keywords: Evidence-informed practices; evidence-informed scholarship; medical education; medical education research; research use.

ABSTRACT

This year, 2024, marks the 60th anniversary of the Declaration of Helsinki, with the latest revision adopted by the World Medical Association (WMA) in October 2024. The 2024 Declaration of Helsinki is a statement document of ethical principles for research involving humans, human data, and human cells and tissues. Revising the 2013 Declaration of Helsinki document was undertaken over more than two years with international collaboration to enhance the inclusivity of medical research, protect the rights of research study participants, and address contemporary research challenges such as global health emergencies and data privacy. The revised Declaration document does not replace the roles of the Institutional Review Board and the local Ethics Committee in reviewing

and approving all research study protocols but continues to provide ethical guidance for the individuals who support, review, and conduct medical research. This editorial highlights the timely revisions in the 2024 Declaration of Helsinki and the importance of updating and maintaining an international consensus for a code of ethics that guides medical research.

4. *Zhang C, Wang Y, Peng J, Wen X, Zhang Y, Li K, et al. Decoding trends in mRNA vaccine research: A comprehensive bibliometric study. Hum Vaccin Immunother. 2024 Dec 31;20(1):2355037. doi: 10.1080/21645515.2024.2355037. Epub 2024 May 30.*

ABSTRACT

Background: In recent years, infectious diseases like COVID-19 have had profound global socio-economic impacts. mRNA vaccines have gained prominence due to their rapid development, industrial adaptability, simplicity, and responsiveness to new variants. Notably, the 2023 Nobel Prize in Physiology or Medicine recognized significant contributions to mRNA vaccine research.

Methods: Our study employed a comprehensive bibliometric analysis using the Web of Science Core Collection (WoSCC) database, encompassing 5,512 papers on mRNA vaccines from 2003 to 2023. We generated cooperation maps, co-citation analyses, and keyword clustering to evaluate the field's developmental history and achievements.

Results: The analysis yielded knowledge maps highlighting countries/institutions, influential authors, frequently published and highly cited journals, and seminal references. Ongoing research hotspots encompass immune responses, stability enhancement, applications in cancer prevention and treatment, and combating infectious diseases using mRNA technology.

Conclusions: mRNA vaccines represent a transformative development in infectious disease prevention. This study provides insights into the field's growth and identifies key research priorities, facilitating advancements in vaccine technology and addressing future challenges.

Keywords: 2023 Nobel prize; bibliometric analysis; hotspot; mRNA vaccine.

5. *Foy JP, Serresse L, Decavèle M, Allaire M, Nathan N, Renaud MC, et al. Clues for improvement of research in objective structured clinical examination. Med Educ Online. 2024 Dec 31;29(1):2370617. doi: 10.1080/10872981.2024.2370617. Epub 2024 Jun 27.*

ABSTRACT

While objective clinical structured examination (OSCE) is a worldwide recognized and effective method to assess clinical skills of undergraduate medical students, the latest Ottawa conference on the assessment of competences raised vigorous debates regarding the future and innovations of OSCE. This study aimed to provide a comprehensive view of the global research activity on OSCE over the past decades and to identify clues for its improvement. We performed a bibliometric and scientometric analysis of OSCE papers published until March 2024. We included a description of the overall scientific productivity, as well as an unsupervised analysis of the main topics and the international scientific collaborations. A total of 3,224 items were identified from the Scopus database. There was a sudden spike in publications, especially related to virtual/remote OSCE, from 2020 to 2024. We identified leading journals and countries in terms of number of publications and citations. A co-occurrence term network identified three main clusters corresponding to different topics of research in OSCE. Two connected clusters related to OSCE performance and reliability, and a third cluster on student's experience, mental health (anxiety), and perception with few connections to the two previous clusters. Finally, the United States, the United Kingdom, and Canada were identified as leading countries in terms of scientific publications and collaborations in an international scientific network involving other European countries (the Netherlands, Belgium, Italy) as well as Saudi Arabia and Australia, and revealed the lack of important collaboration with Asian countries. Various avenues for improving OSCE research have been identified: i) developing remote OSCE with comparative studies between live and remote OSCE and issuing international recommendations for sharing remote OSCE between universities and countries; ii) fostering international collaborative studies with the support of key collaborating countries; iii) investigating the relationships between student performance and anxiety.

Keywords: OSCE; bibliometry; objective structured clinical examination; scientific network; scientometry.

6. *Delimanoli E, Muurlink O, Myrianthefs P, Korompeli A. Cardiac Rehabilitation After Open Heart Surgery: A Narrative Systematic Review. J Cardiovasc Dev Dis. 2024 Nov 20;11(11):376. doi: 10.3390/jcdd11110376.*

ABSTRACT

Background: Postoperative cardiac rehabilitation (CR) programs are increasingly recommended by clinicians, but only a minority of patients who have undergone open heart surgery participate in such programs. Participation rates in postoperative CR, if anything, appear to be declining. This systematic review examines the effectiveness of post-operative CR and reveals possible participation barriers.

Methods: A search of two scholarly databases for primary research papers published in the last decade examining the impact of post-operative CR was conducted and the resultant papers reviewed.

Results: The 21 resulting studies revealed physiological functioning improvement and a reduction in mortality and readmission rates, while highlighting an enhancement in mental status. Some of the studies recognized the need for nutritional support and suggested that age, gender, access to

CR centers, and socioeconomic variables impact participation in CR.

Conclusions: Post-operative CR participation rates continue to decline despite increasing evidence of the value of the approach.

Keywords: bypass graft; cardiac surgery; cardiac surgical procedures; exercise therapy; heart surgery; rehabilitation; valve surgery.

7. *Izumi A, Lee G, Gomes Z, Ouzounian M, Adinku P, Montes L, et al. Women in cardiac surgery: a global workforce analysis. Eur J Cardiothorac Surg. 2024 Dec 26;67(1):ezae463. doi: 10.1093/ejcts/ezae463.*

ABSTRACT

Objectives: Cardiac surgery remains one of the most gender-imbalanced surgical specialties. Women constitute 6-11% of the North American workforce, while other regional data are scarce. Despite the acknowledged under-representation of women in cardiac surgery globally and evidence that surgeon-patient gender concordance enhances postoperative outcomes, precise figures remain poorly defined. Herein, we provide the 1st global quantification of women cardiac surgeons (WCS) and explore correlates of workforce diversity.

Methods: The Cardiothoracic Surgery Network database was queried for cardiac surgeons within each country and cross-validated with external sources. Profile pronouns and the genderize.io application determined surgeon sex. Data were stratified by country, geographical region and national income group, and correlation analyses with socioeconomic and gender parity metrics were performed.

Results: Women constitute 8.0% (1178/14 651) of the international cardiac surgical workforce, with a median of 0.00 WCS per million women (interquartile range: 0.00-0.09). North America (11.4%) and Europe (10.3%) lead regional representation, while East Asia (2.9%) and the Middle East (1.7%) rank lowest. High-income countries (9.9%) have double the proportion of WCS as low- and middle-income countries (4.8%), with a notable absence among low-income countries. Female representation correlates with Gross National Income per capita ($\tau = 0.39$), the Global Gender Gap Index ($\tau = 0.26$) and health expenditure ($\tau = 0.26$).

Conclusions: Improving female representation in cardiac surgery is essential to advancing social justice and overall patient care. Yet, WCS remain a minority worldwide, with the most pronounced disparities in low- and middle-income countries and regions with low Gross National Income, Global Gender Gap Index and health expenditure. Confronting these inequities will require targeted mentorship efforts and addressing country-specific entry barriers, necessitating further research into the unique factors influencing women in low- and middle-income countries.

Keywords: Gender gap; Gender representation in surgery; Global cardiac surgery; Global health workforce; Woman cardiac surgeon; Women in medicine.

8. *Gibbison B, Murphy G, O'Brien B, Pufulete M. An Update on Guidelines to Prevent and Manage Atrial Fibrillation After Cardiac Surgery and a Survey of Practice in the UK. J Cardiothorac Vasc Anesth. 2024 Oct;38(10):2307-2313. doi: 10.1053/j.jvca.2024.07.043. Epub 2024 Jul 26.*

ABSTRACT

Objectives: Postoperative atrial fibrillation (POAF) is the most common complication after cardiac surgery and affects around 30% of patients. Variable guidelines from multiple organizations exist for the prevention of POAF after cardiac surgery. A survey of UK practice was conducted to define "usual care" for a platform trial of interventions to prevent POAF after cardiac surgery. To provide context for the survey, all current guidelines for the prevention and management of atrial fibrillation (AF) after cardiac surgery were reviewed.

Design: Online survey and literature review.

Setting: All 35 UK National Health Service Cardiac Surgery Centres participated in the survey. Guidelines from specialist societies and other guideline-making organizations from the UK, Europe, and North America were reviewed.

Participants: Established a link network of researchers.

Measurements and main results: Five relevant guidelines were identified from the literature review. All guidelines recommend β-blockade for prevention of AF after cardiac surgery. Treatment of AF is recommended using either rate or rhythm control. Cardioversion is recommended only for the hemodynamically unstable patient. Patients who remain in AF for over 48 hours should be considered for anticoagulation. Patients should be followed up within 60 days to review the need for antiarrhythmic and anticoagulant therapy. Of 35 centers, 31 (89%) responded. A total of 11 of 31 (35.5%) centers followed local guidance for prevention of POAF, 4 (13%) centers followed Society of Cardiovascular Anesthesiologists/European Association of Cardiothoracic Anaesthesia guidelines, 4 (13%) followed UK National Institute of Health and Care Excellence guidance and 4 followed "other" guidance. Of 31 centers, 8 (26%) followed no guidelines to prevent POAF; 28 of 31 (90%) centers did not risk-stratify their patients for POAF. Most centers (23/31, 74%) did not have a care package in place to prevent POAF, but 14 of 31 (45%) try in some way to prevent AF in patients presenting with sinus rhythm. The most common interventions to prevent POAF are β-blocker use postoperatively (23/31, 74%), magnesium (20/31, 64.5%), and maintaining a serum K+ ≥4.5 mmol/L (26/31, 84%).

Conclusions: Guidance to prevent AF after cardiac surgery centers around the use of β-blockade. Although patients in the UK do not appear to be risk-assessed for POAF, the main

interventions used to prevent it are similar: β-blockade and maintenance of serum K+ and Mg2+ levels.

9. *Gayatri D, Tongers J, Efremov L, Mikolajczyk R, Sedding D, Schumann J. Prophylactic use of inotropic agents for the prevention of low cardiac output syndrome and mortality in adults undergoing cardiac surgery. Cochrane Database Syst Rev. 2024 Nov 27;11(11):CD013781. doi: 10.1002/14651858.CD013781.pub2.*

ABSTRACT

Background: As the burden of cardiovascular disease grows, so does the number of cardiac surgeries. Surgery is increasingly performed on older people with comorbidities who are at higher risk of developing perioperative complications such as low cardiac output state (LCOS). Surgery-associated LCOS represents a serious pathology responsible for substantial morbidity and mortality. Prevention of LCOS is a critical and worthwhile aim to further improve the outcome and effectiveness of cardiac surgery. However, guidelines consistently report a lack of evidence for pharmacological LCOS prophylaxis.

Objectives: To assess the benefits and harms of the prophylactic use of any inotropic agent to prevent low cardiac output and associated morbidity and mortality in adults undergoing cardiac surgery.

Search methods: We identified trials (without language restrictions) via systematic searches of CENTRAL, MEDLINE, Embase, and CPCI-S Web of Science in October 2022. We checked reference lists from primary studies and review articles for additional references. We also searched two registers of ongoing trials.

Selection criteria: We included randomised controlled trials (RCTs) enrolling adults who underwent cardiac surgery and were prophylactically treated with one or multiple inotropic agent(s) in comparison to any type of control (i.e. standard cardiac care, placebo, other inotropic agents).

Data collection and analysis: We used established methodological procedures according to Cochrane standards. Two review authors independently extracted data and assessed risk of bias according to a pre-defined protocol. On request, we obtained a reply and additional information from only one of the included study authors. We used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness, and publication bias) to assess the certainty of evidence from the studies that contributed data to the meta-analyses for the pre-specified outcomes. Based on the identified studies, there were seven comparison groups: amrinone versus placebo, dopamine versus placebo, milrinone versus placebo, levosimendan versus dobutamine, levosimendan versus milrinone, levosimendan versus standard cardiac care, and levosimendan versus placebo.

Main results: We identified 29 eligible studies, including 3307 individuals, and four ongoing studies. In general, confidence in the results of the analysed studies was reduced due to relevant study limitations, imprecision, or inconsistency. Domains of concern encompassed inadequate methods of sequence generation and lack of blinding. The majority of trials were small, with only a few included participants, and investigated the prophylactic use of levosimendan. Our meta-analyses showed that levosimendan as compared to placebo may reduce the risk of LCOS (risk ratio (RR) 0.43, 95% confidence interval (CI) 0.25 to 0.74; I2 = 66%; 1724 participants, 6 studies; GRADE: low) and probably reduces all-cause mortality (RR 0.65, 95% CI 0.43 to 0.97; I2 = 11%; 2347 participants, 14 studies; GRADE: moderate). This translates into a number needed to treat for an additional beneficial outcome (NNTB) of 8 to prevent one event of LCOS post surgery and of 44 to prevent one death at 30 days. Subgroup analyses revealed that the beneficial effects of levosimendan were predominantly observed in preoperative drug administration. Our meta-analyses further indicated that levosimendan as compared to placebo may shorten the length of intensive care unit (ICU) stay (mean difference -1.00 days, 95% CI -1.63 to -0.37; 572 participants, 7 studies; GRADE: very low) and the duration of mechanical ventilation (mean difference -8.03 hours, 95% CI -13.17 to -2.90; 572 participants, 7 studies; GRADE: very low) but the evidence is very uncertain. The risk of adverse events did not clearly differ between levosimendan and placebo groups (cardiogenic shock: RR 0.65, 95% CI 0.40 to 1.05; I2 = 0%; 1212 participants, 3 studies; GRADE: high; atrial fibrillation: RR 1.02, 95% CI 0.82 to 1.27; I2 = 60%; 1934 participants, 11 studies; GRADE: very low; perioperative myocardial infarction: RR 0.89, 95% CI 0.61 to 1.31; I2 = 13%; 1838 participants, 8 studies; GRADE: moderate; non-embolic stroke or transient ischaemic attack: RR 0.89, 95% CI 0.58 to 1.38; I2 = 0%; 1786 participants, 8 studies; GRADE: moderate). However, levosimendan as compared to placebo might reduce the number of participants requiring mechanical circulatory support (RR 0.47, 95% CI 0.24 to 0.91; I2 = 74%; 1881 participants, 10 studies; GRADE: low). There was no conclusive evidence on the effect of levosimendan compared to standard cardiac care on LCOS (RR 0.49, 95% CI 0.14 to 1.73; I2 = 59%; 208 participants, 3 studies; GRADE: very low), all-cause mortality (RR 0.37, 95% CI 0.13 to 1.04; I2 = 0%; 208 participants, 3 studies; GRADE: low), adverse events (cardiogenic shock: RR 0.62, 95% CI 0.22 to 1.81; 128 participants, 1 study; GRADE: very low; atrial fibrillation: RR 0.40, 95% CI 0.11 to 1.41; I2 = 60%; 188 participants, 2 studies; GRADE: very low; perioperative myocardial infarction: RR 0.62, 95% CI 0.22 to 1.81; 128 participants, 1 study; GRADE: very low; non-embolic stroke or transient ischaemic attack: RR 0.56, 95% CI 0.27 to 1.18; 128 participants, 1 study; GRADE: very low), length of ICU stay (mean difference 0.33 days, 95% CI -1.16 to 1.83; 80 participants, 2 studies; GRADE: very low), the duration of mechanical ventilation (mean difference -3.40 hours, 95% CI -11.50 to 4.70; 128

participants, 1 study; GRADE: very low), and the number of participants requiring mechanical circulatory support (RR 0.88, 95% CI 0.50 to 1.55; I2 = 0%; 208 participants, 3 studies; GRADE: low).

Authors' conclusions: Prophylactic treatment with levosimendan may reduce the incidence of LCOS and probably reduces associated mortality in adult patients undergoing cardiac surgery when compared to placebo only. Conclusions on the benefits and harms of other inotropic agents cannot be drawn due to limited study data. Given the limited evidence available, there is an unmet need for large-scale, well-designed randomised trials. Future studies of levosimendan ought to be designed to derive potential benefit in specific patient groups and surgery types, and the optimal administration protocol.

10. *Zeng G, Yu Y, Wang M, Liu J, He G,Yu S, et al. Advancing cancer research through organoid technology. J Transl Med. 2024 Nov 8;22(1):1007. doi: 10.1186/s12967-024-05824-1.*

ABSTRACT

The complexity of tumors and the challenges associated with treatment often stem from the limitations of existing models in accurately replicating authentic tumors. Recently, organoid technology has emerged as an innovative platform for tumor research. This bioengineering approach enables researchers to simulate, in vitro, the interactions between tumors and their microenvironment, thereby enhancing the intricate interplay between tumor cells and their surroundings. Organoids also integrate multidimensional data, providing a novel paradigm for understanding tumor development and progression while facilitating precision therapy. Furthermore, advancements in imaging and genetic editing techniques have significantly augmented the potential of organoids in tumor research. This review explores the application of organoid technology for more precise tumor simulations and its specific contributions to cancer research advancements. Additionally, we discuss the challenges and evolving trends in developing comprehensive tumor models utilizing organoid technology.

11. *Ajikumar A, Lei KF. Microfluidic Technologies in Advancing Cancer Research. Micromachines (Basel). 2024 Nov 28;15(12):1444. doi: 10.3390/mi15121444.*

ABSTRACT

This review explores the significant role of microfluidic technologies in advancing cancer research, focusing on the below key areas: droplet-based microfluidics, organ-on-chip systems, paper-based microfluidics, electrokinetic chips, and microfluidic chips for the study of immune response. Droplet-based microfluidics allows precise manipulation of cells and three-dimensional microtissues, enabling high-throughput experiments that reveal insights into cancer cell migration, invasion, and drug resistance. Organ-on-chip systems replicate human organs to assess drug efficacy and toxicity, particularly in the liver, heart, kidney, gut, lung, and brain. Paper-based microfluidics offers an alternative approach to accomplish rapid diagnostics and cell- and tissue-based bioassays. Electrokinetic microfluidic chips offer precise control over cell positioning and behavior, facilitating drug screening and cellular studies. Immune response studies leverage real-time observation of interactions between immune and cancer cells, supporting the development of immunotherapies. These microfluidic advances are paving the way for personalized cancer treatments while addressing challenges of scalability, cost, and clinical integration.