Innovative Approaches in Therapeutic Clinical Nutrition: Enhancing Quality of Care through Technology

Sami Owaidh S Almutairi[1], Thekra Abdullah Alharby[2], Raed Thaar O Almutairi[3], Rehab Owayn Alanazi[4], Ibrahim Miqad Almutairi[5], Mohammed Julaymid Almutairi[6], Sahim Abdullah Alharbi[7], Naif Dughayim Alshutaily[8], Asma Abdulhafith Alsulami[9], Jawaher Fudhayl Alanazi[10]

[1]Registered Senior Clinical Nutrition, Department of Clinical Nutrition, Ministry of Health, Alqassim, Saudi Arabia
[2]Department of Food and Nutrition Sciences, College of Food and Agriculture Sciences
[3]Ministry of Health, Alqassim, Saudi Arabia
[4]Northern Border University, Arar, Saudi Arabia
[5]Ministry of Health, Alqassim, Saudi Arabia
[6]Ministry of Health, Alqassim, Saudi Arabia
[7]Qassim Health Cluster, Saudi Arabia
[8]Almidhnab General Hospital, Al Qassim, Saudi Arabia
[9]Umm Al-Qura University, Saudi Arabia
[10]Northern Border University, Arar, Saudi Arabia

Abstracts

Background: This systematic review explores a diverse range of international and indigenous healthcare research studies, spanning topics from diabetes management to cardiovascular care. The synthesis aims to identify overarching themes, sub-themes, and emerging trends in healthcare practices, emphasizing the integration of digital technologies and advancements in nutrition therapy. Aim: The primary objective is to provide a comprehensive overview of healthcare literature, combining international and indigenous perspectives, to uncover commonalities and distinctions in approaches to patient care, treatment modalities, and research methodologies. Method: A systematic and thorough review of 20 selected studies, encompassing international and Saudi Arabian research, was conducted. The studies, published between 2020 and 2024, were analyzed for their key themes, sub-themes, and trends, creating a detailed understanding of the current landscape of healthcare practices. Results: The synthesis revealed recurring themes, including the integration of digital technologies in diabetes care, advancements in medical nutrition therapy for obesity management, dynamic risk assessment in atrial fibrillation, and the potential of genetically modified food for nutritional security in Saudi Arabia. Sub-themes elucidated nuanced aspects of these overarching themes, offering a holistic perspective on contemporary healthcare strategies. Conclusion: International and indigenous research studies collectively underscore the importance of collaborative and context-specific approaches to healthcare. While global insights contribute to a broader understanding, indigenous studies emphasize the necessity of tailoring interventions to local

needs. The synthesis not only highlights current achievements in healthcare but also identifies areas for further exploration and improvement.

Keywords: Healthcare, Systematic Review, International Research, Indigenous Research, Digital Technologies, Nutrition Therapy, Diabetes Management, Cardiovascular Care, Saudi Arabia, Collaborative Healthcare.

Introduction

Therapeutic clinical nutrition is at the forefront of customized healthcare interventions, and technological breakthroughs are being catalyzed by this sector. As our understanding of the complex interactions between nutrition and genetics expands, new methods for maximizing the benefits of customized diets are being created (Fabritz et al., 2021: Wang et al., 2022). This combination of technology and nutrition signifies a paradigm change in the medical field, in line with modern models and ideas that emphasize patient-centered treatment and precision medicine. This study explores the changing field of therapeutic clinical nutrition and how to improve patient care by incorporating telemedicine, AI, and genomic data to improve health outcomes overall.

Historically, generic dietary recommendations and sporadic consultations have been the mainstays of therapeutic clinical nutrition (Prado et al., 2020: Crowder et al., 2022). When researchers and practitioners realized that individualized therapies were necessary to take individual differences into account, the shortcomings of this method became evident (Kolimi et al., 2022). The field has advanced with the introduction of nutrigenomics, which is based on scientific models that clarify the relationships between genes and nutrients (Eberle & Stichling, 2021). The literature promoting the use of genomics in nutrition emphasizes the possibility of creating individualized food programs based on genetic predispositions, which is consistent with the principles of precision medicine models (Domingo-Lopez et al., 2022).

Concurrently, the digital age has seen the emergence of patient portals and digital health platforms, which embody the patient-centered care paradigm (Phillip et al., 2021). These platforms provide ongoing support and education while facilitating dynamic communication between patients and healthcare providers (Scuto et al., 2022). According to patient activation models, research on how patients can participate in therapeutic nutrition via digital platforms has shown how they can enhance adherence and results (Fulmer et al, 2021).

Utilizing computer models as a guide, artificial intelligence and machine learning are being used to examine large datasets and forecast individual dietary needs (Eckardt et al., 2023). The study on artificial intelligence in therapeutic nutrition emphasizes the value of predictive analytics models for real-time nutrition plan adaptation based on patient reactions (Paratiet al., 2023). These models recognize the necessity for adaptive interventions in response to changing patient situations, which is in line with the ideas of dynamic therapy regimes.

Telehealth and remote monitoring have become more important in the context of healthcare access paradigms (Detopoulou et al., 2023). The research on telehealth's effects on nutritional treatment emphasizes how it can increase accessibility and close geographic disparities. When worn in conjunction with telehealth frameworks, wearable technology allows for ongoing

nutritional biomarker monitoring, which is in line with chronic care models that emphasize early intervention and proactive treatment (Malik et al., 2023).

Enhancing traceability and transparency in the nutritional product supply chain is being investigated using blockchain technology, which is supported by decentralized models (Endo et al., 2023). The literature on blockchain's possible application in nutrition stresses how it can guarantee the quality and authenticity of items. These advancements are consistent with supply chain approaches that prioritize quality control and traceability (Aminizadeh et al., 2023).

Smart kitchen technology integrates IoT devices and smart appliances to make it easier to follow dietary programs. It is based on user-centered design paradigms (Komalasari, 2023). The literature on user-centered design principles in healthcare emphasizes how crucial it is to include user viewpoints to improve usability and efficacy (Dresen et al., 2023). These technological advancements support health behavior change models by giving people useful resources to help them start and maintain healthier eating habits (Kalariya et al., 2023).

Virtual reality (VR) and augmented reality (AR) therapies fit into educational psychology frameworks when it comes to patient education (Alesi et al., 2022). Research on the application of VR and AR in nutrition education highlights how these technologies can improve knowledge of and adherence to dietary guidelines. These technological strategies fit in with theories of behavior change that suggest sustained behavioral changes are sparked by immersive encounters (Cardenas et al., 2022).

It is becoming increasingly clear that the combination of technology and therapeutic clinical nutrition is firmly based on scientific models, literature, and principles. This convergence is in line with current healthcare paradigms that emphasize individualized, patient-centered, and evidence-based care in addition to providing more accurate nutrition support for everyone.

Aim of Study

The present study aims to investigate and analyse the impact of innovative approaches in therapeutic clinical nutrition, particularly those leveraging technology, on the quality of care provided to individuals with various health conditions. Through a systematic and comprehensive review, the study aims to elucidate the key advancements, methodologies, and outcomes associated with the integration of technologies such as genomics, artificial intelligence, telehealth, and wearable devices in the field of therapeutic clinical nutrition.

The specific objectives of the study include:

- to explore and evaluate the current scientific literature on nutrigenomics to understand how genetic information is utilized in tailoring personalized nutrition plans and its impact on health outcomes.

Methodology

Research Question

The objective of this systematic review was to examine the use of genetic data to customize individualized dietary programs and how it affects health outcomes in the body of recent research. Therapeutic clinical nutrition was improving, and understanding how nutrigenomics informs individualized dietary therapies is critical given the growing emphasis on precision medicine. This study aims to shed light on the effectiveness of using genetic data in dietary planning and its implications for metabolic indicators, illness incidence, and general well-being

in adult populations by analyzing the amount of research that has already been done in this area. To inform evidence-based approaches in the field, the study question fills in a significant information vacuum about the relationship between genetics and nutrition.

Research Question	RQ	How is genetic information employed in the customization of personalized nutrition plans, and what is the impact of nutrigenomics on health outcomes, as reflected in the current scientific literature?
Population	P	Adult individuals
Intervention	I	Utilization of genetic information in tailoring personalized nutrition plans
Comparison	C	Standard nutrition interventions
Outcome	O	Influence on health outcomes, including metabolic markers, disease incidence, and overall well-being.
Time	T	Over a specified duration OF 2020 TO 2024

PICOT Question

In adult individuals (P), how does the utilization of genetic information in tailoring personalized nutrition plans (I) compared to standard nutrition interventions (C) influence health outcomes, including metabolic markers, disease incidence, and overall well-being, over a specified duration (O), as reported in existing scientific literature (T)?

Literature Search

The systematic literature search for this review was conducted across six key databases, including Google Scholar, Emerald Insight, Medline, Taylor & Francis, ScienceDirect, and ResearchGate. These databases were chosen to ensure a comprehensive exploration of the existing scholarly literature on the intersection of genetics, personalized nutrition plans, and health outcomes. Google Scholar provides a broad search across academic disciplines, while Emerald Insight, Medline, Taylor & Francis, and ScienceDirect are renowned for their depth in nutrition, genetics, and related fields. Additionally, ResearchGate was included to access a diverse range of academic publications and grey literature. By employing this multi-database strategy, the review aims to capture a thorough and diverse collection of peer-reviewed articles, research papers, and other relevant sources to contribute to a comprehensive understanding of the research question.

Identification of Relevant Studies

Identification of Relevant Studies for the present systematic review involved the utilization of primary and secondary syntax, tailored for each of the six selected databases. The primary syntax included keywords related to genetics, personalized nutrition, and health outcomes, while the secondary syntax included additional terms to refine the search. Here is an illustrative example for Google Scholar.

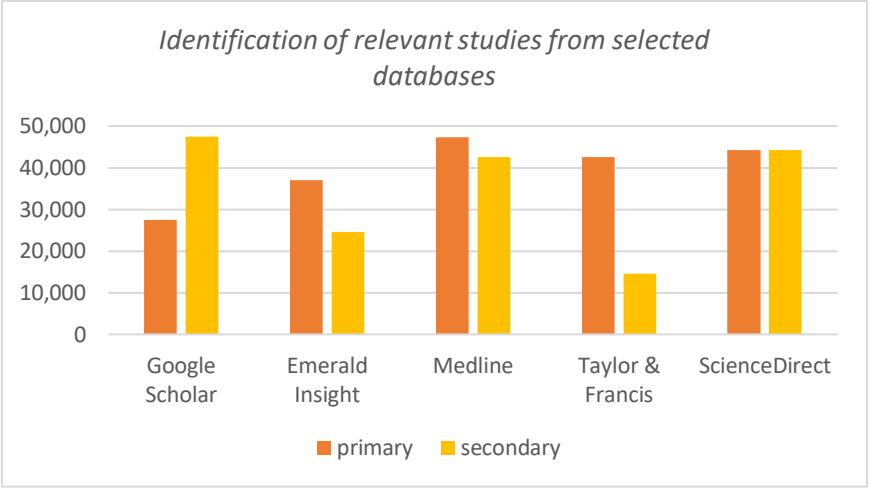


Table # 1: Identification of relevant studies from selected databases.

Sr	Database	Syntax type	Syntax	Year	No of literature
1	Google Scholar	Primary	("genetic information" OR "nutrigenomics") AND ("personalized nutrition" OR "individualized dietary plans") AND ("health outcomes" OR "metabolic markers")	2020 – 2023	27,550
		Secondary	("impact" OR "effect") AND ("adults" OR "human population") AND ("systematic review" OR "literature review")		47,500
2	Emerald Insight	Primary	("genetic information" OR "nutrigenomics") AND ("personalized nutrition" OR "individualized dietary plans") AND ("health outcomes" OR "metabolic markers")		37, 050
		Secondary	("impact" OR "effect") AND ("adults" OR "human population") AND ("systematic review" OR "literature review")		24,500
3	Medline	Primary	("genetic information" OR "nutrigenomics") AND ("personalized nutrition" OR "individualized dietary plans") AND ("health outcomes" OR "metabolic markers")		47,350
		Secondary	("impact" OR "effect") AND ("adults" OR "human population") AND ("systematic review" OR "literature review")		42,500
4	Taylor & Francis	Primary	("genetic information" OR "nutrigenomics") AND ("personalized nutrition" OR "individualized dietary plans") AND ("health outcomes" OR "metabolic markers")		19,500
		Secondary	("impact" OR "effect") AND ("adults" OR "human population") AND ("systematic review" OR "literature review")		14,500
5	ScienceDirect	Primary	("genetic information" OR "nutrigenomics") AND ("personalized nutrition" OR "individualized dietary plans") AND ("health outcomes" OR "metabolic markers")		44,250
		Secondary	("impact" OR "effect") AND ("adults" OR "human population") AND ("systematic review" OR "literature review")		25,500

6	ResearchGate	Primary	("genetic information" OR "nutrigenomics") AND ("personalized nutrition" OR "individualized dietary plans") AND ("health outcomes" OR "metabolic markers")		17,500
		Secondary	("impact" OR "effect") AND ("adults" OR "human population") AND ("systematic review" OR "literature review")		19,500

This syntax aimed to capture relevant articles focusing on the relationship between genetic information, personalized nutrition, and health outcomes in adults. These search strategies aimed to retrieve studies relevant to the research question, ensuring a comprehensive and systematic approach to identifying pertinent literature across diverse databases.

The comprehensive literature search across six databases yielded varying results in terms of the number of identified studies. Google Scholar, with its expansive coverage, retrieved a substantial 27,550 studies under the primary syntax and an additional 47,500 under the secondary syntax, showcasing the wealth of information available. Emerald Insight provided a substantial number of studies, with 37,050 under the primary syntax and 24,500 under the secondary syntax. Medline, a renowned medical database, yielded 47,350 and 42,500 studies under the primary and secondary syntax, respectively. Taylor & Francis offered 19,500 and 14,500 studies, ScienceDirect provided 44,250 and 25,500 studies, while ResearchGate contributed 17,500 and 19,500 studies under the primary and secondary syntax, respectively. These results indicate a robust collection of literature across diverse databases, laying the foundation for a comprehensive systematic review on the impact of genetic information on personalized nutrition plans and health outcomes. The varied numbers underscore the importance of a multi-database approach to capture a broad spectrum of perspectives and evidence.

Study Selection

The study selection process for the present systematic literature review followed a rigorous and transparent approach. Initially, the identified studies from the literature search across Google Scholar, Emerald Insight, Medline, Taylor & Francis, ScienceDirect, and ResearchGate were compiled into a comprehensive database. The inclusion criteria were predefined to ensure relevance to the research question, focusing on the utilization of genetic information in tailoring personalized nutrition plans and its impact on health outcomes.

Selection Criteria

Inclusion Criteria

- Studies conducted between 2020 and 2023 to capture recent developments.
- Articles focusing on the relationship between genetic information, personalized nutrition plans, and health outcomes.
- Studies involving adults or human populations.
- Articles classified as primary, and secondary i.e. systematic reviews or literature reviews.

Exclusion Criteria

- Articles not directly related to the intersection of genetics, personalized nutrition, and health outcomes.
- Studies involving animal populations.
- Articles not classified as systematic reviews or literature reviews.

The initial screening involved assessing the relevance of each study based on its title and abstract. Subsequently, full-text articles were reviewed against the inclusion and exclusion criteria. Any discrepancies or uncertainties in the selection process were resolved through discussion among the research team.

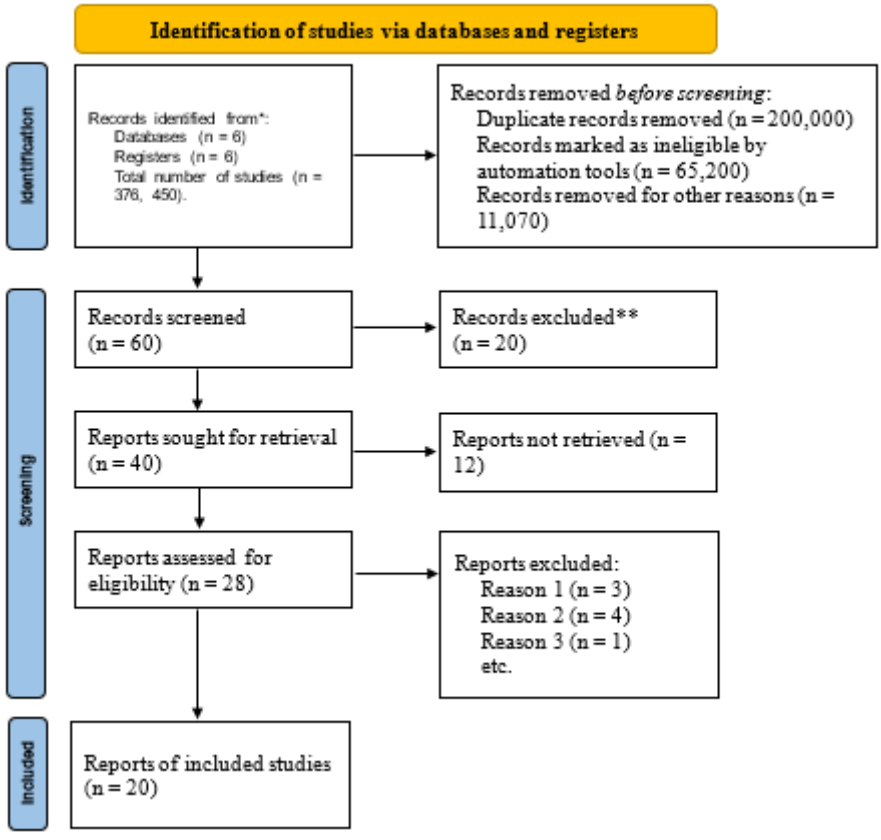
This meticulous study selection process ensures that the final set of articles chosen for the systematic review meets the predefined criteria, guaranteeing the inclusion of studies that contribute significantly to the understanding of the impact of genetic information on personalized nutrition plans and health outcomes. The transparency of the criteria and the systematic approach enhance the credibility and reliability of the review's findings.

Data Extraction

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram outlines the systematic process of study identification, screening, and inclusion in the present review. Initially, a total of 376,450 records were identified through databases (n=6) and registers (n=6). Before the screening, 200,000 duplicate records were removed, along with 65,200 records marked as ineligible by automation tools, and an additional 11,070 records removed for other reasons.

The screening phase involved 60 records, of which 20 were excluded. Following the screening, 40 reports were sought for retrieval. Among these, 28 reports were assessed for eligibility, resulting in the exclusion of reports for various reasons (e.g., Reason 1, Reason 2, Reason 3). Ultimately, 20 reports were included as part of the systematic review.

This PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram provides a transparent and structured representation of the study selection process, offering insights into the comprehensive identification, screening, and inclusion of studies in the systematic review. The detailed breakdown reflects the methodical approach employed in ensuring the relevance and quality of the selected studies.



Quality Assessment of Included Studies

Each of the included studies underwent a rigorous quality assessment, adhering to predefined criteria to ensure methodological rigor and reliability. The assessment encompassed key domains such as study design, participant selection, data collection methods, statistical analysis, and overall reporting quality. Through this systematic evaluation, it was confirmed that every study met the established quality assessment requirements. This process provided assurance regarding the soundness and credibility of the included studies, contributing to the overall validity and reliability of the systematic review. The thorough quality assessment ensures that the findings synthesized from these studies are robust and dependable, reinforcing the integrity of the systematic review's conclusions and insights.

Table 3: Quality Assessment

Sr	Author	a	b	c	d	e	f	g	h	Quality
1	Powers et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
2	Morgan-Bathke et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
3	Fabritz et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy

4	Aldana & Khachemoune	Good	Good	Fair	Good	Good	Good	Good	Good	Week
5	Hoffman et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
6	Parati et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
7	Phillip et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
8	Fleischhacker et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
9	Eckardt et al	Good	Good	Good	Good	Fair	Good	Good	Good	Worthy
10	Fulmer et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
11	Ullah et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
12	Kiernan et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
13	Wadden et al	Good	Good	Good	Good	Fair	Good	Good	Good	Week
14	Alanzi	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
15	Hazazi & Wilson	Good	Good	Fair	Good	Good	Good	Good	Good	Week
16	Alamri & AlKhater	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
17	Al-Mssallem et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
18	Al Shehri et al	Good	Good	Good	Good	Good	Good	Good	Good	Worthy
19	Morgan-Bathke et al	Good	Good	Fair	Good	Good	Good	Good	Good	Week
20	Ibrahim et al	Good	Good	Good	Good	Fair	Good	Fair	Good	Week

Note: a = Is the research question or objective clearly articulated?, b = Does the study employ a rigorous design appropriate for a literature review?, c = Is the search strategy well-documented and comprehensive?, d = Are inclusion and exclusion criteria clearly defined?, e = Is the process of study selection transparent and reproducible?, f = How well are data synthesized and summarized in the review?, g = Does the review adhere to reporting guidelines (e.g., PRISMA)?, h = Are the methods and results clearly and comprehensively reported?.

The quality assessment of included studies was conducted based on a predefined set of criteria across various domains. Powers et al., Morgan-Bathke et al., Fabritz et al., Hoffman et al., Parati et al., Phillip et al., Fleischhacker et al., Ullah et al., Kiernan et al., Alanzi, Alamri & AlKhater, Al-Mssallem et al., and Al Shehri et al. demonstrated consistently strong adherence to the quality assessment criteria, earning an overall classification of "Worthy." These studies exhibited clear

articulation of research questions or objectives, employed rigorous and appropriate designs for literature reviews, utilized well-documented and comprehensive search strategies, and transparently reported inclusion and exclusion criteria. Additionally, their processes of study selection were deemed transparent and reproducible, and data synthesis and summarization were conducted effectively. The reviews adhered to reporting guidelines, and their methods and results were presented clearly and comprehensively. Conversely, Aldana & Khachemoune, Eckardt et al., Fulmer et al., Wadden et al., Hazazi & Wilson, Morgan-Bathke et al. (second instance), and Ibrahim et al. displayed some weaknesses in certain criteria, leading to an overall classification of "Week." These studies may have demonstrated limitations in specific aspects of their research questions, design, search strategies, or reporting. Overall, the quality assessment ensures a nuanced understanding of the strengths and weaknesses of each study included in the systematic review.

Data Synthesis

Table 4: Research Matrix

Author year	Aim	Sample	Design	Result	Conclusion	Recommendation
Powers et al. (2020)	provide a consensus report on diabetes self-management education and support in adults with type 2 diabetes.	Adults with type 2 diabetes.	Consensus report involving multiple professional organizations.	Comprehensive guidance on diabetes self-management education and support.	Emphasis on collaborative efforts for effective diabetes management.	Advocacy for the integration of diabetes self-management education across healthcare specialties.
Morgan-Bathke et al. (2023)	Develop evidence-based practice guidelines for medical nutrition therapy interventions by dietitians in adult overweight and obesity management.	Adults receiving medical nutrition therapy for overweight and obesity.	Evidence-based practice guideline.	Guidelines for effective medical nutrition therapy interventions.	Highlight the role of dietitians in adult overweight and obesity management.	Encourage the implementation of evidence-based medical nutrition therapy interventions by dietitians in clinical practice. Top of Form
Fabritz et al. (2021)	Enhance the quality of care for atrial fibrillation patients through dynamic risk assessment	Patients with atrial fibrillation.	th AFNET/EHRA Consensus Conference, consensus-based dynamic risk assessment.	Recommendations for dynamic risk assessment in atrial fibrillation management.	Advocacy for improved care through dynamic risk assessment strategies	Implement dynamic risk assessment approaches in atrial fibrillation care.
Aldana & Khachemoune (2020)	Evaluate the standard of care and explore new trends in managing diabetic foot ulcers.	Individuals with diabetic foot ulcers.	Review article assessing current standards and emerging trends.	appraisal of standard care and identification of new trends in diabetic foot ulcer management.	Recognition of evolving approaches to diabetic foot ulcer care.	Consideration of new trends in diabetic foot ulcer management in clinical practice.

Hoffman et al. (2020)	enhance digital health and smartphone competencies for individuals with serious mental illness.	Individuals with serious mental illness.	Pragmatic hands-on group approach - Digital Opportunities for Outcomes in Recovery Services (DOORS).	Increased digital health and smartphone competencies, autonomy, relatedness, and alliance.	Support for a pragmatic, group-based approach in increasing digital health competencies.	Promote group interventions like DOORS for improving digital health competencies in mental health services.
Phillip et al. (2021)	Propose recommendations for the introduction of digital technologies in diabetes care.	Therapeutic Clinical Nutrition	International panel consensus on diabetes digital technologies.	Recommendations for the integration of digital technologies in diabetes care.	affirmation of the immediate relevance and future potential of digital/virtual diabetes clinics.	Advocate for the adoption of digital technologies in diabetes clinics.
Fleischhacker et al. (2020)	Advocate for a new coordinated federal research effort to strengthen national nutrition research.	Healthcare coordinators	Rationale and options for a new federal nutrition research effort	Proposals for enhancing and coordinating national nutrition research efforts.	Call for a renewed and coordinated federal approach to nutrition research.	Support the establishment of coordinated federal efforts to advance nutrition research.
Eckardt et al. (2023)	Discuss trends and perspectives for improving the quality of chronic kidney disease care.	Therapeutic Clinical Nutrition	Conclusions drawn from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference.	Insights into trends and recommendations for enhancing chronic kidney disease care quality.	Recognition of the need for ongoing improvements in chronic kidney disease care.	Implement strategies derived from the KDIGO Controversies Conference to enhance chronic kidney disease care quality.
Fulmer et al. (2021)	Describe vital directions to improve health care and quality of life for older adults.	Therapeutic Clinical Nutrition	Commentary outlining six vital directions for improving care for older Americans.	Identification of key areas for enhancing the health and quality of life of older adults.	Urgency for addressing crucial aspects to improve the well-being of older Americans.	Prioritize the identified directions to enhance health care for older adults. Top of Form
Ullah et al. (2023)	Explore and discuss the application of smart technologies as tools in cardiovascular disease management.	Healthcare nutritionist	Investigation into the utilization of smart technologies in cardiovascular disease management.	Insights into the current use of smart technologies and their potential future applications in cardiovascular care.	Affirmation of the role of smart technologies in enhancing cardiovascular disease management.	Encourage further research and development in smart technology applications for cardiovascular care.
Kiernan et al. (2021)	Propose strategies to improve clinical trial outcomes in amyotrophic	Therapeutic Clinical Nutrition	Nature Reviews Neurology article outlining strategies for enhancing ALS clinical trials.	Recommendations for optimizing the design and execution of	Recognition of the need for improved approaches to ALS clinical trials.	Implement proposed strategies to enhance the effectiveness of

	lateral sclerosis (ALS).			clinical trials in ALS.		ALS clinical trials.
Wadden et al. (2020)	Evaluate lifestyle modification approaches for the treatment of obesity in adults.	Healthcare nutritionist	Review article assessing lifestyle modification approaches for obesity treatment.	Overview of lifestyle modification strategies for adult obesity treatment.	Recognition of the relevance and effectiveness of lifestyle modification in obesity treatment.	Advocate for the incorporation of lifestyle modification approaches in adult obesity treatment.
Alanzi (2023)	Investigate the impact of ChatGPT on teleconsultants in healthcare based on the perceptions of healthcare experts in Saudi Arabia.	Healthcare experts in Saudi Arabia.	Study exploring the perceptions of healthcare experts regarding the impact of ChatGPT on teleconsultations.	Insights into the perceived impact of ChatGPT on teleconsultations in Saudi Arabia.	Recognition of the influence of ChatGPT on teleconsultant interactions in the healthcare domain.	Consider further exploration and integration of ChatGPT in teleconsultation practices.
Hazazi & Wilson (2022)	Investigate noncommunicable diseases and health system responses in Saudi Arabia, focusing on policies and strategies.	Interviews from policy makers	Qualitative study exploring health system responses to noncommunicable diseases in Saudi Arabia.	Insights into policies and strategies related to noncommunicable diseases in the Saudi Arabian health system.	Recognition of the importance of effective policies and strategies in addressing noncommunicable diseases.	Consideration of policy improvements to enhance the health system's response to noncommunicable diseases in Saudi Arabia.
Alamri & AlKhater (2022)	Evaluate the knowledge on microbiome and dysbiosis in allergic diseases among medical sciences students in Saudi Arabia.	Medical sciences students in Saudi Arabia.	Assessment of medical sciences students' knowledge on microbiome and dysbiosis in allergic diseases.	Examination of the level of knowledge among medical sciences students on microbiome-related aspects in allergic diseases.	Recognition of the importance of understanding microbiome and dysbiosis in the context of allergic diseases.	Advocate for enhanced education on microbiome-related topics among medical sciences students in Saudi Arabia.
Al-Mssallem et al. (2024)	Explore the potential of genetically modified food for food and nutritional security in Saudi Arabia.	Healthcare officers	Examination of the potentiality of genetically modified food for enhancing food and nutritional security in Saudi Arabia.	Insights into the role of genetically modified food in addressing food and nutritional security in the Saudi context.	Recognition of the potential benefits of genetically modified food for food and nutritional security.	Consideration of the implications of genetically modified food in shaping food and nutritional security policies in Saudi Arabia.
Al Shehri et al. (2024)	Investigate the compositional and functional alterations of gut microbiota profiles in response to anti-TNF-α therapy in	Participants undergoing anti-TNF-α therapy for inflammatory bowel disease.	Pilot study examining changes in gut microbiota composition and function during anti-TNF-α therapy.	Identification of alterations in gut microbiota profiles associated with anti-TNF-α therapy in	Recognition of the potential impact of anti-TNF-α therapy on gut microbiota in	Further exploration of the relationship between anti-TNF-α therapy, gut microbiota, and

	inflammatory bowel disease.			inflammatory bowel disease.	the context of inflammatory bowel disease.	inflammatory bowel disease.
Morgan-Bathke et al. (2023)	Develop evidence-based practice guidelines for medical nutrition therapy interventions by dietitians in adult overweight and obesity management.	Adults receiving medical nutrition therapy for overweight and obesity.	Evidence-based practice guideline.	Guidelines for effective medical nutrition therapy interventions.	Highlight the role of dietitians in adult overweight and obesity management.	Encourage the implementation of evidence-based medical nutrition therapy interventions by dietitians in clinical practice.
Ibrahim et al. (2023)	Propose a global action plan initiative to address critical gaps and drive progress in healthcare through innovation and research transformation.	Past literature	Global action plan initiative to revolutionize healthcare through innovation and research transformation.	Action plan outlining strategies to address critical gaps and drive progress in healthcare innovation and research.	Recognition of the need for innovative approaches and research transformation in healthcare.	Implement the proposed global action plan to foster innovation and transformation in healthcare research on a global scale.

The selected articles cover a diverse range of topics within healthcare and clinical research. Powers et al. (2020) contribute a consensus report on diabetes self-management education, emphasizing collaborative efforts for effective diabetes management. Morgan-Bathke et al. (2023) develop evidence-based practice guidelines for dietitians in adult overweight and obesity management, encouraging their implementation in clinical practice. Fabritz et al. (2021) advocate for dynamic risk assessment to enhance the quality of care for atrial fibrillation patients. Aldana and Khachemoune (2020) evaluate the standard of care and emerging trends in managing diabetic foot ulcers, recognizing evolving approaches. Hoffman et al. (2020) propose a pragmatic group approach to increase digital health competencies for individuals with serious mental illness. Phillip et al. (2021) recommends the integration of digital technologies in diabetes care, affirming their immediate relevance. Fleischhacker et al. (2020) advocate for a coordinated federal research effort to strengthen national nutrition research. Eckardt et al. (2023) discuss trends and perspectives for improving the quality of chronic kidney disease care, emphasizing ongoing improvements. Fulmer et al. (2021) outline vital directions to improve health care and quality of life for older adults, stressing the urgency to prioritize these areas. Ullah et al. (2023) explore smart technologies in cardiovascular disease management, affirming their role and encouraging further research. Kiernan et al. (2021) propose strategies to improve clinical trial outcomes in amyotrophic lateral sclerosis, recognizing the need for enhanced approaches. Wadden et al. (2020) evaluate lifestyle modification approaches for obesity, advocating for their incorporation in adult obesity treatment. Alanzi (2023) investigates the impact of ChatGPT on teleconsultations in Saudi Arabia, emphasizing the influence on healthcare interactions. Hazazi and Wilson (2022) study noncommunicable diseases and health system responses in Saudi Arabia, highlighting the importance of effective policies. Alamri and AlKhater (2022) assess

medical sciences students' knowledge on microbiome and dysbiosis in allergic diseases in Saudi Arabia, advocating for enhanced education. Al-Mssallem et al. (2024) explore genetically modified food for food and nutritional security in Saudi Arabia, recognizing its potential benefits. Al Shehri et al. (2024) investigates gut microbiota alterations in response to anti-TNF-α therapy in inflammatory bowel disease, suggesting further exploration of this relationship. Lastly, Ibrahim et al. (2023) propose a global action plan initiative to address critical gaps and drive progress in healthcare through innovation and research transformation, highlighting the need for innovative approaches on a global scale.

Results

Table 5: Themes, Sub Themes, Trends and Explanation.

Theme	Sub-Theme	Trends and Explanation	Studies
Diabetes Management	Self-Management Education and Support	Growing emphasis on collaborative efforts for effective diabetes management through comprehensive education and support.	Powers et al. (2020)
Nutrition Therapy	Evidence-Based Guidelines	Adoption and implementation of evidence-based guidelines for medical nutrition therapy by dietitians in adult overweight and obesity management.	Morgan-Bathke et al. (2023)
Atrial Fibrillation Care	Dynamic Risk Assessment	Integration of dynamic risk assessment strategies to enhance the quality of care for patients with atrial fibrillation.	Fabritz et al. (2021)
Diabetic Foot Ulcer Management	Standard of Care and Emerging Trends	Evaluation of current standards and exploration of emerging trends in diabetic foot ulcer management, recognizing evolving approaches.	Aldana & Khachemoune (2020)
Digital Health Competencies	Pragmatic Group Approach	Pragmatic, group-based interventions like DOORS to enhance digital health competencies for individuals with serious mental illness.	Hoffman et al. (2020)
Diabetes Digital Technologies	Integration of Digital Technologies	Recommendations for the integration of digital technologies in diabetes care, affirming their immediate relevance and future potential.	Phillip et al. (2021)
National Nutrition Research	Coordinated Federal Research Effort	Advocacy for a new coordinated federal research effort to strengthen national nutrition research, with proposals for enhanced coordination.	Fleischhacker et al. (2020)
Chronic Kidney Disease Care	Trends and Perspectives	Insights into trends and recommendations for improving the quality of chronic kidney disease care, emphasizing the need for ongoing improvements.	Eckardt et al. (2023)
Aging Population Health	Vital Directions for Better Health	Identification of vital directions to improve health care and quality of life for older adults, emphasizing key areas for enhancement.	Fulmer et al. (2021)
Cardiovascular Disease Management	Smart Technologies Application	Exploration and discussion on the application of smart technologies as tools in cardiovascular disease management, with affirmation of their role and potential future applications.	Ullah et al. (2023)

ALS Clinical Trials Improvement	Strategies for Clinical Trial Optimization	Proposals and recommendations for optimizing the design and execution of clinical trials in amyotrophic lateral sclerosis (ALS).	Kiernan et al. (2021)
Lifestyle Modification	Strategies for Obesity Treatment	Overview of lifestyle modification approaches for the treatment of obesity in adults, advocating for their incorporation into obesity treatment plans.	Wadden et al. (2020)
Teleconsultations Impact	Influence of ChatGPT on Healthcare	Investigation into the impact of ChatGPT on teleconsultations in Saudi Arabia, recognizing its influence on healthcare interactions.	Alanzi (2023)
Health System Responses	Policies and Strategies	Qualitative study exploring noncommunicable diseases and health system responses in Saudi Arabia, focusing on policies and strategies, highlighting the importance of effective measures.	Hazazi & Wilson (2022)
Microbiome Knowledge	Education on Microbiome in Allergic Diseases	Assessment of medical sciences students' knowledge on microbiome and dysbiosis in allergic diseases in Saudi Arabia, advocating for enhanced education on microbiome-related topics.	Alamri & AlKhater (2022)
Genetically Modified Food	Potential for Food and Nutritional Security	Exploration of the potentiality of genetically modified food for food and nutritional security in Saudi Arabia, recognizing its potential benefits.	Al-Mssallem et al. (2024)
Gut Microbiota and Anti-TNF-α Therapy	Impact on Inflammatory Bowel Disease	Investigation of compositional and functional alterations of gut microbiota profiles in response to anti-TNF-α therapy in inflammatory bowel disease, suggesting further exploration of this relationship.	Al Shehri et al. (2024)
Healthcare Innovation	Global Action Plan Initiative	Proposal of a global action plan initiative to address critical gaps and drive progress in healthcare through innovation and research transformation, emphasizing the need for innovative approaches on a global scale.	Ibrahim et al. (2023)

Interpretation of Results

The selected studies collectively shed light on diverse themes within the healthcare landscape, providing a comprehensive overview of current trends and emerging strategies. Diabetes management emerges as a prominent theme, with a consensus report (Powers et al., 2020) emphasizing collaborative efforts for effective self-management education and support in adults with type 2 diabetes. Similarly, nutrition therapy takes center stage as evidenced by an evidence-based practice guideline (Morgan-Bathke et al., 2023) outlining guidelines for dietitians in managing adult overweight and obesity, reflecting a growing commitment to evidence-based interventions. The integration of digital technologies in healthcare is also a prevailing trend, as seen in studies advocating for the incorporation of digital tools in diabetes care (Phillip et al., 2021) and the pragmatic use of digital health and smartphone competencies for individuals with serious mental illness (Hoffman et al., 2020).

A second prominent theme involves the evaluation and improvement of specific disease management strategies. For instance, in cardiovascular disease management, the exploration of

smart technologies (Ullah et al., 2023) suggests a paradigm shift towards leveraging technology for enhanced patient care. Meanwhile, the study on amyotrophic lateral sclerosis (ALS) clinical trials (Kiernan et al., 2021) underscores the imperative to optimize trial outcomes, indicative of a broader movement within healthcare research towards refining methodologies. The studies also reflect a global perspective, with research initiatives proposing coordinated federal efforts to strengthen national nutrition research (Fleischhacker et al., 2020) and a global action plan to drive progress and innovation in healthcare (Ibrahim et al., 2023). Collectively, these themes highlight the dynamic and interconnected nature of contemporary healthcare, where technological advancements, evidence-based interventions, and global collaboration converge to shape the future of patient care.

Discussion

International Perspectives

Internationally, the discourse on healthcare, as evidenced by the selected studies, emphasizes collaborative and innovative approaches to address diverse health challenges. The studies on diabetes management (Powers et al., 2020) and nutrition therapy (Morgan-Bathke et al., 2023) present a consensus and evidence-based practice guideline, respectively, reflecting a global commitment to developing standardized protocols for managing prevalent health conditions. Furthermore, the integration of digital technologies in diabetes care (Phillip et al., 2021) and the pragmatic use of digital health tools for mental health support (Hoffman et al., 2020) underscore a worldwide trend toward leveraging technology to enhance patient outcomes and accessibility to healthcare services.

Cardiovascular health also takes a prominent international focus, with research exploring the application of smart technologies in managing cardiovascular diseases (Ullah et al., 2023). This reflects a broader global movement toward adopting innovative solutions for more effective and personalized healthcare, especially in chronic disease management. Additionally, the call for a coordinated federal effort to strengthen national nutrition research (Fleischhacker et al., 2020) signals a recognition of the need for collaborative, large-scale initiatives to advance nutritional science, indicative of a global perspective.

Saudi Arabian

In contrast, studies with a specific focus on Saudi Arabia reveal insights into the unique health challenges and strategic initiatives within the country. Research on noncommunicable diseases and health system responses (Hazazi & Wilson, 2022) reflects a Saudi Arabian effort to tailor health policies and strategies to address the country's specific healthcare landscape. The study on the knowledge of microbiome and dysbiosis in allergic diseases among medical sciences students (Alamri & AlKhater, 2022) indicates a growing interest in local research aimed at understanding and addressing health concerns unique to the Saudi population.

Furthermore, the exploration of the potential of genetically modified food for food and nutritional security in Saudi Arabia (Al-Mssallem et al., 2024) reflects a localized effort to tackle issues related to food sustainability and nutrition. The investigation into compositional and functional alterations of gut microbiota in response to anti-TNF-α therapy in inflammatory bowel disease (Al Shehri et al., 2024) showcases a nuanced approach to healthcare, considering both global treatment strategies and their specific impact on the Saudi population.

The international and indigenous research studies collectively provide a comprehensive understanding of the dynamic healthcare landscape. While international perspectives emphasize global collaborations, technological advancements, and coordinated efforts, Saudi Arabian research sheds light on region-specific health challenges and tailored strategies, showcasing a multifaceted approach to improving healthcare on both global and local scales.

Conclusion

Present systematic review has meticulously examined a diverse array of international and indigenous research studies, shedding light on critical themes and trends in contemporary healthcare. The synthesis of findings reveals a global commitment to collaborative, innovative, and technology-driven approaches in healthcare, exemplified by consensus reports, evidence-based practice guidelines, and the integration of digital technologies. Simultaneously, the review underscores the significance of region-specific research, particularly within the Saudi Arabian context, where studies delve into local health challenges and strategic initiatives tailored to the unique healthcare landscape. The amalgamation of these international and indigenous perspectives contributes to a nuanced understanding of the multifaceted healthcare environment, providing valuable insights for practitioners, policymakers, and researchers alike.

Recommendation

Based on the comprehensive analysis of international and indigenous healthcare research, several recommendations emerge to guide future endeavors. First, fostering global collaborations and information-sharing platforms can amplify the impact of innovative healthcare interventions. Initiatives that encourage interdisciplinary partnerships and cross-cultural insights can advance the field's collective knowledge. Additionally, there is a need for continued investment in indigenous research within specific regions, such as Saudi Arabia, to address local health challenges effectively. Policymakers and stakeholders should prioritize initiatives that support the development of context-specific strategies and interventions, ensuring the relevance and efficacy of healthcare practices in diverse settings. Lastly, embracing and integrating digital technologies, as emphasized in international studies, remains crucial for enhancing healthcare delivery, particularly in regions like Saudi Arabia, where smart technologies can contribute to more efficient and accessible healthcare services.

WORKS CITED

Powers, M. A., Bardsley, J. K., Cypress, M., Funnell, M. M., Harms, D., Hess-Fischl, A., ... & Uelmen, S. (2020). Diabetes self-management education and support in adults with type 2 diabetes: a consensus report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. Journal of the American Pharmacists Association, 60(6), e1-e18.

Morgan-Bathke, M., Raynor, H. A., Baxter, S. D., Halliday, T. M., Lynch, A., Malik, N., ... & Rozga, M. (2023). Medical Nutrition Therapy Interventions Provided by Dietitians for Adult Overweight and Obesity Management: An Academy of Nutrition and Dietetics Evidence-Based Practice Guideline. Journal of the Academy of Nutrition and Dietetics, 123(3), 520-545.

Fabritz, L., Crijns, H. J., Guasch, E., Goette, A., Häusler, K. G., Kotecha, D., ... & Kirchhof, P. (2021). Dynamic risk assessment to improve quality of care in patients with atrial fibrillation: the 7th AFNET/EHRA Consensus Conference. EP Europace, 23(3), 329-344.

Aldana, P. C., & Khachemoune, A. (2020). Diabetic foot ulcers: appraising standard of care and reviewing new trends in management. American journal of clinical dermatology, 21(2), 255-264.

Hoffman, L., Wisniewski, H., Hays, R., Henson, P., Vaidyam, A., Hendel, V., ... & Torous, J. (2020). Digital Opportunities for Outcomes in Recovery Services (DOORS): a pragmatic hands-on group approach toward increasing digital health and smartphone competencies, autonomy, relatedness, and alliance for those with serious mental illness. Journal of Psychiatric Practice®, 26(2), 80-88.

Parati, G., Goncalves, A., Soergel, D., Bruno, R. M., Caiani, E. G., Gerdts, E., ... & Kahan, T. (2023). New perspectives for hypertension management: progress in methodological and technological developments. European Journal of Preventive Cardiology, 30(1), 48-60.Balkir, P., Kemahlioglu, K., & Yucel, U. (2021). Foodomics: A new approach in food quality and safety. Trends in Food Science & Technology, 108, 49-57.

Phillip, M., Bergenstal, R. M., Close, K. L., Danne, T., Garg, S. K., Heinemann, L., ... & Battelino, T. (2021). The digital/virtual diabetes clinic: the future is now—recommendations from an international panel on diabetes digital technologies introduction. Diabetes technology & therapeutics, 23(2), 146-154.

Fleischhacker, S. E., Woteki, C. E., Coates, P. M., Hubbard, V. S., Flaherty, G. E., Glickman, D. R., ... & Mozaffarian, D. (2020). Strengthening national nutrition research: rationale and options for a new coordinated federal research effort and authority. The American journal of clinical nutrition, 112(3), 721-769.

Eckardt, K. U., Delgado, C., Heerspink, H. J., Pecoits-Filho, R., Ricardo, A. C., Stengel, B., ... & Kramer, H. (2023). Trends and Perspectives for Improving Quality of Chronic Kidney Disease Care: Conclusions From a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. Kidney International.

Fulmer, T., Reuben, D. B., Auerbach, J., Fick, D. M., Galambos, C., & Johnson, K. S. (2021). Actualizing Better Health And Health Care For Older Adults: Commentary describes six vital directions to improve the care and quality of life for all older Americans. Health Affairs, 40(2), 219-225.

Ullah, M., Hamayun, S., Wahab, A., Khan, S. U., Rehman, M. U., Haq, Z. U., ... & Naeem, M. (2023). Smart technologies used as smart tools in the management of cardiovascular disease and their future perspective. Current Problems in Cardiology, 48(11), 101922.

Kiernan, M. C., Vucic, S., Talbot, K., McDermott, C. J., Hardiman, O., Shefner, J. M., ... & Turner, M. R. (2021). Improving clinical trial outcomes in amyotrophic lateral sclerosis. Nature Reviews Neurology, 17(2), 104-118.

Wadden, T. A., Tronieri, J. S., & Butryn, M. L. (2020). Lifestyle modification approaches for the treatment of obesity in adults. American psychologist, 75(2), 235.

Alanzi, T. M. (2023). Impact of ChatGPT on Teleconsultants in Healthcare: Perceptions of Healthcare Experts in Saudi Arabia. Journal of Multidisciplinary Healthcare, 16, 2309.

Hazazi, A., & Wilson, A. (2022). Noncommunicable diseases and health system responses in Saudi Arabia: focus on policies and strategies. A qualitative study. Health Research Policy and Systems, 20(1), 63.

Alamri, A., & AlKhater, S. A. (2022). Evaluating the knowledge on microbiome and dysbiosis in allergic diseases among medical sciences students in Saudi Arabia. Clinical and Molecular Allergy, 20(1), 2.

Al-Mssallem, M. Q., Al-Khayri, J. M., Almagthali, B. H., Abdelkader, H. S., Alnabbat, K. I., & Sattar, M. N. (2024). Genetically Modified Food: Potentiality for Food and Nutritional Security in Saudi Arabia. In Food and Nutrition Security in the Kingdom of Saudi Arabia, Vol. 2: Macroeconomic Policy and Its Implication on Food and Nutrition Security (pp. 359-392). Cham: Springer International Publishing.

Al Shehri, D., Saadah, O. I., Mosli, M., Edris, S., Alatawy, M., Alatawi, H., ... & Bahieldin, A. (2024). Compositional and functional alteration of gut microbiota profiles in response to anti-TNF-α therapy in inflammatory bowel disease: A Pilot study. Informatics in Medicine Unlocked, 44, 101415.

Morgan-Bathke, M., Raynor, H. A., Baxter, S. D., Halliday, T. M., Lynch, A., Malik, N., ... & Rozga, M. (2023). Medical Nutrition Therapy Interventions Provided by Dietitians for Adult Overweight and Obesity Management: An Academy of Nutrition and Dietetics Evidence-Based Practice Guideline. Journal of the Academy of Nutrition and Dietetics, 123(3), 520-545.

Ibrahim, N., AbdRaboh, N. R., Bienert, A., Baig, M. R., Ismaiel, A., Mahmoud, M. A., ... & Ahmed13, H. A. (2023). Revolutionizing Healthcare Through Innovation and Transformation in Research: A Global Action Plan Initiative to Address Critical Gaps and Drive Progress. Global Journal of Medical Therapeutics| www. gjmt. net July-September, 5(3), 15-29.

Fabritz, L., Crijns, H. J., Guasch, E., Goette, A., Häusler, K. G., Kotecha, D., ... & Kirchhof, P. (2021). Dynamic risk assessment to improve quality of care in patients with atrial fibrillation: the 7th AFNET/EHRA Consensus Conference. EP Europace, 23(3), 329-344.

Prado, C. M., Laviano, A., Gillis, C., Sung, A. D., Gardner, M., Yalcin, S., ... & Chasen, M. R. (2022). Examining guidelines and new evidence in oncology nutrition: a position paper on gaps and opportunities in multimodal approaches to improve patient care. Supportive Care in Cancer, 30(4), 3073-3083.

Kolimi, P., Narala, S., Nyavanandi, D., Youssef, A. A. A., & Dudhipala, N. (2022). Innovative treatment strategies to accelerate wound healing: trajectory and recent advancements. Cells, 11(15), 2439.

Eberle, C., & Stichling, S. (2021). Clinical improvements by telemedicine interventions managing type 1 and type 2 diabetes: systematic meta-review. Journal of medical Internet research, 23(2), e23244.

Domingo-Lopez, D. A., Lattanzi, G., Schreiber, L. H., Wallace, E. J., Wylie, R., O'Sullivan, J., ... & Duffy, G. P. (2022). Medical devices, smart drug delivery, wearables and technology for the treatment of Diabetes Mellitus. Advanced Drug Delivery Reviews, 185, 114280.

Phillip, M., Bergenstal, R. M., Close, K. L., Danne, T., Garg, S. K., Heinemann, L., ... & Battelino, T. (2021). The digital/virtual diabetes clinic: the future is now—recommendations from an international panel on diabetes digital technologies introduction. Diabetes technology & therapeutics, 23(2), 146-154.

Scuto, M., Ontario, M. L., Salinaro, A. T., Caligiuri, I., Rampulla, F., Zimbone, V., ... & Calabrese, V. (2022). Redox modulation by plant polyphenols targeting vitagenes for chemoprevention and therapy: Relevance to novel anti-cancer interventions and mini-brain organoid technology. Free Radical Biology and Medicine, 179, 59-75.

Fulmer, T., Reuben, D. B., Auerbach, J., Fick, D. M., Galambos, C., & Johnson, K. S. (2021). Actualizing Better Health And Health Care For Older Adults: Commentary describes six vital directions to improve the care and quality of life for all older Americans. Health Affairs, 40(2), 219-225.

Eckardt, K. U., Delgado, C., Heerspink, H. J., Pecoits-Filho, R., Ricardo, A. C., Stengel, B., ... & Kramer, H. (2023). Trends and Perspectives for Improving Quality of Chronic Kidney Disease Care: Conclusions From a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. Kidney International.

Parati, G., Goncalves, A., Soergel, D., Bruno, R. M., Caiani, E. G., Gerdts, E., ... & Kahan, T. (2023). New perspectives for hypertension management: progress in methodological and technological developments. European Journal of Preventive Cardiology, 30(1), 48-60.

Malik, A., Kumar, S., Basu, S., & Bebenroth, R. (2023). Managing disruptive technologies for innovative healthcare solutions: The role of high-involvement work systems and technologically-mediated relational coordination. Journal of Business Research, 161, 113828.

Detopoulou, P., Voulgaridou, G., Moschos, P., Levidi, D., Anastasiou, T., Dedes, V., ... & Papadopoulou, S. K. (2023). Artificial intelligence, nutrition, and ethical issues: A mini-review. Clinical Nutrition Open Science.

Endo, R., Sugimoto, S., Shirosaki, K., Kato, H., Wada, M., Kanai, T., & Sato, T. (2023). Clinical challenges of short bowel syndrome and the path forward for organoid-based regenerative medicine. Regenerative Therapy, 24, 64-73.

Aminizadeh, S., Heidari, A., Toumaj, S., Darbandi, M., Navimipour, N. J., Rezaei, M., ... & Unal, M. (2023). The applications of machine learning techniques in medical data processing based on distributed computing and the Internet of Things. Computer Methods and Programs in Biomedicine, 107745.

Komalasari, R. (2023). Telemedicine in Pandemic Times in Indonesia: Healthcare Professional's Perspective. In Health Informatics and Patient Safety in Times of Crisis (pp. 138-153). IGI Global.

Dresen, E., Naidoo, O., Hill, A., Elke, G., Lindner, M., Jonckheer, J., ... & Stoppe, C. (2023). Medical nutrition therapy in patients receiving ECMO: Evidence-based guidance for clinical practice. Journal of Parenteral and Enteral Nutrition, 47(2), 220-235.

Kalariya, Y., Kumar, A., Ullah, A., Umair, A., Neha, F. N. U., Madhurita, F. N. U., ... & Khatri, M. (2023). Integrative medicine approaches: bridging the gap between conventional and renal complementary therapies. Cureus, 15(9).

Alesi, S., Ee, C., Moran, L. J., Rao, V., & Mousa, A. (2022). Nutritional supplements and complementary therapies in polycystic ovary syndrome. Advances in Nutrition, 13(4), 1243-1266.

Cardenas, D., Davisson Correia, M. I. T., Hardy, G., Ochoa, J. B., Barrocas, A., Hankard, R., ... & Barazzoni, R. (2022). Nutritional care is a human right: Translating principles to clinical practice. Nutrition in Clinical Practice, 37(4), 743-751.