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SPECIAL THEME

TELEHEALTH IN NURSING

2020

WHO YEAR OF THE NURSE AND THE MIDWIFE 2020

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JISfTeH is an official journal of the International Society for Telemedicine and eHealth whose stated mission is to *«Facilitate the international dissemination of knowledge and experience in Telemedicine and eHealth and provide access to recognized experts in the field worldwide.»*

JISfTeH is a peer reviewed, open access, online journal that seeks to publish information on all aspects of eHealth activity and research from around the World. Its primary focus is on original research, critical reviews, preliminary communications and case reports. All of which undergo peer review. Scientific letters and letters to the editor are also welcomed.

JISfTeH encourages submission of preliminary communications and short reports from developing countries. Papers are published online immediately on acceptance of the final galley proofs to ensure rapid access to new work.

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TABLE OF CONTENTS

JISfTeH

GUEST EDITORIAL

Nurses and Midwives in eHealth

This Special Theme issue of the Journal of the International Society for Telemedicine and eHealth (JISfTeH) serves to recognise, support and advance the important role of nurses and midwives in eHealth and all of health care delivery. The World Health Organization (WHO) has declared that 2020 is the 'Year of the Nurse and Midwife' to advance nurses' and midwives' vital position in transforming healthcare around the world.[1] As the largest group of health care workers in the world, nurses and midwives play a vital role in providing health services. These are the people who can exploit the digital health revolution to deliver care over rural distances and urban barriers, caring for basic health needs, chronic diseases and the effects of war and natural disasters. They are often the first and only point of care in their communities. The world needs 9 million more nurses and midwives if it is to achieve universal health coverage by 2030.[2]

The worldwide recognition of nursing and midwifery is timely, in that 2020 is the 200th anniversary of Florence Nightingale's birth. Nightingale's book, 'Notes on Nursing,' was published in 1859 and has been a beacon for nursing and midwifery ever since, with its topics such as taking food, light in the wards, cleanliness of rooms and walls, and observation of the sick.[3] The observation chapter is one of the longest and we can perhaps glean some ties to the digital proliferation in health care today. For example, she wrote that nurses, and we include midwives, should be taught what to observe – how to observe – what symptoms indicate improvement – what the reverse – which are of importance and which are of none – which are evidence of neglect.[3] Think of a chronically ill elder in her technology-supported home, or of a woman with a complicated pregnancy who is distant from care. Digital observation by providers is critical for appropriate and timely support and interventions.

ISfTeH – Your Global Partner in Digital Health – has, since its inception, been a strong supporter of nurses in all of their specialties. The Telenursing Working Group (TWG) was organised early in ISfTeH's history and continues to grow today, with more than 165 members representing 47 countries. The TWG's vision is to extend nurses' reach through technology and improve the quality of healthcare delivery worldwide. Its mission is to provide a forum for exchange of knowledge and experiences of nurses and others who are working with or supporting nurses using eHealth applications. Each year, one or two TWG-organised nursing webinars are hosted worldwide. The annual Med-e-Tel conferences included presentations and on-site global web-

inars by and for nurses. The annual international conferences co-sponsored by the sponsoring country's telehealth organization and ISfTeH also welcome nursing presentations. The newer annual meeting of ISfTeH, 'Digital Health Global Commons, powered by ISfTeH' continues to be an excellent venue for nursing and midwifery presentations and information sharing.

The Working group of Women (WoW) and the TWG are partners within the ISfTeH context, given that their goals are similar and of course nursing and midwifery are about 90 percent women. WoW develops actions to support and promote the role of Women in the areas of telemedicine and eHealth in the world. It aims to develop collaborations with other WGs, the Journal of the ISfTeH and international partners to make women visible in international conferences and scientific publications.

The idea for this Special Theme Nurses and Midwives in eHealth issue came from the outstanding accomplishments of the WoW leaders, who have published four Special Theme Women in eHealth collections in JISfTeH volumes 3, 5, 6 & 7 with corresponding printed monographs for each of the sets of papers.[4] A call for abstracts was sent out widely to nurses and midwives in early Autumn of 2019[5,6] and five papers were accepted by the organisers for submission to the

JISfTeH editors and review process. While nurses authored these five papers, we acknowledge the work of midwives found in the monographs noted above. For example, the editorial by Cadee and Ali described technology and care by midwives and briefly reviewed research that increases the knowledge and evidence for safe practice worldwide.[7] The paper by Perez-Chavolla et al described six midwifery projects of the Women Observatory for eHealth with the aim of supporting the adoption of information and communication technologies in eight countries.[8] And the paper by Pezaro described the development of an evidence and theory-based design of an online intervention to support midwives in work-related psychological stress.[9]

The five papers in this 2020 issue reflect a wide diversity of eHealth-based interests. The development of a cohort data capture interface using real-time monitoring of breast-feeding indicators for high foetal, neonatal and child risk from birth two years was described by Silva et al. The paper by Bartz looks at nurse-led research more comprehensively to identify and describe research-based evidence for use in clinical nursing practice and education. The papers by Heli et al and Padmalatha et al demonstrate how nurses are facing

Bartz CC, et al. Guest Editorial, *J Int Soc Telemed eHealth* 2020;8:e18

1

JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

the constant in-flow of digital health technology and also what methods can be used to inform and educate nurses to ease the constant change. Well-being technology approaches suggest new ways of using technology, gamification and computational intelligence in addressing the challenges. The paper by Kouri et al describes the Futures Wheel Method as one means by which people in health care can work to anticipate and articulate the future, both for digital technology in all of its health-related applications and for interpersonal communication skills and requirements.

We hope that the papers in this Special Theme Nurses and Midwives in eHealth issue, together with the previous Women in eHealth issues, will be an encouragement to all nurses and midwives to submit their research manuscripts to JISfTeH for review and publication. Guidelines for papers format and submission are on the journal's website (https://journals.ukzn.ac.za/index.php/JISfTeH/issue/view/60). If you are not already a member of the Telenursing Working Group or the Working group of Women, or both, please do join ISfTeH and at least one working group (https://www.isfteh.org/).

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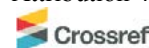**Pirkko Kouri**
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The Women Observatory for
eHealth
Foundation Millennia2025
Women and Innovation
Belgium

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Bartz CC, et al. Guest Editorial, *J Int Soc Telemed eHealth* 2020;8:e18

2

5 | JOURNAL OF THE INTERNATIONAL SOCIETY
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TELEHEALTH NURSING RESEARCH: ADDING TO THE EVIDENCE-BASE FOR HEALTHCARE

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Abstract

This paper reviews recent, nurse-led telehealth research with the goal of describing research findings that provide evidence for practice. **Methods:** Using an iterative search method, of eight electronic databases, 84 nurse-led research papers were separated into intervention research, systematic reviews and meta-analyses, and descriptive research. The main emphasis was on full text analysis of the intervention research. **Results**: Fifteen intervention research papers reported findings related to cardiovascular disease, diabetes mellitus, older age, young adults, early adolescents, children with special health care needs, people with a stoma, post-partum mothers and nurses. Also reviewed for useable evidence for practice were 10 systematic reviews, two meta-analyses and two papers that described reviews plus meta-analyses. Fifty-five papers with descriptive designs are briefly described. Nurse-led intervention research is increasing knowledge about the use of telehealth technology and applications in care delivery. People with healthcare needs do better with individual attention and increased follow-up. People have a tolerance for technology used with them to advance their quality of life and healing but there is a point at which too much technology is overwhelming. Clinical research is a challenge due to the number of extraneous variables that are difficult to control and that can affect a person's response to the research intervention. **Conclusion:** Continuation of nurse-led telehealth intervention research will help to ensure that technology used to support and advance care delivery will be evidence-based.

Keywords: nursing; telehealth; intervention research; evidence-based practice; review

Crossref

Introduction

More than 20 million nurses worldwide are involved in health professions and care delivery 24/7.[1] Nurses have been involved with telehealth technology and applications for decades; the telephone has always been used by nurses to educate, consult with, and support patients and families. Mobile phones and digital capability have extended the reach and scope of nurses for healthcare delivery. Successful nurses use the technology that most appropriately supports their practice. Nurses' roles in the development of research-based evidence for practice should not be overlooked. Those nurses who lead randomised controlled trials or other intervention research in the telehealth environment are a small fraction of all nurses worldwide. However, these role models show how nurses can be leaders in advancing evidence-based practice. Nursing, with its ethos of holistic caring, will use research to strengthen its impact on healthcare with a growing body of evidence-based knowledge. This is all to the good for health and well-being of people worldwide.

Since late 2016, a constant search of the English language literature has been underway for telehealth research publications that have a nurse as first author. While nurses may be listed among the author group on some articles, or they may clearly have participated in the research interventions without direct attribution, by using the nurse-as-first-author criterion nurses can be given full credit for leading the research team. Literature searches in 2016, 2017 and early 2018 found nurse-led research publications with predominantly descriptive designs that covered telehealth nursing, clinical practice, education and research.[2-4] These demonstrated the depth and breadth of nursing in the telehealth environment. Of 51 papers identified in 2017 plus first quarter 2018, 38 used descriptive designs and 5 described technology (apps) evaluations. Eight papers used quasi-experimental designs, resulting in some evidence for practice.[4] The papers represented nurses from 19 countries.

The purpose of this paper is to discuss nurse-led telehealth research from 2018 through first quarter 2019, organising the papers by design: intervention research, systematic reviews and meta-analyses, and descriptive designs. The greatest emphasis will be on intervention

research and resulting outcomes that can be used to support evidence-based practice. The goal of this work is to encourage more nurses to do intervention research, thus generating observable and measurable evidence for healthcare delivery.

Methods

The design for this paper is a critical analysis of nurse-led intervention research, systematic reviews and meta-analyses, and a brief discussion of the descriptive research papers found during the study period. The literature searches supporting the prior and current work are iterative. A medical librarian regularly and repeatedly reviews dozens of tables of contents of health-related publications and then forwards to this author all telehealth research publications found in the ongoing reviews. This provides a steady flow of multidisciplinary papers involving telehealth, e.g., 357 papers in 2018. We recognise that this contrasts with traditional, one-time searches that use one or several search terms and inclusion criteria with databases such as PubMed, CINAHL, PsychINFO, EMBASE, Global Health, HealthStar, ISI Web of Science and Google. However, established databases are slow to add new journals and, with PubMed, to assign MeSH subject headings to new titles. Also, the headings for different databases may overlap or be different. Further, the terms and keywords used in telehealth articles vary a great deal, e.g., tele-(specialty), eHealth, mHealth, mobile health, digital health, artificial intelligence. And, databases that use automatic term mapping make searches more difficult as the search terms are identified wherever they are in the article, making a more detailed manual search necessary after all.

Results

In all of 2018 through first quarter-2019, 84 nurse-led research papers from 21 countries were identified. (Table 1) Fifteen papers described intervention research, ranging from intervention-control studies to randomised controlled trials. Fourteen papers described systematic reviews and/or meta-analyses and 55 papers used descriptive research designs.

Table 1. Papers by country.

Country	Count	Country	Count
Australia	3	Netherlands	1
Brazil	2	New Zealand	2
Canada	5	Norway	1
China	5	Singapore	1
Denmark	1	South Korea	2
Finland	2	Spain	2
Greece	1	Sweden	4
Hong Kong	1	Switzerland	1
Iran	2	Taiwan	2
Italy	2	United Kingdom	2
		United States	42

Intervention Research

The 15 full-text papers were organised by research target group to lead current and future nurse researchers to their areas of interest. Research participants were as follows: those with cardiovascular disease,[5-9] diabetes mellitus,[10,11] older age;[12,13] those who were young adults,[14] early adolescents,[15] children with special health care needs,[16] people with a stoma,[17] post-partum mothers,[18] and nursing students.[19] Ten studies used power analysis to guide their participant recruitment.[5-8,10,13,15-18] Each paper's aim(s) and findings are briefly summarised. The papers themselves must be consulted for detailed methods, care delivery or replication.

The study by Abbasi et al[5] used a non-randomised controlled clinical trial with 111 subjects. Their aim was to compare the effects of the self-management education programme using a multi-method approach or multimedia approach on the quality of life among patients with chronic heart failure. Findings were that the multi-method approach and multi-media approach groups had statistically significantly improved total quality of life (QOL) and knowledge compared with the control group. The multi-method approach was statistically significantly more effective than multimedia in terms of increasing QOL and self-efficacy in the knowledge domain.

Dadosky et al[6] used a prospective nonrandomised trial design comparing a historical control group that had received standard care with a prospective intervention group receiving standard care plus tele-management. Their aim was to investigate whether tele-management of heart failure patients throughout the post-acute continuum of care would reduce rehospitalisation rates and improve patient self-care knowledge and satisfaction. Patients who were re-admitted within the tele-management group had significantly higher cardiac ejection fractions and significantly higher Centre for Outcomes Research Evaluation scores predicting rehospitalisation risk compared with the historical group. Clinically significant findings were noted for risk reduction in time to intervention for the tele-management group.

Ghezeljeh et al[7] completed a randomised clinical trial with control group among people with hypertension (HTN). The aim was to compare the effects of self-management (SM) education using telephone follow-up and smartphone-based social networking follow-up on SM behaviours among patients with HTN. Six weeks after the intervention, there were statistically significant findings. Participants in the telephone and smartphone social networking follow-up groups had statistically significant differences in SM behaviours compared to the control group and the group without follow-up. The telephone and smartphone social networking groups were not significantly different in the effectiveness of the SM education.

Mols et al[8] used a single-centre, prospective, randomised controlled design to assess the 30-day impact of a nurse-led telephone follow-up performed 2 to 5 days after same-day discharge following percutaneous coronary intervention

JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

JISiTeH

pathways. No differences were found between the groups in terms of adherence to platelet inhibitors or aspirin regimens. The portion of patients readmitted, the self-initiated contacts to general practitioners and the knowledge of how to manage symptoms of angina were all significantly lower in the intervention group when compared to the control group. Carrying out healthy physical activity was significantly higher in the intervention group.

Ni et al[9] used an exploratory randomised controlled trial to evaluate the feasibility of using mHealth (WeChat and BB Reminder) as a tool to assist people with coronary heart disease to take their cardio-protective medications. While medication adherence increased at the 30-day follow-up for both groups, the intervention group had a greater increase but these changes were not significant. Changes in blood pressure were not significantly different but heart rate significantly decreased at 30 days in the control group.

Two intervention studies targeted people with diabetes. The study by Kotsani et al[10] used a randomised controlled design to evaluate the efficacy of telenursing on the frequency of glucose measurements and the improvement of blood glucose variation in young type 1 diabetic adults (age 18-39). The researchers found a significant improvement in the glucose concentrations in the management group in month 1; the mean morning glucose concentration in month 3 were also significantly lower in the intervention group. In month 2 the difference was not significant. Also, the pre-prandial glucose concentration were significantly lower in the control group than the intervention group in months 1 and 3. The changes in HbA1c were not significant.

Mott et al[11] reported a study of adults with type 2 diabetes undergoing a surgical intervention. The aim of the study was to develop, implement and evaluate a nurse-led telehealth preoperative intervention to improve glycaemic control prior to surgery. On the day of surgery, a fasting glucose was drawn; there were no significant differences between the usual care group and the telephone intervention group. An interesting finding was that 4 of the 25 participants in the intervention group decided to postpone their surgery, possibly because the education and knowledge from the phone call made them realise their glycaemic control should be improved before a surgical procedure.

Two intervention studies involving older people were found. Bakas et al[12] used a quasi-experimental design to test the feasibility of a new programme, the Telehealth Community Health Assistance Team (T-Chat), a nurse-led intervention delivered through a telepresence robot designed to promote chronic disease self-management and healthy independent living among older adults. The primary outcome of the study was unhealthy days based on 2 items in the post-intervention interview and data collection. Depressive symptoms, other symptoms (e.g., fatigue, pain, stress, sleep), aerobic activity, cognitive ability and quality of life were also measured. Trends in positive directions could be seen in the data. For example, the T-CHAT group, in comparison with

the wait list control group showed medium to large improvements in unhealthy days and there was a moderate improvement in depressive symptoms favouring the T-CHAT group.

The aim of the quasi-experimental study by Santana et al[13] was to compare the effectiveness of telephone versus conventional follow-up in post-surgical older adult patients. The study hypothesis was that the intervention would improve patients' autonomy for self-care and surgical recovery. Findings were that the patients in the control group showed significantly increased time for surgical recovery and patients in the intervention group had significantly less impaired mobility, need for assistance for self-care, fatigue and time required for recuperation.

Côté et al[14] used an experimental design to evaluate the efficacy of a web-based tailored intervention with the aim of reducing cannabis use among young people (18-24 years) by promoting a more positive intention to abstain. Findings were that a higher proportion of participants in the experimental group reduced their cannabis use compared with the control group. There was also a significant intention in the experimental group to abstain over time and intention increased significantly in the experimental group but stayed stable for the control group.

Parisod et al[15] used a single-blinded, 3-armed cluster randomised trial to study tobacco-related health literacy among early adolescents (10-13 years). The study aim was to determine the short-term effectiveness of the tobacco-related mobile health game *Fume* and a non-gamified website in comparison with a no-intervention control group. No statistical significance was found in anti-smoking self-efficacy between the groups after the intervention nor were there differences in the five other outcome variables: smoking outcome expectations, attitudes towards tobacco use, motives to use tobacco, motivation to decline tobacco in the future, and knowledge about tobacco. However, the health game group visited *Fume* significantly more frequently than the early adolescents in the website group and *Fume* raised more interest than the website. The authors noted that self-efficacy scores among the early adolescents were high already at baseline and may have hindered favourable results, statistically.

Hooshmand and Foronda[16] used a prospective, quasi-experimental design to examine cost, caring, and family-centred care (FCC) from the family perspective in relationship to paediatric specialty services integrating telemedicine (TM) visits compared to traditional face-to-face visits for children with special care needs (CSHCN) in rural, remote and medically underserved areas. There was no difference between the groups on the perception of the care their CSHCN received or their perception of healthcare providers as caring. Significant differences between groups were found on perception of the system of care as family-centred between the traditional and telemedicine groups, with the TM group having significantly higher scores on all

JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

JISfTeH

six facets of the FCC measure. Costs were not significantly different between groups except if the CHSCN needed care by specialists who were not in the local clinic; then the costs for the traditional care group were significantly higher.

Wang et al[17] used a randomised controlled trial to assess the effectiveness of the follow-up care enhanced with a home care mobile app on the psychosocial adjustment, self-efficacy and stoma-related complications of discharged from hospital patients with stomas. Findings were that both groups had improved psychosocial adjustment over time but the intervention group had significantly greater increase in improvement in psychosocial adjustment at 1, 3, and 6-months over the control group. Similarly, the intervention group had significantly higher stoma self-efficacy than the control group at 1, 3 and 6-months after discharge. The intervention group had a lower incidence rate of stoma complications but the differences were not statistically significant.

Harris-Luna and Badr[18] used a pragmatic research design to evaluate the effectiveness of a breastfeeding telephone support intervention delivered by *promotoras* (lay healthcare workers) to increase exclusive breast feeding (EBF) rates among Hispanic women at 12 weeks after birth. A pragmatic trial was described as taking place in the setting where individuals already receive their usual clinical care with trained research staff responsible for recruitment and data collection to maximise applicability and generalisability. Findings were that at 12 weeks after birth, significantly more women in the intervention group than control group were continuing EBF. Perceived breastfeeding support, lower household income, *promotora* breastfeeding telephone support and higher self-efficacy scores all significantly predicted breastfeeding at 12 weeks after birth.

Liu et al[19] used a retrospective, historical control group design to evaluate the effectiveness of platform-based emergency department (ED) training of nurses compared with the same nurses who received their continuing education programme in conventional classroom settings during the prior year. The number of nurses completing the training significantly increased over the previous year (from 60% to 100%) and the examination scores were also significantly improved in the intervention group.

Systematic Reviews and Meta-analyses
Fourteen reviews (systematic or integrative) and meta-analyses were found in this literature review: 10 systematic/integrative,[20-29] two meta-analyses,[30,31] and two combined.[32,33] Traditional search methods were used with hundreds, if not thousands, of citations first found, with a range of 66[31] to 14,292.[32] Years covered by the searches ranged from 1[24] to 28,[32] with two papers[26,30] noting 'inception to' or 'up to' (current year) and two papers[23,31] not noting the range in years. The papers evaluated by the 14 studies ranged from 5 (of 185)[29] to 70 (of 3622).[21]
Topics addressed in these papers were cardiovascular disease,[27,29,32,33] cancer,[23,31] chronic disease,[21,25] chronic obstructive pulmonary disease,[30] teledermoscopy,[20] follow-up after discharge,[28] nurses,[22] apps for quality improvement,[24] and physical activity in elders.[26]

A study by Jin et al[32] reported a significant finding, that being telehealth significantly improved cardiovascular risk factors. Rush et al[25] reported virtual education delivered to patients with chronic diseases was comparable or more effective than usual care. More commonly, authors noted that the studies showed lack of homogeneity,[21,22,31] methodological inconsistencies or limitations,[23] variable quality,[24,29,33] lack of studies,[26] or limited evidence.[20,27,28,30]

Descriptive Research
Of the 55 descriptive research papers, 28 reported studies of availability, acceptability, perceptions, and attitudes of the study targets (patients, people in various age groups, people with various diseases, caregivers in the home or community, and nurses). This set consisted of 12 papers targeting people with diseases or conditions.[34-45] Seven papers looked at nurses or nursing students.[46-52] Four papers were about maternal-child issues.[53-56] Three papers looked at elders or homecare,[57-59] and two papers looked at care in limited resource settings.[60,61]

The second largest set (11) described studies of apps or mHealth applications used for a particular treatment need. Four papers dealt with cardiovascular issues.[62-65] Three papers were in oncology settings.[66-68] The last four papers addressed single topics: post-operative monitoring,[69] e-outpatient visits,[70] parenting,[71] and eICU.[72]

Six studies described development, testing and evaluation of apps for care delivery.[73-78] Four studies described the use of modelling or other predictive strategies for assessing risks or outcomes.[79-82] Four studies described the use of digital learning, simulation or social media for learning and communication among nurses,[83-86] and two papers addressed telehealth policy and standards.[87,88]

Discussion

The studies found with this literature review show many areas of interest among telehealth nurses. The topics indicate that nurses want to know more about the who, what, when, why and how of integrating telehealth applications into care delivery and education.

Evidence-based knowledge can be drawn from the results of the intervention studies. Patients or people with healthcare needs do better with individual attention and longer than usual follow-up using phones or mHealth applications.[7,8,10,13,17,18] However, people may be overwhelmed with too much technology given to them at one time.[5] Phone or mHealth follow-up can be a useful adjunct to traditional education for self-management of chronic disease.[7] Nurse-learners preferred mixed methods. Self-directed online learning was not seen as sufficient and may not have accurately reflected the learner's participation.[19] On the other hand, a web-based tailored intervention reduced

JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

cannabis use among 18 to 24-year-olds and increased their intention to abstain over time.[14] And, early adolescents (10-13-year-olds) are willing to participate in education with gaming and digital education applications for tobacco-related health literacy.[15] Cost of care is a consideration; parents with local access to specialty care via telehealth for their children perceive their care as better.[16]

Clinical research, and thus evidence accumulation, is a challenge, given countless extraneous variables that can affect the person's response to an intervention.[6,11,12] Historic data used as a study's control may lack reliability due to missing or unusable data.[6] Adequate sample size and study duration, attentive management of the control group, and minimal study complexity are essential to successful research.[11,12] Pre-programming and automating mHealth applications could facilitate scaling up the sample size and study duration.[9]

What can be learned from the 14 systematic reviews and meta-analyses? The answer, unfortunately, is 'not much.' It may be that systematic reviews and meta-analyses would be best used to bring together all that is known about a specialty or setting. This endeavour could include anecdotal reports, editorials, opinion pieces, economic analyses, quality and process improvement reports, education programme descriptions, historical information and research reports. Until research itself becomes more programme-driven with consistent terminology, measurement tools, interventions and reporting templates, large research reviews are not contributing to the evidence base for practice. The World Health Organization is making a commitment to bringing the digital era to healthcare worldwide and looks to structured systems for data collection, aggregation and analysis. Its MAPS toolkit is one example: mHealth assessment and planning for scale.[89]

Descriptive research findings can establish a basic foundation for programmes of research that can continue toward controlled trials to build knowledge and advance practice. Descriptive studies can also help nurses new to research to learn the process and understand the benefits, barriers and challenges of achieving reliable methods and producing valid results. Most telehealth nursing research involves human beings. Researchers would most likely agree that human subjects' research is difficult due to concern for ethical treatment of the subjects and also to the countless extraneous variables that can diminish the goodness of research results. That said, it is important, if not imperative, that nurse-led research uses intervention studies that generate reliable and valid evidence for practice.

One limitation of this paper is that only English language papers were reviewed. More nurse-led telehealth research has surely been published in other languages. A second limitation is the way that authors are identified in publications; if only the author's name or name plus practice environment are listed some nurse-led research may have been missed.

The main recommendation drawn from this work is that telehealth nurse researchers must continue to lead intervention studies with large, randomised controlled designs wherein, insofar as possible, all extraneous variables are controlled. With telehealth technology and applications rapidly transforming from optional nice-to-have technologies and applications to being integrated with the healthcare infrastructure,[90] nurses know that evidence-based telehealth applications are essential to the capacity of care delivery and quality of care outcomes for people with health needs, their families and their communities.

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JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

JISITeH

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TELEHEALTH NURSING RESEARCH: ADDING TO THE EVIDENCE-BASE FOR HEALTHCARE

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Abstract

This paper reviews recent, nurse-led telehealth research with the goal of describing research findings that provide evidence for practice. **Methods:** Using an iterative search method, of eight electronic databases, 84 nurse-led research papers were separated into intervention research, systematic reviews and meta-analyses, and descriptive research. The main emphasis was on full text analysis of the intervention research. **Results**: Fifteen intervention research papers reported findings related to cardiovascular disease, diabetes mellitus, older age, young adults, early adolescents, children with special health care needs, people with a stoma, post-partum mothers and nurses. Also reviewed for useable evidence for practice were 10 systematic reviews, two meta-analyses and two papers that described reviews plus meta-analyses. Fifty-five papers with descriptive designs are briefly described. Nurse-led intervention research is increasing knowledge about the use of telehealth technology and applications in care delivery. People with healthcare needs do better with individual attention and increased follow-up. People have a tolerance for technology used with them to advance their quality of life and healing but there is a point at which too much technology is overwhelming. Clinical research is a challenge due to the number of extraneous variables that are difficult to control and that can affect a person's response to the research intervention. **Conclusion:** Continuation of nurse-led telehealth intervention research will help to ensure that technology used to support and advance care delivery will be evidence-based.

Keywords: nursing; telehealth; intervention research; evidence-based practice; review

Crossref

Introduction

More than 20 million nurses worldwide are involved in health professions and care delivery 24/7.[1] Nurses have been involved with telehealth technology and applications for decades; the telephone has always been used by nurses to educate, consult with, and support patients and families. Mobile phones and digital capability have extended the reach and scope of nurses for healthcare delivery. Successful nurses use the technology that most appropriately supports their practice. Nurses' roles in the development of research-based evidence for practice should not be overlooked. Those nurses who lead randomised controlled trials or other intervention research in the telehealth environment are a small fraction of all nurses worldwide. However, these role models show how nurses can be leaders in advancing evidence-based practice. Nursing, with its ethos of holistic caring, will use research to strengthen its impact on healthcare with a growing body of evidence-based knowledge. This is all to the good for health and well-being of people worldwide.

Since late 2016, a constant search of the English language literature has been underway for telehealth research publications that have a nurse as first author. While nurses may be listed among the author group on some articles, or they may clearly have participated in the research interventions without direct attribution, by using the nurse-as-first-author criterion nurses can be given full credit for leading the research team. Literature searches in 2016, 2017 and early 2018 found nurse-led research publications with predominantly descriptive designs that covered telehealth nursing, clinical practice, education and research.[2-4] These demonstrated the depth and breadth of nursing in the telehealth environment. Of 51 papers identified in 2017 plus first quarter 2018, 38 used descriptive designs and 5 described technology (apps) evaluations. Eight papers used quasi-experimental designs, resulting in some evidence for practice.[4] The papers represented nurses from 19 countries.

The purpose of this paper is to discuss nurse-led telehealth research from 2018 through first quarter 2019, organising the papers by design: intervention research, systematic reviews and meta-analyses, and descriptive designs. The greatest emphasis will be on intervention

research and resulting outcomes that can be used to support evidence-based practice. The goal of this work is to encourage more nurses to do intervention research, thus generating observable and measurable evidence for healthcare delivery.

Methods

The design for this paper is a critical analysis of nurse-led intervention research, systematic reviews and meta-analyses, and a brief discussion of the descriptive research papers found during the study period. The literature searches supporting the prior and current work are iterative. A medical librarian regularly and repeatedly reviews dozens of tables of contents of health-related publications and then forwards to this author all telehealth research publications found in the ongoing reviews. This provides a steady flow of multidisciplinary papers involving telehealth, e.g., 357 papers in 2018. We recognise that this contrasts with traditional, one-time searches that use one or several search terms and inclusion criteria with databases such as PubMed, CINAHL, PsychINFO, EMBASE, Global Health, HealthStar, ISI Web of Science and Google. However, established databases are slow to add new journals and, with PubMed, to assign MeSH subject headings to new titles. Also, the headings for different databases may overlap or be different. Further, the terms and keywords used in telehealth articles vary a great deal, e.g., tele-(specialty), eHealth, mHealth, mobile health, digital health, artificial intelligence. And, databases that use automatic term mapping make searches more difficult as the search terms are identified wherever they are in the article, making a more detailed manual search necessary after all.

Results

In all of 2018 through first quarter-2019, 84 nurse-led research papers from 21 countries were identified. (Table 1) Fifteen papers described intervention research, ranging from intervention-control studies to randomised controlled trials. Fourteen papers described systematic reviews and/or meta-analyses and 55 papers used descriptive research designs.

Table 1. Papers by country.

Australia	3	Netherlands	1
Brazil	2	New Zealand	2
Canada	5	Norway	1
China	5	Singapore	1
Denmark	1	South Korea	2
Finland	2	Spain	2
Greece	1	Sweden	4
Hong Kong	1	Switzerland	1
Iran	2	Taiwan	2
Italy	2	United Kingdom	2
		United States	42

Intervention Research

The 15 full-text papers were organised by research target group to lead current and future nurse researchers to their areas of interest. Research participants were as follows: those with cardiovascular disease,[5-9] diabetes mellitus,[10,11] older age;[12,13] those who were young adults,[14] early adolescents,[15] children with special health care needs,[16] people with a stoma,[17] post-partum mothers,[18] and nursing students.[19] Ten studies used power analysis to guide their participant recruitment.[5-8,10,13,15-18] Each paper's aim(s) and findings are briefly summarised. The papers themselves must be consulted for detailed methods, care delivery or replication.

The study by Abbasi et al[5] used a non-randomised controlled clinical trial with 111 subjects. Their aim was to compare the effects of the self-management education programme using a multi-method approach or multimedia approach on the quality of life among patients with chronic heart failure. Findings were that the multi-method approach and multi-media approach groups had statistically significantly improved total quality of life (QOL) and knowledge compared with the control group. The multi-method approach was statistically significantly more effective than multimedia in terms of increasing QOL and self-efficacy in the knowledge domain.

Dadosky et al[6] used a prospective nonrandomised trial design comparing a historical control group that had received standard care with a prospective intervention group receiving standard care plus tele-management. Their aim was to investigate whether tele-management of heart failure patients throughout the post-acute continuum of care would reduce rehospitalisation rates and improve patient self-care knowledge and satisfaction. Patients who were re-admitted within the tele-management group had significantly higher cardiac ejection fractions and significantly higher Centre for Outcomes Research Evaluation scores predicting rehospitalisation risk compared with the historical group. Clinically significant findings were noted for risk reduction in time to intervention for the tele-management group.

Ghezeljeh et al[7] completed a randomised clinical trial with control group among people with hypertension (HTN). The aim was to compare the effects of self-management (SM) education using telephone follow-up and smartphone-based social networking follow-up on SM behaviours among patients with HTN. Six weeks after the intervention, there were statistically significant findings. Participants in the telephone and smartphone social networking follow-up groups had statistically significant differences in SM behaviours compared to the control group and the group without follow-up. The telephone and smartphone social networking groups were not significantly different in the effectiveness of the SM education.

Mols et al[8] used a single-centre, prospective, randomised controlled design to assess the 30-day impact of a nurse-led telephone follow-up performed 2 to 5 days after same-day discharge following percutaneous coronary intervention

pathways. No differences were found between the groups in terms of adherence to platelet inhibitors or aspirin regimens. The portion of patients readmitted, the self-initiated contacts to general practitioners and the knowledge of how to manage symptoms of angina were all significantly lower in the intervention group when compared to the control group. Carrying out healthy physical activity was significantly higher in the intervention group.

Ni et al[9] used an exploratory randomised controlled trial to evaluate the feasibility of using mHealth (WeChat and BB Reminder) as a tool to assist people with coronary heart disease to take their cardio-protective medications. While medication adherence increased at the 30-day follow-up for both groups, the intervention group had a greater increase but these changes were not significant. Changes in blood pressure were not significantly different but heart rate significantly decreased at 30 days in the control group.

Two intervention studies targeted people with diabetes. The study by Kotsani et al[10] used a randomised controlled design to evaluate the efficacy of telenursing on the frequency of glucose measurements and the improvement of blood glucose variation in young type 1 diabetic adults (age 18-39). The researchers found a significant improvement in the glucose concentrations in the management group in month 1; the mean morning glucose concentration in month 3 were also significantly lower in the intervention group. In month 2 the difference was not significant. Also, the pre-prandial glucose concentration were significantly lower in the control group than the intervention group in months 1 and 3. The changes in HbA1c were not significant.

Mott et al[11] reported a study of adults with type 2 diabetes undergoing a surgical intervention. The aim of the study was to develop, implement and evaluate a nurse-led telehealth preoperative intervention to improve glycaemic control prior to surgery. On the day of surgery, a fasting glucose was drawn; there were no significant differences between the usual care group and the telephone intervention group. An interesting finding was that 4 of the 25 participants in the intervention group decided to postpone their surgery, possibly because the education and knowledge from the phone call made them realise their glycaemic control should be improved before a surgical procedure.

Two intervention studies involving older people were found. Bakas et al[12] used a quasi-experimental design to test the feasibility of a new programme, the Telehealth Community Health Assistance Team (T-Chat), a nurse-led intervention delivered through a telepresence robot designed to promote chronic disease self-management and healthy independent living among older adults. The primary outcome of the study was unhealthy days based on 2 items in the post-intervention interview and data collection. Depressive symptoms, other symptoms (e.g., fatigue, pain, stress, sleep), aerobic activity, cognitive ability and quality of life were also measured. Trends in positive directions could be seen in the data. For example, the T-CHAT group, in comparison with

the wait list control group showed medium to large improvements in unhealthy days and there was a moderate improvement in depressive symptoms favouring the T-CHAT group.

The aim of the quasi-experimental study by Santana et al[13] was to compare the effectiveness of telephone versus conventional follow-up in post-surgical older adult patients. The study hypothesis was that the intervention would improve patients' autonomy for self-care and surgical recovery. Findings were that the patients in the control group showed significantly increased time for surgical recovery and patients in the intervention group had significantly less impaired mobility, need for assistance for self-care, fatigue and time required for recuperation.

Côté et al[14] used an experimental design to evaluate the efficacy of a web-based tailored intervention with the aim of reducing cannabis use among young people (18-24 years) by promoting a more positive intention to abstain. Findings were that a higher proportion of participants in the experimental group reduced their cannabis use compared with the control group. There was also a significant intention in the experimental group to abstain over time and intention increased significantly in the experimental group but stayed stable for the control group.

Parisod et al[15] used a single-blinded, 3-armed cluster randomised trial to study tobacco-related health literacy among early adolescents (10-13 years). The study aim was to determine the short-term effectiveness of the tobacco-related mobile health game *Fume* and a non-gamified website in comparison with a no-intervention control group. No statistical significance was found in anti-smoking self-efficacy between the groups after the intervention nor were there differences in the five other outcome variables: smoking outcome expectations, attitudes towards tobacco use, motives to use tobacco, motivation to decline tobacco in the future, and knowledge about tobacco. However, the health game group visited *Fume* significantly more frequently than the early adolescents in the website group and *Fume* raised more interest than the website. The authors noted that self-efficacy scores among the early adolescents were high already at baseline and may have hindered favourable results, statistically.

Hooshmand and Foronda[16] used a prospective, quasi-experimental design to examine cost, caring, and family-centred care (FCC) from the family perspective in relationship to paediatric specialty services integrating telemedicine (TM) visits compared to traditional face-to-face visits for children with special care needs (CSHCN) in rural, remote and medically underserved areas. There was no difference between the groups on the perception of the care their CSHCN received or their perception of healthcare providers as caring. Significant differences between groups were found on perception of the system of care as family-centred between the traditional and telemedicine groups, with the TM group having significantly higher scores on all

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six facets of the FCC measure. Costs were not significantly different between groups except if the CHSCN needed care by specialists who were not in the local clinic; then the costs for the traditional care group were significantly higher.

Wang et al[17] used a randomised controlled trial to assess the effectiveness of the follow-up care enhanced with a home care mobile app on the psychosocial adjustment, self-efficacy and stoma-related complications of discharged from hospital patients with stomas. Findings were that both groups had improved psychosocial adjustment over time but the intervention group had significantly greater increase in improvement in psychosocial adjustment at 1, 3, and 6-months over the control group. Similarly, the intervention group had significantly higher stoma self-efficacy than the control group at 1, 3 and 6-months after discharge. The intervention group had a lower incidence rate of stoma complications but the differences were not statistically significant.

Harris-Luna and Badr[18] used a pragmatic research design to evaluate the effectiveness of a breastfeeding telephone support intervention delivered by *promotoras* (lay healthcare workers) to increase exclusive breast feeding (EBF) rates among Hispanic women at 12 weeks after birth. A pragmatic trial was described as taking place in the setting where individuals already receive their usual clinical care with trained research staff responsible for recruitment and data collection to maximise applicability and generalisability. Findings were that at 12 weeks after birth, significantly more women in the intervention group than control group were continuing EBF. Perceived breastfeeding support, lower household income, *promotora* breastfeeding telephone support and higher self-efficacy scores all significantly predicted breastfeeding at 12 weeks after birth.

Liu et al[19] used a retrospective, historical control group design to evaluate the effectiveness of platform-based emergency department (ED) training of nurses compared with the same nurses who received their continuing education programme in conventional classroom settings during the prior year. The number of nurses completing the training significantly increased over the previous year (from 60% to 100%) and the examination scores were also significantly improved in the intervention group.

Systematic Reviews and Meta-analyses
Fourteen reviews (systematic or integrative) and meta-analyses were found in this literature review: 10 systematic/integrative,[20-29] two meta-analyses,[30,31] and two combined.[32,33] Traditional search methods were used with hundreds, if not thousands, of citations first found, with a range of 66[31] to 14,292.[32] Years covered by the searches ranged from 1[24] to 28,[32] with two papers[26,30] noting 'inception to' or 'up to' (current year) and two papers[23,31] not noting the range in years. The papers evaluated by the 14 studies ranged from 5 (of 185)[29] to 70 (of 3622).[21]
Topics addressed in these papers were cardiovascular disease,[27,29,32,33] cancer,[23,31] chronic disease,[21,25] chronic

obstructive pulmonary disease,[30] teledermoscopy,[20] follow-up after discharge,[28] nurses,[22] apps for quality improvement,[24] and physical activity in elders.[26]

A study by Jin et al[32] reported a significant finding, that being telehealth significantly improved cardiovascular risk factors. Rush et al[25] reported virtual education delivered to patients with chronic diseases was comparable or more effective than usual care. More commonly, authors noted that the studies showed lack of homogeneity,[21,22,31] methodological inconsistencies or limitations,[23] variable quality,[24,29,33] lack of studies,[26] or limited evidence.[20,27,28,30]

Descriptive Research
Of the 55 descriptive research papers, 28 reported studies of availability, acceptability, perceptions, and attitudes of the study targets (patients, people in various age groups, people with various diseases, caregivers in the home or community, and nurses). This set consisted of 12 papers targeting people with diseases or conditions.[34-45] Seven papers looked at nurses or nursing students.[46-52] Four papers were about maternal-child issues.[53-56] Three papers looked at elders or homecare,[57-59] and two papers looked at care in limited resource settings.[60,61]

The second largest set (11) described studies of apps or mHealth applications used for a particular treatment need. Four papers dealt with cardiovascular issues.[62-65] Three papers were in oncology settings.[66-68] The last four papers addressed single topics: post-operative monitoring,[69] e-outpatient visits,[70] parenting,[71] and eICU.[72]

Six studies described development, testing and evaluation of apps for care delivery.[73-78] Four studies described the use of modelling or other predictive strategies for assessing risks or outcomes.[79-82] Four studies described the use of digital learning, simulation or social media for learning and communication among nurses,[83-86] and two papers addressed telehealth policy and standards.[87,88]

Discussion

The studies found with this literature review show many areas of interest among telehealth nurses. The topics indicate that nurses want to know more about the who, what, when, why and how of integrating telehealth applications into care delivery and education.

Evidence-based knowledge can be drawn from the results of the intervention studies. Patients or people with healthcare needs do better with individual attention and longer than usual follow-up using phones or mHealth applications.[7,8,10,13,17,18] However, people may be overwhelmed with too much technology given to them at one time.[5] Phone or mHealth follow-up can be a useful adjunct to traditional education for self-management of chronic disease.[7] Nurse-learners preferred mixed methods. Self-directed online learning was not seen as sufficient and may not have accurately reflected the learner's participation.[19] On the other hand, a web-based tailored intervention reduced

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cannabis use among 18 to 24-year-olds and increased their intention to abstain over time.[14] And, early adolescents (10-13-year-olds) are willing to participate in education with gaming and digital education applications for tobacco-related health literacy.[15] Cost of care is a consideration; parents with local access to specialty care via telehealth for their children perceive their care as better.[16]

Clinical research, and thus evidence accumulation, is a challenge, given countless extraneous variables that can affect the person's response to an intervention.[6,11,12] Historic data used as a study's control may lack reliability due to missing or unusable data.[6] Adequate sample size and study duration, attentive management of the control group, and minimal study complexity are essential to successful research.[11,12] Pre-programming and automating mHealth applications could facilitate scaling up the sample size and study duration.[9]

What can be learned from the 14 systematic reviews and meta-analyses? The answer, unfortunately, is 'not much.' It may be that systematic reviews and meta-analyses would be best used to bring together all that is known about a specialty or setting. This endeavour could include anecdotal reports, editorials, opinion pieces, economic analyses, quality and process improvement reports, education programme descriptions, historical information and research reports. Until research itself becomes more programme-driven with consistent terminology, measurement tools, interventions and reporting templates, large research reviews are not contributing to the evidence base for practice. The World Health Organization is making a commitment to bringing the digital era to healthcare worldwide and looks to structured systems for data collection, aggregation and analysis. Its MAPS toolkit is one example: mHealth assessment and planning for scale.[89]

Descriptive research findings can establish a basic foundation for programmes of research that can continue toward controlled trials to build knowledge and advance practice. Descriptive studies can also help nurses new to research to learn the process and understand the benefits, barriers and challenges of achieving reliable methods and producing valid results. Most telehealth nursing research involves human beings. Researchers would most likely agree that human subjects' research is difficult due to concern for ethical treatment of the subjects and also to the countless extraneous variables that can diminish the goodness of research results. That said, it is important, if not imperative, that nurse-led research uses intervention studies that generate reliable and valid evidence for practice.

One limitation of this paper is that only English language papers were reviewed. More nurse-led telehealth research has surely been published in other languages. A second limitation is the way that authors are identified in publications; if only the author's name or name plus practice environment are listed some nurse-led research may have been missed.

The main recommendation drawn from this work is that telehealth nurse researchers must continue to lead intervention studies with large, randomised controlled designs wherein, insofar as possible, all extraneous variables are controlled. With telehealth technology and applications rapidly transforming from optional nice-to-have technologies and applications to being integrated with the healthcare infrastructure,[90] nurses know that evidence-based telehealth applications are essential to the capacity of care delivery and quality of care outcomes for people with health needs, their families and their communities.

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DEVELOPING A COHORT WEB APPLICATION: REAL-TIME MONITORING OF BREASTFEEDING INDICATORS

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Abstract

Investing in the development of methodologies for timely intervention in breastfeeding practices that provide improved indicators and prolong breastfeeding duration positively impacts the health of women and children. **Aim:** To develop children cohort data capture interface of a national reference institution for high foetal, neonatal and child risk from birth, covering all hospitalisation up to the second year of life for real-time monitoring of breastfeeding indicators and prevalence. **Methods**: Four primary criteria were considered: data security (specific permissions for different profiles and encryption of sensitive data), researcher time streamlining, data quality and construction of data export auxiliary tools. **Results:** A web-based tool for data collection using a mobile device or computer was developed. The tool successfully allowed the ongoing collection for a defined population cohort of measures related to breastfeeding: maternal factors, child-related factors, health service issues, pacifier use, introduction of fluids and other processed foods, as well as breastfeeding practice. **Conclusion**: The developed product enables the validated extraction and collation of data from existing electronic records and other sources for the monitoring of breastfeeding practices. Such data can be used to refine guidelines and individual behaviour to maximise the benefits of breastfeeding and avoid early weaning.

Keywords: telehealth; web application; nursing; breastfeeding; cohort; Brazil

Crossref

Introduction

Breastfeeding brings short, medium, and long term benefits, and is considered an investment for the future by promoting the health of women and children, thereby supporting human capital development and economic return for the nation.[1] Improved breastfeeding rates can impact the morbidity and mortality of mothers and children, potentially save the lives over 800,000 children and 20,000 women worldwide annually.[2] Thus, the investment in the development of methodologies that allow prompt intervention in breastfeeding behaviour, to ensure a higher prevalence and longer duration would be valuable and positively impact the health of women and children.

Monitoring and assessment are some of the components of the National Policy for the Promotion, Protection and Support of Breastfeeding (BF) in Brazil, aimed at following-up the status of national BF indicators and Policy-related interventions, as well as encouraging and supporting related

research.[3] The latest national prevalence survey was conducted over 10 years ago, and cross-sectional data are limited to the sixth month only.[4]

The monitoring of BF indicators in Brazil is the responsibility of the health facility (hospital, primary health unit, and maternity hospitals).[3] To date, Brazil has not invested in establishing strategies that allow near-time follow-up and monitoring of the child's feeding practice for the first two years of life, especially for the first six months, during which time exclusive BF is recommended for all children.[5]

Therefore, a study was designed to investigate the prevalence and duration of breastfeeding and their relationship with determinants in the first two years of life. A cohort of children born at the National Institute of Women, Children and Adolescents Health Fernandes Figueira (IFF/FIOCRUZ) was followed. This national reference institution for foetal, neonatal, and child high risk was chosen because of its vocation for teaching and research, its level of

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excellence, and the volume of annual records of hospital visits, admissions, and newborn profiles with significant variability in risk exposures. The IFF/FIOCRUZ is equipped with a Human Milk Bank, and it is a National Referral Center for the Brazilian Network of Human Milk Banks and a Global Referral Center for 23 cooperating countries.

A major goal of this longitudinal study was to maintain data continuity and avoid participant dropout and associated data losses, albeit temporary. To minimise this, a combination of monitoring strategies, directly and indirectly related to obtaining information for the study,[6] and proper follow-up of participants were employed to ensure sufficient and reliable information to identify and classify incident outcomes of interest.[7]

Given the need to collect and manage large volumes of data in a prospective longitudinal study on breastfeeding, and the enormous challenge of preventing follow-up losses, we considered the development of a tool that would allow cohort follow-up. It was anticipated that this would serve as a monitoring prototype for the institution, with the potential to be applied in state reference centres throughout the national human milk bank network.

Thus, this study describes the development of a web-based application that facilitates the capture of data from a study cohort, and allows near-time monitoring of breastfeeding indicators, its prevalence, and duration. The data include foetal, neonatal and child risk information from birth, covering all hospitalisation up to the second year of life.

Methods

This applied research involved the development of a web application for data capture of breastfeeding practice on a mobile device or computer. The application was initially developed a doctoral thesis[8] with a proposal for later implementation at a reference service.

The planning and development of the application involved a nurse, a system's analyst and a team of four experts. Collectively the experts (nurse, paediatrician, Human Milk Bank Network (Rede Brasileira de Bancos de Leite Humano; rBLH) coordinator, and epidemiologist) had recognised experience in the area of breastfeeding, human milk, and epidemiology. The team reviewed the proposed technological solution, critiquing the approach to facilitating participant adherence over time, to improve the questionnaire, and to assess the relevance and appropriateness of the questions against the proposed objective.

Three steps were required to build the software: i) data entry structuring, ii) computational application building, and iii) pre-test application, and pilot study to adjust application execution problems.

Data entry structuring. The application was structured into five questionnaires related to the theme, as per the forms

created especially for this study, i) the participants' profile characterisation questionnaire (newborns and their mothers; with baseline information on prenatal care, childbirth and immediate postpartum care; related to the child, health service use and breastfeeding); ii) follow-up questionnaire for each hospitalisation (information regarding participants, health service used, pacifier use, and feeding practice record); iii) questionnaire for first consultation after hospital discharge (information regarding mother, child, pacifier use and breastfeeding); iv) the monthly follow-up up to six months (information regarding mother, child, pacifier use, readmission and breastfeeding); and (v) early weaning questionnaire. Details about participants, setting, and procedures have been published elsewhere.[9]

Computational application building. A responsive web application was developed using a Bootstrap framework.[10] This is a serverless architecture where the application incorporates third-party "Backend as a Service" (BaaS Firebase)[11] services and includes custom code run in managed, ephemeral containers on a "Functions as a Service" (FaaS) platform.[12]

Pre-test application and pilot study. To adjust the application's data capture interface a pilot of the data collection instrument was performed with 20 volunteer nursing mothers with a social and functional profile similar to the target population.

After the pilot study, a three-stage data capture process was implemented for the study. Data were captured for a birth cohort of all children born in the institution between March 2017 to October 2018, excluding those with contraindications to breastfeeding (HIV, HTLV, inability to feed themselves orally, and incompatibility with life).[9] The first stage occurred in the maternity ward with individual interviews and data extraction from medical records. In the second stage, the mothers were interviewed during the first consultation after hospital discharge. In the third stage, telephone interviews were conducted at each month of the child's life (up to six months, and then at 24 months of life) to obtain information about the children's feeding practice. The application was used at all stages of follow-up by a previously trained team (leading researcher and research assistant staff).

Results

A web-based tool was developed for data collection using a mobile device or computer. The tool is an organised breastfeeding monitoring system for mothers and their children up to two years of age. Identification and assessment forms (based on three main pillars: security, quality, and low-cost infrastructure (webserver)) are provided to capture data for each health system encounter. It has been using Bootstrap and Firebase Progressive Web Application technologies to support non-relational data storage and application hosting.

During development, the demands of different collection

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stages and departments (maternity, neonatal and neurosurgical intensive care units, neonatal care follow-up outpatient clinics and the Human Milk Bank) were considered. The platform was designed to be, flexible, to facilitate input from these multiple data sources (data extraction from medical records, plus face-to-face interaction and telephone interviews with mothers). Interviews were conducted using the application to gather information from the mothers of 1,003 newborn cohorts.

At each data collection point, several attempts were made to contact the participating mothers, thus ensuring follow-up contacts within the specified timeframe in order to avoid follow-up losses and secure adherence and bonding with the research team. The application's home screen (Figure 1a) informs when each child completes a month, and year of birthday.

Figure 1 (a). Main page with access to all newborn forms.

The data collected were imbalanced, and 75 mothers (7.5%) were lost to follow-up,[9] which ensured internal validity for this longitudinal study. Proper follow-up of participants is necessary to ensure that sufficient and reliable information is obtained for the identification and classification of incident outcomes of interest in the study.[6,7]

The tool was demonstrated to be successful in several aspects, based upon the experience of the leading researcher and research assistant staff as implementers and users. For example, the tool enabled the monitoring of all low and high-risk children in the cohort for up to two years of age, providing insight in 'near time' of the prevalence of breastfeeding and breastfeeding practices, supporting timely intervention to prevent premature discontinuation of breastfeeding. In addition, use of the tool was found to be intuitive, being easy to understand and fill out for any trained professional, and facilitated data collection and minimised loss to follow-up by highlighting best time to conduct telephone interviews with mothers. It also ensured

confidentiality through different levels of user access authorisation. Finally, reports of data-based information could be compiled and exported in interchangeable formats for different statistical software, always respecting the arrangement of rows and columns. This feature allowed, for example, ongoing near time estimate of the prevalence of breastfeeding; functions as a complementary strategy in maintaining cohort adherence; allows automatic recording of data between screens; and favours the streamlining of different times (completion, data processing, typing, linking, face-to-face interviewing and time of researchers and women in the various data capture contexts).

When recruiting a mother and their newborn for follow-up, the admission form was completed (Figure 1-b) with questions on identification, date of birth, date of admission and discharge, address, and telephone number. In this screen,
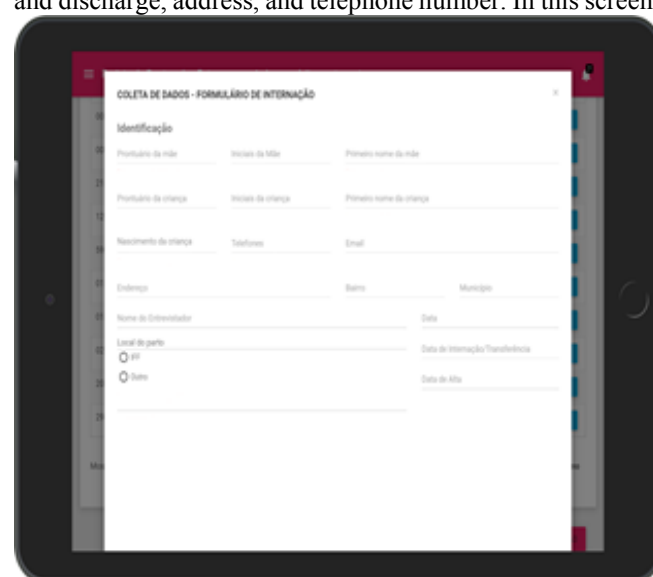

Figure 1 (b) - Application Screenshot: Admission Form.

the nurse/researcher entered answers from the different blocks of questions regarding maternal factors, factors related to the child, the health service, the use of nipples or industrialised liquid foods, and breastfeeding habits. The transition between screens allowed automatic saving. The application had a feature that automatically recorded the interview date and participant identification with a key code, allowing simultaneous collection of data from different sources by more than one research assistant. In addition, the data were structured and stored non-relationally, allowing constant development of the form and permitting quick action for any necessary changes in the follow-up of children. By establishing 'required fields' (Figure 1c) the system prevented advancing forward before completing the field. A red alert showed the need to answer the question before proceeding to the next block. This measure formed a part of the quality control process. In addition, the reason for loss to follow-up could be recorded (bottom right, Figure 1c), choosing from: mother gave up on the research, no contact

JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

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Figure 1 (c). Validation and required fields.

Figure 1 (d). Automatic saving of data in the passage for each question block.

made up to 6 months, mother unable to answer, or not possible to follow-up.

After completing any form, it was necessary to press the SAVE key to store the responses in the database (Figure 1d). Each new interview involved selecting a new form that automatically became available. Viewing spreadsheets and reports required exporting of the stored data, as described earlier.

Discussion

This study describes the successful development and application of a tool by which to monitor breastfeeding performance and habits of mothers and their newborns and illustrates the main benefits of the application. As a monitoring tool, the developed system supports tracking of feeding practice from birth to two years of a child's life. The benefits included: adherence to protocols for data collection, guaranteeing confidentiality and security levels; timely data capture; flexibility to use on different electronic devices; use of different data sources; adherence to protocols for data collection, and supporting quality data collection and analysis. The application facilitated near time knowledge of breastfeeding indicators, and thereby timely interventions to prevent early interruption of breastfeeding. Further investments are required to encourage monitoring of breastfeeding indicators in other spheres.

Increasingly mobile device apps are being used for health research, service delivery, and public health surveillance through aiding community data collection.[13] Studies have shown fewer errors when collecting data using questionnaires on mobile devices versus paper.[6,14] As a surveillance system the tool identifies breast feeding related sentinel events impacting mothers and newborn quality of care. Although there were no studies on the development of

this type of data collection application in this context,[15] the creation and computerisation of this meaningfully supports breastfeeding follow-up and, especially, allows timely interventions, to discourage premature interruption of exclusive breastfeeding.

The product uses serverless technologies that remove the burden of infrastructure, and accelerate the development process by allowing time to create the leanest data collection forms and create field versions. Computerised data collection can also reduce human errors during data entry, contributing to better data quality and increased credibility of survey results.[16] One improvement proposed by the team involves the creation of an alert system to issue notification from the beginning of the follow-up contact period until the end of this period.

This study is one of the few on the development of this kind of application for data capture and monitoring of health indicators, especially breastfeeding in Latin America, and one of the first to develop an organised system for monitoring breastfeeding and its determinants in Brazil.

The main limitations of the application are its Internet dependence and lack of integration with the institution's medical records system. The use of the application is limited to the hospital context by the need to check information regarding hospitalisations.

Conclusion

The breastfeeding monitoring application offers more rapid insight regarding current breastfeeding habits, and is important to allow meaningful, accurate, and timely planning of short-term actions to improve breastfeeding outcomes. The architecture of this technological solution proved to be effective and efficient in managing high volume data from

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different sources, in ensuring quality and security during all stages, and in offering expected functionalities for prospective observational studies and is an essential contribution as an organised system for monitoring breastfeeding from birth to up to two years of age.

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ATTITUDES TOWARD INFORMATION TECHNOLOGY AMONG OPERATING THEATRE NURSES IN SRI LANKA

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Abstract

Incorporating the use of information and communication technologies (ICT) into everyday professional practice requires nurses to overcome resistance to change and to become willing users and creative operators of IT. Managing the change process effectively while implementing eHealth (e.g., Hospital Information Systems) within the operating theatre environment can facilitate the efficient delivery of quality patient care. **Aim:** To describe the uses of and attitudes toward current IT by operating theatre nurses at The National Hospital of Sri Lanka (NHSL). **Methods:** The research used a descriptive design and survey method. The study population was theatre nurses working in 16 theatres. A convenience sample of 112 nurses selected from the 16 theatres was used. Nurses with a service period over 20 years were excluded. Data were gathered with a self-administered questionnaire. **Results:** The response rate was 97 of 112 (87%). The study found that nurses were highly confident in using computers, touch screens, the Internet and email. Almost 80% of theatre nurses used computer technology for their work and personal matters. However only 60% of the nurses had personal email addresses. Furthermore, 79% of nurses believed that computers would reduce paper work. **Conclusion:** Most operating theatre nurses possess a positive attitude toward advances that use IT applications. This may be due to the growing presence and accessibility of IT in their work environment, which has added value in their day to day practice in the hospital. To facilitate ongoing growth in use of IT in Sri Lanka, continuing education opportunities for operating theatre and other nurses should be pursued.
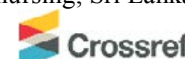
Keywords: nurses; ehealth; information and communication technology; education; operating theatre nursing; Sri Lanka

Introduction

Over the last decade, information technology (IT) has experienced an extraordinary rate of development. IT has brought significant change in the perceptions, attitudes and ways of thinking of its users,[1,2] made many aspects of life,[2,3] and necessitated organisations to adopt IT to remain competitive.[4] However, use of IT in healthcare settings has also had negative impacts on care delivery systems. For example, while IT overcomes the problem of distance between healthcare provider and patient, it also means that there is no hands on interaction between doctor/nurse and patient.[5] IT may extend quality of life and socioeconomic status as well.[6] Adoption of new IT systems requires skilled staff and positive attitudes to the new technology.[7] Wilbright et al[8] found that nurses lacked sufficient computer literacy, work-related computer skills and proficiency with basic Windows' functions.

Sri Lanka had no national IT-based healthcare system until 2011, although some healthcare institutions had previously adopted digital solutions of their own accord.[9] The Ministry of Health of Sri Lanka established the Health Information Unit of the Management Development and Planning Unit (MDPU) as the focal point for eHealth activities.[10] There are currently no large-scale eHealth projects implemented in Sri Lanka, but the MDPU is poised to implement some IT-based information system initiatives in healthcare settings within the next few years.[11] However, there has been no nursing research into IT in healthcare, and a gap in knowledge exists around, for example, the use and attitudes of operating theatre nurses in Sri Lanka toward computer technology. This study fills this knowledge gap, and also explores the interest of nurses in participating in IT based activities in nursing care settings for future benefits.

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Methods

This study used a descriptive research design and a survey to assess the use of IT by operating theatre nurses, and describe their attitudes toward present and future use of IT. It was carried out with operating theatre nurses of the National Hospital of Sri Lanka (NHSL). This hospital is the largest hospital and final referral centre in the country and has about 3,500 beds. It is the only national level hospital, and supports most specialties; for example, there are 31 specialty clinics (surgical, medical, cardiothoracic, ear-nose and throat), but no paediatric clinics. It has 16 operating theatres, with 358 nurses working in the operating theatres. These nurses were graded according to their work experience: Grade 11-B (0-5 years of work experience), Grade 11-A (6-10 years' work experience), Grade 1(11–15 years of work experience), and Super Grade (15–20 years of work experience).

Those with between 0 and 20 years of experience could volunteer to participate in the study. Nurses with over 20 years of work experience were excluded as they were nearing retirement and were not expected to be working with the new IT-based systems). Nurses who were on medical / long-term leave during the data collection period were also excluded. Both Sinhalese and Tamil nurses were included. A convenience sample of 112 operating theatre nurses (seven nurses from each of the 16 theatres) were approached to participate without regard for duty or shift hours.

A self-administered questionnaire was designed based on the reviewed literature and prior research.[4] . The survey had 9 closed-ended questions and one open-ended question. One question had 7-parts, and used a five point Likert scale to ask about nurses' attitudes toward, access to, and use of IT Another question asked about the meaning of IT; the Oxford Dictionary definition was used as the reference definition – "the study or use of electronic equipment, especially computers, for storing, accessing, analysing and sending information".[12] Because both Sinhalese and Tamil nurses were fluent in English, the questionnaire was provided only in English.

The questionnaire was reviewed by two research supervisors at the International Institute of Health Sciences Sri Lanka for face and content validity, and pre-tested by 10 government sector nurses enrolled in the Open University of Malaysia Bachelor of Nursing degree programme.

Although the questionnaire was self-administered, the researcher was present in person during data collection allowing immediate response to any questions in accordance with a pre-prepared protocol that provided explanation for each question. The survey data were collected from 20 March to 15 April 2014. The researcher handed the questionnaire to each of 112 nurses (7 from each theatre), personally meeting them after duty hours to minimise disturbance to the nurse's work and patient care. The procedure was explained to them and their consent was sought and received.

This study was approved by the Institutional Review Board of the National Hospital of Sri Lanka Informed and written consent was obtained from all participants.

Descriptive statistics were used to summarise data and to compute the frequency, percentage, mean, mode and median values of different variables in the data using Microsoft Excel. Categorical variables were described using frequencies and proportions.

Results

The response rate was 87% (97 of 112) as 15 respondents did not complete all questions. Forty-nine nurses (51%) were grade 11-B, 40 (41%) were grade 11-A, 3 (3%) were grade 1 and 5 (5%) were in the super grade category.

Confidence in use of information technology
The confidence of theatre nurses in using a variety of IT hardware and software applications ranged from Very Confident to Not Confident. Some respondents selected Don't Know or No Experience, did not respond. (Table 1)

Attitude of nurses to IT use
In response to a need for training in the use of different IT applications tools and software, responses ranged from 34 nurses wanting more training in use of the Internet to 39 wanting more training in the use of email. (Figure 1)

Most of nurses either 'agreed' or 'strongly agreed' that it is essential for a nurse to learn about using IT applications. When responses were displayed by years of employment, there was little difference across groups. (Figure 2)

Most respondents also agreed that IT applications made their jobs easier, although more 'agreed' than 'strongly agreed'. (Table 2) Also, nurses with 10 or fewer years of work experience were more in agreement than nurses with 11 to 20 years.

The responses of nurses on learning about and using IT applications in the workplace were quite positive. The ques-

Table 1. Confidence of respondents in the use of ICT.

Confidence Items	Very confident	Confident	A little confident	Not confident	Don't know	Have no experience with IT	No response
Items	14	48	24	3	1	5	2
Computer	20	43	23	3	1	4	3
Mouse	20	41	21	5	1	6	3
Touch screen	17	46	20	7	1	3	3
Internet	17	41	17	11	1	7	3
Email	17	41	17	11	1	7	3

Padmalatha S. *J Int Soc Telemed eHealth* 2020;8:e21

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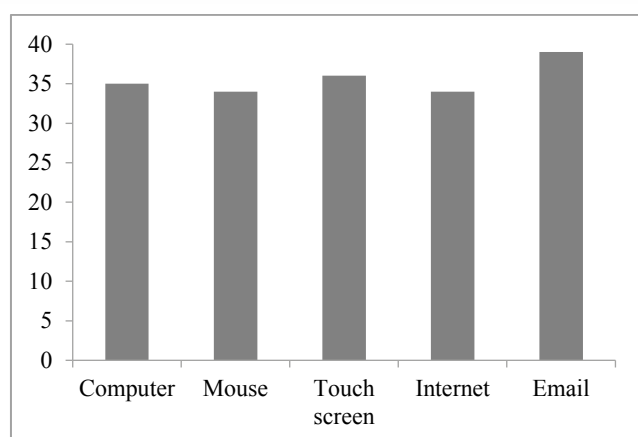JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

Figure 1. Number of nurses wanting training in IT applications.
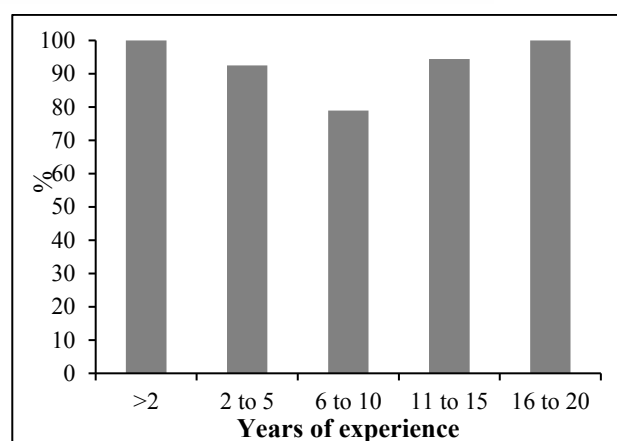

Figure 2. Percentage of respondents agreeing that learning about IT is essential.

Table 2. Opinions on the statement "The use of IT in my workplace has made my job easier".

Work Experience in years	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No response
0-2	3	1	0	1	3	0
3-5	7	25	3	1	0	5
6-10	2	13	0	0	0	4
11-15	4	13	1	0	0	0
16-20	5	4	0	0	0	1

Table 3. Responses about the use and benefits of IT applications.

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No response
Avoid using computers whenever possible	7	23	4	37	14	12
Learning about computers is essential	46	43	1	1	0	6
Use of IT reduces error	19	48	8	8	2	12
Use of IT reduces duplication	10	55	6	9	1	16
Use of IT makes life easier	22	55	5	2	3	10
Use of IT improves information access	25	58	2	1	0	11
Computers will reduce paper-work	25	51	4	6	0	11

tion about using computers whenever possible was reverse coded. There were also generally positive responses to various actual or potential benefits of IT applications. (Table 3) Between 6 and 16 respondents chose not to answer the items.

Access to Information Technology
Seventy-six respondents indicated they used a computer for work related activities or personal use or both. (Table 4) Nurses with between 3 and 5 years of work experience gave the highest positive response to this question. Thirteen respondents between 2 and 15 years of experience did not use computers and three respondents said they had 'no idea'.

On the question of email use, 59 (61%) respondents had email access and personal email addresses. (Table 5) Those

nurses with 3 to 5 years of employment were most likely to have email addresses. About half of the nurses with less than 2 and between 6 and 15 years of employment had email. Almost all nurses with 16 to 20 years of experience had email.

Table 4. Use of computer for work or personal activities.

Work Experience (y)	Yes	No	No idea	No response
0-2	7	0	1	0
3-5	32	5	2	0
6-10	12	5	0	2
11-15	14	3	1	0
16-20	11	0	0	0

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Table 5. Nurses who have personal e-mail accounts categorised according to work experience.

Work Experience	Yes
>2	20
3-5	26
6-10	7
11-15	1
16-20	5

The questionnaire included one item that asked for respondents' opinions on the statement "Information technology will improve multi-disciplinary communication." Only 20 nurses agreed with the statement and years of experience did not make a difference. The view that IT will benefit the care environment where the clinical working practice relies on a collaborative, multidisciplinary interaction was agreed by 5 nurses.

Discussion

The study evaluated the use of, access to, and attitudes of operating theatre nurses toward IT in the National Hospital of Sri Lanka. A survey examined the nurses' preparedness for the sort of IT-based work environments found in the developed world. Some countries, for example Australia with its rapidly developing digital healthcare services, have recognised this as a high priority.[4,13]

The results of the study demonstrated important factors for the use of information technology by operating theatre nurses in Sri Lanka. The survey was long, but the high response rate (87%) suggests this topic is one which is very important to nurses. The results of this study can be used as reference material for governmental policy makers or researchers to initiate future IT base activities.

The study found a confident attitude among most staff toward basic IT applications. Given that previous studies have shown increased computer experience relates to positive attitudes,[13,14] it may be that familiarity of operating theatre nurses with touch screen monitors and other technology facilitated this confident response. Experience and confidence in other tools and applications were not limited for the most part to more senior personnel. Low use, experience and confidence in IT were seen most in senior nurses and nurses with less than 2 years' experience. Greater use and confidence were seen among nurses with greater than 2 years' experience.

An interesting finding was that the nurses were reluctant to discuss multi-disciplinary communication that could be improved based on IT in the workplace. This contrasts with a study in Finland that noted nurses believe that computerised information improves multi-disciplinary communication.[15]

The Government of Sri Lanka continues with health system improvements, including the implementation of eHealth innovations, which cannot be achieved without the readiness of healthcare providers. Findings from this study could form the basis for developing the structure and composition of assessment tools to determine the readiness of nurses and other healthcare providers to participate in ehealth innovations in the workplace. Further research to understand the views of senior nurses regarding IT may also be needed. This group is responsible for the efficiency and effectiveness of care delivery, and for decisions about the operating theatre functions, and their attitudes toward and knowledge about ehealth will be critical for success. As the largest cohort of healthcare professionals, nurses represent an influential group. Raising their awareness, ability, and readiness to integrate ehealth innovations would be valuable.

Limitations

A convenience sample was used in the study reducing generalisability of the results and opening the possibility for sampling error because respondents may have been more interested in IT than those who chose not to participate. There may have been discussions about the questionnaire among participants, but this was not controlled for. The study was in only one institution which could limit its applicability to other institutions.

Recommendations

Professional, on-going training programmes are necessary to support nurses in understanding and using IT to its maximum effect. Schools of nursing could consider integrating content about informatics and digital applications into their curricula and providing continuing professional development programmes. The government is encouraged to continue advancing eHealth programmes and IT applications in Sri Lanka.

Conclusion

This study of attitudes toward access to and use of IT has shown that operating theatre nurses have a basic understanding and positive attitude toward IT in the workplace. Operating theatre nurses at the National Hospital of Sri Lanka are prepared to embrace IT advancements in their work environment. Consequently, the IT and larger eHealth upgrades that have been proposed by the government of Sri Lanka could be initiated in the National Hospital's operating theatre section before broader implementation.

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PREDICTING THE FUTURE OF HEALTHCARE AND eHEALTH WITH THE FUTURES WHEEL METHOD

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Abstract

By using information and communication technology (ICT), eHealth is a key enabler in improving healthcare, specifically its efficiency, productivity, quality, and patient satisfaction. Whilst eHealth applies technical developments to healthcare services, it is also about managing, finding, using, recording, and transmitting information to support health-related decisions. Moreover, eHealth encompasses a broad approach and commitment to improving healthcare through networking and co-operation. Thus healthcare providers need to have sufficient tools to predict and involve the possible futures of healthcare, specifically in the context of continuous eHealth development, implementation and innovations. This paper introduces the Futures Wheel (FW) method, describes the process for its use and some of its outcomes as a tool by which to achieve these goals. Based on experiences from over 60 FW working groups, the authors suggest that the FW method helps to see the possible futures of healthcare and eases the necessary adaptation inherent in eHealth. The FW method provides information and knowledge that professionals can utilise both to influence their future and to gain knowledge about alternative futures. The FW method is suggested for healthcare professionals who want to predict alternative futures of healthcare and eHealth in order to make important decisions that may have far-reaching consequences.

Keywords: eHealth; healthcare trends; Futures Wheel (FW) method; futures work; predicting the future

Crossref

Introduction

Futures studies, or futurology, is an increasingly mainstream social science approach that uses a variety of methods to systematically aggregate and analyse trends to examine what is 'likely to continue and what could plausibly change' in order to forecast possible futures. The future studies method has proved to be an excellent method for concretising co-operation in working life and for systematically collecting information on the future of working life. The method provides an overview of current and anticipated trends and the skills that people will require to optimally use and benefit from these. The development of innovative and up-to-date learning requires new ways of working, tools and learning environments. Learning can therefore be considered anticipation, so anticipation skills and future thinking must be the starting point of development work and part of all learning.[1-2] One of the aims of futures studies in the context of healthcare is to systematically explore both possible and desirable futures and to improve decisions made by practitioners, managers, leaders, educators, policy makers and clients/patients.[3] By examining different development paths, futures studies can describe multiple scenarios such as current and new styles of ehealthcare processes and effects of digitalisation and help inform perceptions, alternatives and choices about the future.[4] Indeed, healthcare providers need futures research to offer them a vision for their future work and work environments. Although the future is unpredictable, alternative futures, scenarios and possibilities can be described and anticipated. There are few methods which help healthcare providers to predict alternative futures for healthcare, particularly in the area of eHealth innovations and implementation.

Technology is an integral part of health science, with constant change and advancement. However, human factors will be one of the durable limitations of breakthroughs, and needed when anticipating future.[5] It has been suggested that medicine and technology are entering an era called 'ITicine',[6] showing the deep liaison between use of digitised technology, such as "caring machines," by patients/clients and healthcare professionals, also termed digital therapeutics (software driven, evidence-based, ICT to prevent, manage, or treat a disease or disorder).[7] Caring machines refers to persons who cure themselves with the help of machines supported by ubiquitous computing.[8] In Nordic countries, 'ITicine' healthcare is moving toward more patient-centric

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care, enhancing patients' participation in the healthcare process.[6] Healthcare professionals could benefit from sharing their perspectives and views with others concerning futures work,[6] requiring tools to help them anticipate and understand future changes and their implications.

The Futures Wheel method involves group discussion to build a vision of an agreed theme. It has been applied in different professional fields and disciplines, and some research has been published in the context of healthcare and healthcare education. For example, the method was applied to discover critical futures utilising a so-called "Think Tank" programme.[9,10] With the help of an experienced facilitator, the participants questioned existing culture and manners and determined future healthcare scenarios. The method provided information about actions needed to build a preferred future over the next two decades. The actions defined were adoption of new technologies, better information collection and management, training and education programs, and, most importantly, attitudinal and cultural change. Futures methods have also supported the development of a regional plan to improve health outcomes and to make present health services more dynamic.[11] In workshops, participants described existing reality and then constructed a future of healthcare. The desired future was delineated in tight strategic alliances, education, inspiring technology usage, and taking better care of both older and younger people.[11] The futures method was also used to describe the perceptions of Finnish master's students (social services and healthcare) about their future work and the competencies they will need in the future. The participants learned futures thinking which would, optimistically, be used in their studies and jobs.[12]

The purpose of this paper is to give insight into one Futures Studies method, the Futures Wheel. Although there are several alternative approaches to designing and conducting the Futures Wheel (FW) method,[12-14] multiple steps for one way to use the FW method in the healthcare context are presented, together with recognition of the strengths and limitations of the method. Between 2014 and 2018 the authors organised and conducted over 60 Futures Wheel workshops with groups from various professional fields. Some of these sessions focused on staff working in the fields of social services and healthcare. The approach taken to the process of presenting and analysing a session forms the basis for the paper.

Futures Wheel Method

Glenn[13,14] developed the Futures Wheel (FW) method in the 1970s as a structured brainstorming method used for thinking about the future. It is a group work method in which the potential impacts on the future are arranged in circles around a wheel. According to Jackson[15] the FW method produces a graphical visualisation of the direct and indirect consequences of a change or development, thereby encouraging participants to 'think outside the box'. The wheel organises participants' answers surrounding questions that go from strategic to operational. The questions are written in the middle of a piece of paper, and then small spokes are drawn wheel-like from the centre. Thus, the FW workshops function as tools for data collection and enhance learning and innovation among participants.[12-14] In our workshops, we used an application created by Glenn.[13,14] The process is presented in Figure 1, and key steps are further described below.

Preliminary work - Training the Facilitators
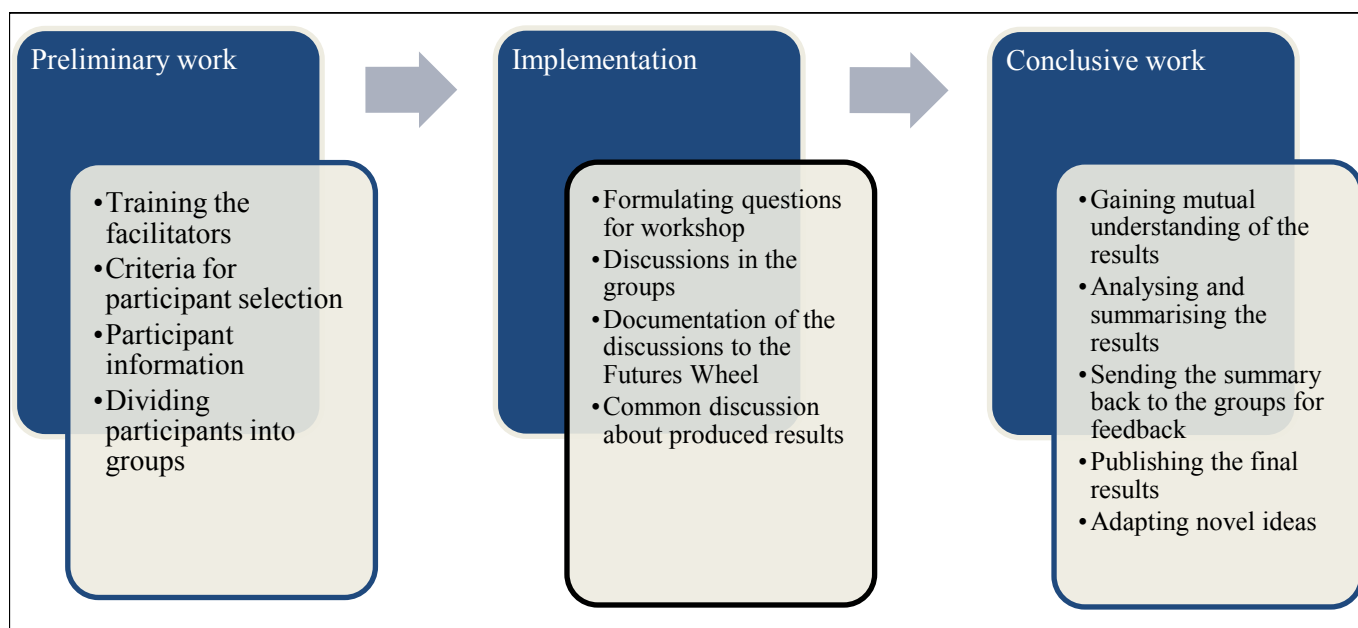Each workshop had a facilitator who was responsible for coordinating the Futures Wheel workshop and leading the

Figure 1. The Futures Wheel method.

JOURNAL OF THE INTERNATIONAL SOCIETY FOR TELEMEDICINE AND EHEALTH

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group discussion. Their role was crucial in creating an innovative atmosphere for producing different possibilities of the future of healthcare and eHealth, and they were responsible for training participants to think about recent developments and potential future developments.

Although Glenn[13,14] argued that successful facilitation required certain considerations, there was a limited description of the role and tasks of the facilitator who would be expected to guide participants in considering plausible futures and trends associated with healthcare and especially with the phenomenon of eHealth. Glenn noted that the facilitator would be a person who is familiar with thinking about the future and the Futures Wheel method and would use the guidelines of the method to help and lead participants in reflecting on the future regarding a specific content area. The facilitator would need to remain objective and neutral and would not take a particular position in the discussion. They would be responsible for assisting the group to achieve consensus on any disagreements that emerged during the workshop. Hence, the facilitator needed to know their own position(s) from the outset and guard against bias or conflicts of interest.[16-18] Throughout the process, the facilitator had to keep the discussion focused on the future. These necessary skills, and the preferences and characteristics of the participants, were carefully considered prior to choosing the facilitator.

Implementation – Formulating Questions for the Workshop

Although many factors influence the future, weak signals or small changes at different levels can yield significant changes overall. Researchers have anticipated, identified and illustrated healthcare and education trends.[19-22] In preparation for the Futures Wheel workshops the facilitators first studied research literature from different sources describing megatrends.[20-22] Healthcare megatrends that are likely to occur during the 21st century were identified as these will shape the sector for the next 10-15 years. Prior to the start of workshops, the trend options were selected, while recognising that local, regional and national changes are constantly altering the healthcare landscape.[12,21]

After discussion by the facilitators, consensus was reached on a set of megatrends that would be used in the workshop. These were the polarisation, internationalisation, and digitalisation of healthcare services; ageing; and ecological soundness/sustainable development. These megatrends were used to stimulate different perspectives from participants. Recognising that the use of these megatrend labels might prevent the participants from considering other future scenarios, a "wildcard option" was also used in the workshop. The idea of the wildcard option was to inspire additional views on the future that went beyond the selected megatrends. According to Mohamed,[23] uncertainty phenomena are defined as randomness with unknowable probabilities. The wildcard option allowed for uncertainty phenomena. A blank sheet of paper was given to

the participants along with the five megatrends.

Based on the discussions and consensus on the megatrends, the facilitators then determined specific questions associated with the goals of the workshops. Three rounds of questions were used to achieve the goals. The questions were as follows: 1) What will the healthcare sector be like in 2025 and thereafter? 2) What new competencies would be required for the realisation of the future of healthcare and eHealth, given the identified megatrends? 3) How will the competencies be acquired? In the workshop, futures were considered for 2025 and thereafter.

Implementation: Facilitating Discussions and Documenting Discussion in the Future Wheel

The Futures Wheel method was described to the workshop participants and included descriptions of where the alternative futures produced by participants would be used.

The participants were asked to consider how the previously identified megatrends would affect the work in their field in 2025 and beyond. The selected five megatrends (polarisation, internationalisation, digitalisation of healthcare services, ageing, and ecological soundness/sustainable development) were introduced to the participants. After a thorough discussion among participants, they wrote their views and perceptions on the papers, which were then arranged by facilitators in the first circle of a Futures Wheel diagram. (Figure 2) The participants were asked to consider the competencies required of professionals in their own field for the realisation of the future described. After the group discussion, the competence descriptions were grouped in the second circle of the FW. The methods through which the requisite competencies would be acquired were then grouped in the third circle of the FW. Thus, the FW comprised three different circles using different colours to separate the circles. When all of the views were collected, the output was appraised by the group, and duplications were removed from the circles. With the help of facilitators, all participants then carried out an analysis of the views in order to gain mutual
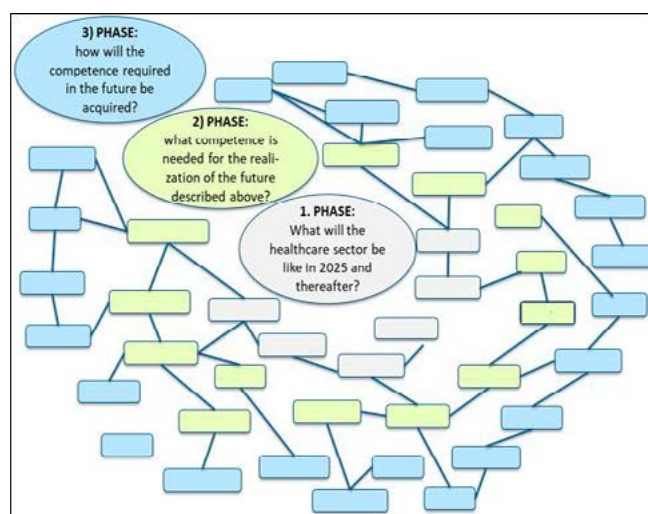

Figure 2. Futures Wheel method and circles.

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understanding. Reaching consensus by the end of the process is crucial. The participants needed to be committed to finding consensus so that everyone involved could actively support, or at least live with, the outcomes.

Strengths and limitations of the Futures Wheel Method

The Futures Wheel method encourages the participants to transition from linear, hierarchical, and simplistic thinking to more network-oriented, organic, and complex thinking. The healthcare system covers different services (e.g., primary, secondary, and tertiary levels), facilities (e.g., hospitals, out-patient clinics, nursing homes, assisted living locations), and people (e.g., families, clients/patients and providers) that interact according to plan, sometimes non-regularly, and sometimes in an *ad hoc* manner. All of these elements in motion can cause unintended consequences such as adverse drug reactions or nosocomial infections. The unforeseen consequences raise the question of how regulations can be created to control the behaviour of a complex healthcare system in order not to deviate from a desired outcome.[24] The FW method can encourage an individual to develop a prospective perspective and response toward a future event, such as competence demands or client/patient expectations for care in the future. The FW method helps to organise thinking and questioning about the future.[13,14]

Although Glenn[13] claimed that the Futures Wheel method promotes a rapid, grass-roots consideration of the future, it is still necessary to discuss the soundness and trustworthiness of its outcomes. Two steps were taken to ensure the accuracy of the results. First, the whole procedure was carefully designed with the facilitators to create common rules and practices concerning the guidance of the workshop and the documentation of the views of the participants in different circles on the wheel. Indeed, Glenn[13,14] recommended strictly following the guidelines of the FW method to prevent chaotic "intellectual spaghetti" that would make clear envisioning of the trend or event more difficult. Glenn[13] further suggested using primary, secondary, and tertiary circles to prevent this problem and organise the associations among the items. These suggestions were followed in our workshop and three different circles were grouped to answer the specific questions associated with each of the megatrends.

Second, the facilitators carefully listened to all participants and, when items were placed on the wheel, any ambiguities were clarified. Moreover, the facilitator had to be aware of the perspectives or biases they brought to the workshop in order to dispassionately capture the possibilities suggested for the megatrends. Glenn also cautioned that a common mistake was to consider the 'potential' impacts or consequences as 'true' consequences and the actual reality.[13,14] Therefore, the facilitator had to avoid making unsupported or premature judgements. In our workshops, a systematic procedure for each step was designed and implemented in this meticulous manner: five megatrends affecting the future were set as the starting points for the

workshops, all respondents were provided with the same information about the Futures Wheel method, and the facilitators were properly trained in use of the method. Using the selected megatrends as the participants' starting point was justified as being widely recognised in the literature.[25-28] The participants were also encouraged to use the wildcard option when there were things that surprised them or when alternatives to the proposed megatrends needed to be expressed.

Discussion

If future trends in healthcare and eHealth are not considered, then important opportunities for the development of appropriate, high quality services might be missed. Although the FW method is a rather simple technique for participants, requiring only paper and pen, a facilitator with motivation, and participants with productive minds transform it into a powerful tool for the exploration of the future. The method is a creative tool that generates and guides input for thinking about the future. As Gabriel stated, "The human brain is trained to anticipate future developments. We have the capability of mental time travel into the future, or the construction of alternate possible situations."[29] Hence, we must use this capability to consider the future of healthcare and particularly the future of eHealth and its role in current and future development and implementation processes.

A flexible time frame can be helpful. Considering futures research, a fundamental question is "how far ahead is the future?" Passig[30] suggested that futures research should focus on five time-frames: the immediate range could be up to five years; a short range of five to ten years; a medium range of ten to thirty years; a long range of thirty to fifty years; and an extremely long range of from fifty to one hundred years.[30] However, uncertainty increases as we move away from the present and look further into the future.[23] Although a specific year as a fixed target was selected in the present case, not all studies use precise time ranges. For example, some consider the future as a moving target, where the behaviours and actions of people are synthesised;[31] thus, there is no requirement to set a specific year in the future as a fixed target when performing futures research.

Based on the authors' experiences, the Futures Wheel method provides several benefits for healthcare, and specifically eHealth. First, this method is quick, inexpensive and relatively easy to use. Data can be organised on the alternative futures within defined areas such eLearning and eHealth. The data collected using the FW method can be used for many purposes, such as the reformulation of job descriptions or requirements needed in evidence-based evaluation of eHealth interventions in future healthcare.

Many healthcare personnel, especially in Nordic countries, represent generation X, whose birth years range from the early-to-mid 1960s to the early 1980s. Such individuals are not 'digital natives' when compared to their

'future colleagues' from generations Y and Z who are considered globally connected and technological oriented. Therefore, structured methods like the Futures Wheel bring together older and younger professionals to grasp and describe eHealth phenomena. By sharing insights, views and perspectives, they can widen each other's empirical knowledge base. Another benefit of using the FW method is understanding how predictions will influence planning and decision-making in healthcare systems, facilitating the role of healthcare professionals to participate in evidence-based decision making to inform patients, other experts and policy makers.[2,5,6,29]

Even though there is no set of rules defining how to think about the future in a scientific manner,[31] using well-planned forecasting techniques such as the FW method can help healthcare professionals make decisions that strengthen evidence-based practices and avoid 'silo thinking'. The Futures Wheel method can also be used to encourage the healthcare workforce to view the future differently. eHealth, with its multi-professional workforce, can leverage such structured forecasting techniques for anticipating the future of eHealth in all of its capacities. Facilitators for the FW method should guide eHealth participants toward considering mobile, ubiquitous, personalised health using terms like availability, accessibility, acceptability and quality in order to see essential elements of eHealth.

Conclusion

eHealth, the use of ICTs for health, has been and continues to be disruptive technology, perhaps already reflecting elements of the ITicine. Human factors have been identified as a recurring barrier to eHealth initiatives and uptake, caused in part by lack of awareness and preparedness for new technology options and changes in work process and flow.[6] Applying the Futures Wheel method may allow anticipation of eHealth induced change in healthcare. History has shown that the dissemination of eHealth is time-consuming and complex. Therefore, it is crucial to implement and evaluate methods that can predict the futures for eHealth.

When using the Futures Wheel method, one should be fully aware that thinking about the future using a systematic procedure means accepting that we cannot know the future. But the world is characterised by structural and dynamic complexities suggesting that illustrative thoughts, plausible explanations and alternative futures can and should be considered.[21,24,31] The practice environment of future healthcare, incorporating eHealth, will be different from what exists today. Therefore, the method presented here could be very useful in viewing the future of eHealth from a rich variety of alternative perspectives. Overall, the FW method might encourage and support a prospective attitude of individuals toward future events, such as the identification and acquisition of the skills and knowledge needed in the development of eHealth technology and the use of its

applications. The authors strongly recommend that the FW method guidelines be thoroughly followed to further confirm the validity of the method. All of the points made in this paper should be taken as the basis for further discussion, and all rules for the FW method should be under continuous critical reflection.

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COMBATING MALNUTRITION AMONG PREGNANT WOMEN, MOTHERS AND BABIES IN THE RURAL AMAZONIAN FOREST: WHAT CAN TELEHEALTH DO?

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Abstract

Purpose: Malnutrition is a current public health problem and a leading cause of childhood morbidity and mortality among the indigenous population in the Amazon forest. This may be related to the nutritional transition observed among indigenous women in Brazil. This research aims to empower health professionals to promote food and nutritional education for mothers and babies living in the forest of the Brazilian state of Amazonas and its Colombian border. We describe our experience using telehealth to combat malnutrition among pregnant women, mothers and babies in the rural Amazonian forest. **Methods:** This is a qualitative study that included three interventions: field visits, a scoping review, and online meetings. Data collect from field visits and the scoping review were used to identify demands and incorporate themes discussed in the virtual meetings held at telehealth units. Sessions used the web conferencing platform of the state of Amazonas and were facilitated by Brazilian specialists. Locations were selected according to existence of telehealth site. **Results and Conclusions:** Seven telehealth sessions were held between April and December in 2018 and three in 2019, including 14 different locations equipped with telehealth points, and lasted 120 minutes each. The main findings were that telehealth services can be an instrument to establish a knowledge exchange between health professionals and indigenous people. The participation of indigenous people in social media could be an instrument to maintain their culture and to promote their healthcare, especially traditional and healthy dietary patterns.

Keywords: telemedicine; indigenous peoples; women's health; child health; food and nutrition security; Brazil

Introduction

Amazonas, named after the river, is the largest state in Brazil with a territorial area of 1,559,168 km^2 and an estimated 4,144,597 inhabitants in 2019. The demographic concentration is in the range of 2.2 inhabitants/km^2; 79.1% living in urban areas and 20.9% in areas considered rural, including the riverside.[1] This is one of the last tropical rainforests crossed by the Amazon River. Isolated native indigenous populations are still found in the Amazonian forest. The river is the state main road and because of that, life there is regulated by the periods of floods and droughts. Long distances and natural barriers hamper continued care provided by multidisciplinary health professional teams.

Data from the First National Survey of Indigenous People's Health and Nutrition in Brazil registered a nutritional transition among Brazilian indigenous women. The women's and children's health indicators measured during the survey were worse than those documented for the national Brazilian population. Moreover, the prevalence rates of anaemia in indigenous children were almost double those reported for non-indigenous Brazilian children.[2,3] There has been an impoverishment of indigenous diets related to an influx of industrialised foods that is affecting mothers and babies and producing anaemia and malnutrition.[4] Among the related problems were changes in their dietary habits, replacing traditional food and exclusive breastfeeding with ultra-processed and industrialised foods having low

nutritional value that were made available to the villages.[5] It is important to revert this and regain better nourishment for indigenous children aged 0-5 years. The family nucleus is paramount in this process and the mothers need to be better educated in relation to satisfying nutritional needs.

This research was designed to find ways to support actions that might contribute to achieving better nutrition among indigenous women and children. The main hypothesis was that empowering primary healthcare professionals (PHCP) to promote food and nutritional education among mothers and babies from the Brazilian Amazon Forest will aid in reducing anaemia and malnutrition among this population. The study used Telehealth Amazonas, the state branch of the Brazilian National Telehealth Network Program, which is present in 62 municipalities of Amazonas and regularly used by PHCP for teleconsulting, online education and telediagnostic activities.[6] The study territory included demarcated lands near the Brazilian-Colombian border in the districts of Alto Rio Negro and Alto Rio Solimões, where 52 different indigenous ethnic groups live.[7]

This paper describes the methods and research approaches used to construct the virtual meetings and our experience in using telehealth to combat malnutrition among pregnant women, mothers and babies in the rural Amazonian forest.

Methods

This is qualitative study that uses a theoretical framework based on the Grounded Theory (GT), developed by Corbin and Strauss,[8] which is broadly used in public health studies involving the fields of anthropology and medicine. In GT the researcher tries to grasp reality in circular movements, where he recreates and interprets the dimension of his research object with a constant comparative analysis of data collected.[9] Therefore, during the study, the categories were progressively identified, and their meanings were analysed and integrated to provide guidelines and help to understand the phenomenon under investigation.

The study took place in three Amazonian urban centres: two in Brazil – São Gabriel da Cachoeira and Tabatinga, and one in Colombia – Letícia and included three interventions: field visits, a scoping review and online meetings. The first two interventions are not in the scope of this paper, that presents the results of the online meetings.

The field visits focused on PHCP and were carried out by two researchers, for seven days. By using a participatory approach, PHCP experiences were accessed alternating individual deep non-structured interviews and interviews with the group, performed at different health facilities. Additionally, river ports and fairs that sell crafts and agriculture products were also visited by the researches in the two cities in Brazil and the visits were guided by local health professionals. All the information collected, including testimonials, places visited and researcher´s observations

were documented in personal field diaries. These data are part of another publication, under review.

The scoping review (SR) was developed to confirm the themes for the virtual meetings, to investigate the living and dietary habits of mothers and babies from the Amazon forest and to observe the existence and viability of previous experience with virtual access in the region. It was based on publications that obligatorily included indigenous living in villages or reserves in the Amazon forest, published in Portuguese, English or Spanish and with open access. The following databases were searched: Pubmed/Medline, Embase (both on the biomedical context), Web of Science, Scopus and Scielo (multidisciplinary databases), Social Service Abstracts and Lilacs (Anthropology and Social Sciences focusing on Latin America and Caribbean researcher). There was no date restriction, and the principal search queries were (Indigenous population OR Amazonian Indians OR Amazonian tribes) AND socioeconomic aspects AND (amazon OR Amazonian OR Amazonas OR Amazonia OR Amazonian rain forest OR Amazonian rain forest OR Amazonas rain forest OR Amazonia rainforest OR Amazonian rainforest OR Amazonas rainforest) with minimal syntax adaptations. The review was performed in January 2019 and has been reported.[10]

The themes and content for the telehealth sessions were determined based on the observations from the field visits and insight gained from the scoping review. Sessions used the web conferencing platform of the Amazonas and were facilitated by Brazilian specialists and PHCP. The locations were selected based on the previous existence of telehealth in the site. The meetings were designed to address PHCP and to last up to 120 minutes each. The schedule of the sessions and the PHCP participation were based on the discussion and approval during the site visits.

The research was approved by the Research Ethics Committee of Instituto Fernandes Figueira — IFF/FIOCRUZ—RJ/ MS under registration CAAE 85439418.8.0000.5269.

Results

The field visits and the scoping review confirmed that indigenous people have access to the Internet and smartphones, as have being published before[11] and that the health teams have used the state telehealth network a few times to access the indigenous population. It also confirmed that the prenatal care was precarious, as also described before[12] and exclusive breastfeeding was reduced and strongly influenced by the subsistence of women and their family.[13]

The scoping review included 21 multidisciplinary studies that addressed topics related to the lifestyle of women and children in the Amazon, their diet during pregnancy and the postpartum period, breastfeeding practices, the introduction of solid foods to the baby, and the care of health services.[10]

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The results confirmed that traditional food has higher nutritional value than industrialised food and suggested that local cuisine was a source of income for indigenous women in the urban environment as well as a link between ethnicities. The need to incorporate the health promotion paradigm and cover themes such as indigenous acculturation in the Amazonian urban centres, the arrival of the Internet in the villages and the role of distance care, require further investigation to better address the problem.

The new knowledges gained during the field visits and scoping review were used to guide the online meetings. Seven telehealth sessions were held between April and December in 2018. These sessions included 14 different locations equipped with telehealth points, and lasted 120 minutes each. The topics discussed included presentation of the research project; nutrition of pregnant woman; women's nutrition in the puerperium; breastfeeding / nutritional and health related information for a baby's first six months of life; alcoholism in pregnancy; and agroecology and sustainable food systems. Digital graphics for Internet use were especially developed to disseminate all topics. (Figures 1) After obtaining the consent of all involved, the sessions were recorded, edited and became learning tools for health professionals in the Open University of the Unified Health System (UNA-SUS) – a public repository from the federal government.[14]

Three virtual meetings happened in 2019, addressing out-of-hospital births; the list of foods offered for babies and mothers at indigenous health facilities; and indigenous peoples' presence on the Internet. (Figure 2)

Three virtual meetings happened in 2019, addressing out-of-hospital births; the list of foods offered for babies and mothers at indigenous health facilities; and indigenous peoples' presence on the Internet. (Figure 2)

Internet connection in the Amazon forest is not always reliable. Despite this, telehealth units of 11 out of the 14 municipalities were able to consistently participate in the conferences with specialists, interacting through video and audio. (Table 1)

Discussion

The indigenous population is growing in the Amazon forest area[2,3] but it has been noticed that their traditional culture is being missed among the different ethnical groups. This is causing a nutritional transition that has been an object of study of several disciplines and sectors. This was also noted in the current study and the changes in dietary habits may be related to the malnutrition and anaemia diagnosed among indigenous population. To be able to change this, it is also important to emphasise that indigenous people have the right to maintain their culture and the ability to freely communicate their needs, and both of these rights are protected by the United Nations Declaration on the Rights of Indigenous Peoples.[15]

The themes selected, and the discussions held during the virtual meetings raised several concerns, as listed in table 1, but also highlighted local solutions that may help PHCP to respond. Language and cultural barriers may be reduced by the collaborative work of health professionals and traditional indigenous leaders, such as the shamans. It will also be important to shift the use of smartphones from a tool to access music and pictures, to include more health-related subjects and positive messages. For the time being, the results of the study are encouraging, and suggest that virtual meetings for sensitising PHCP are viable and may help to review the approach to promoting food and nutritional education among indigenous mothers and their babies. The

Figure 1. Themes in 2018

Figure 2. Themes of 2019.

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Table 1. Summary the themes and issues raised during the 2018 telehealth conferences.

Date	Subject	Primary Care Telehealth Points	Issues Raised/Possible Solutions
April	Presentation of the research project	7 sites: Manaus, Tabatinga, Tefé, Barcelos, Itamarati, Rio de Janeiro, and São Paulo de Olivença	**Main issues raised:** 1. The cultural influence in healthcare. 2. Different languages are a barrier between indigenous population and PHCP. 3. In Alto Rio Negro territory, schools and health facilities frequently consume products from subsistence family agriculture. They work in international projects with Peru and Colombia.
May	Nutrition of the pregnant woman	4 sites: Manaus, Manicoré, Tabatinga, Rio de Janeiro	
June	Women's nutrition in the puerperium	6 sites: Manaus, Tefé, Coari, Urucará, Itamarati, Rio de Janeiro	4. People of the Maku tribe like to eat a typical food named Turú *(Teredo navalis)*; but its nutritional value is unknown by PHCP 5. What is the best food for pregnant women who are underweight?
July	Feeding during the first six months of life and breastfeeding	6 sites: Borba, Alvarães, Eirunepé, Boa Vista do Ramos, Tabatinga and Coari	6. How to reverse the problem of pregnant women and children under six months who are undernourished due to ultra-processed food consumption 7. Several pregnant women were older than 50 years old in indigenous health facilities in the Alto Rio Negro area.
August	Feeding and introduction of solid foods to babies	2 sites: Manaus, Rio de Janeiro	8. What can PHCP do better to assist pregnant women with hypertension in a distant village? 9. Although the rural areas have received the "Ministry of Health official booklets for pregnant women", the number of available forms weren't enough to attend the local demand.
November	Alcoholism in pregnancy (Foetal Alcohol Syndrome)	2 sites: Manaus, Rio de Janeiro	10. How can the district access for the federal document of pregnant be improved? 11. Indigenous people like to watch videos and messages. They have smartphones primarily to listen to music and to take photos because there isn´t Internet connection in the villages.
December	Agroecology and sustainable food systems	2 sites: Manaus, Rio de Janeiro	**Possible solutions**: 1. PHCP often work with shamans to assist indigenous children. 2. The "Ten steps for healthy food", a government project, is present in the villages. 3. One Colombian project has documented traditional indigenous recipes 4. Tabatinga´s maternity is adapted to indigenous mothers. 5. In Alto Rio Solimões territory, there is a project to avoid and prevent alcoholism. 6. In Alto Rio Negro area, PHCP teams have been trying to strengthen the bond with midwives.

results also confirmed the viability of using telehealth as a mean to empower health professional. Once empowered, health professionals will be able to consider the inclusion of face-to-face activities, in areas without telehealth, to educate indigenous women and mothers and reinforce cultural traditions. The materials that were produced during the virtual meetings will be useful for sensitisation activities, recognised as successful in the literature, such as workshops using audio-visual recording of traditional cuisine, building on female protagonist groups[16,17] and building on previous experience with online meetings carried out with similar objectives.[18]

Virtual meetings and face-to-face activities may also be seen as an opportunity to give voice to indigenous people and promote an environment of exchange and dialogue about their eating habits with the team of family healthcare professionals. They may also represent an opportunity to discuss and produce audio-visual files related to ancient feeding practices of indigenous people that may be temporarily forgotten. They can also open a channel for specific group discussions about the protein, caloric and nutritional value of the traditional recipes compared to the new nutritional transition, and the health-related consequences in children and women. The use of Internet and

social networks may help enhancing the network among indigenous women[19] and the effort to also involve PHCP may reinforce a pedagogical interchange[20] between the traditional values in the context of being an indigenous women and the biomedical knowledge.[21]

Conclusion

The results suggest that telehealth services are viable in Amazonian urban centres and they could be an important tool to establish a knowledge exchange between health professionals and indigenous people. Promoting the use of social media among indigenous people could also be an instrument to maintain their culture and to promote healthcare, more specifically in relation to traditional and healthy dietary habits. More studies will be necessary to monitor and evaluate the long-term effects of these creative approaches to empower the nutritional and alimentary security of indigenous population. And to evaluate the impact of this strategy on improving the health indicators of mothers and babies of the Amazon territory.

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WHO YEAR OF THE NURSE AND THE MIDWIFE 2020

INTERVIEWS AND STORIES IN THE BLOG OF THE WOMEN OBSERVATORY FOR EHEALTH

Nurses and Midwives are at the top of the scene in 2020, with the World Health Organization International Year of the Nurse and the Midwife.

Since 2014, the Women Observatory for eHealth has selected 32 innovative projects developed by Nurses and Midwives around the world. With new technologies, Nurses and Midwives connect to their patients with increased efficiency and quality of care.

https://weobservatory.com/tag/2020-who

BEING A NURSE AND SCIENTIST IS MY CHILDHOOD DREAM !

Michael Dino, Nurse Educator, Researcher and Innovator, Director for Research Development and Innovation Center at the Our Lady of Fatima University in the Philippines.
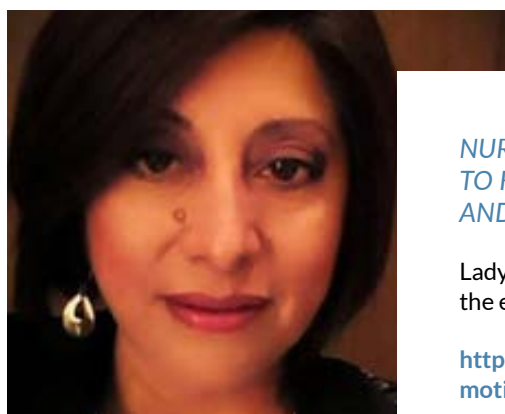
https://weobservatory.com/2020/02/18/being-a-nurse-and-scientist-is-my-childhood-dream

NURSING IS HAVING THE MOTIVATION TO WANT TO LEARN TO HELP, TO STUDY, TO RESEARCH. IT IS SOMETHING EMOTIONAL AND RATIONAL AT THE SAME TIME

Lady Murrugarra, Nurse Technician in Peru leading the ePrevencion program.

https://weobservatory.com/2020/03/12/nursing-is-having-the-motivation-to-want-to-learn-to-help-to-study-to-research-it-is-something-emotional-and-rational-at-the-same-time

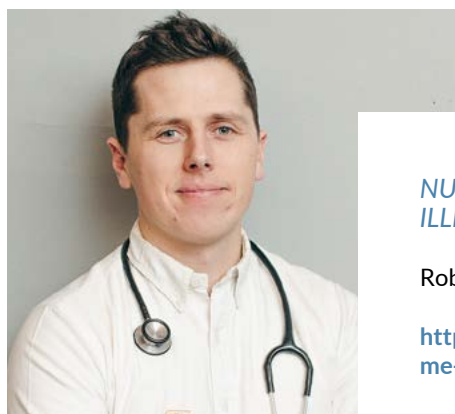**WE ARE NOT GIVING UP !**

" I CHOOSE TO BE A NURSE MIDWIFE BECAUSE IT'S ONE PRO-FESSION THAT CAN CONTINUE TO SPARK MY INNOVATIVE MIND TO DEAL WITH MANY ASPECTS OF PATIENT CARE ESPECIALLY AMONG WOMEN AND CHILDREN"

Chinomso Ibe, Nurse/Midwife founder of Traffina Foundation for Community Health (TFCH) in Nigeria

https://weobservatory.com/2020/07/23/we-are-not-giving-up

NURSING EMPOWERED ME TO HELP OTHERS DEAL WITH ILLNESS AND IMPROVE THEIR HEALTH

Rob Fraser, registered nurse in Canada working in Toronto.

https://weobservatory.com/2020/11/28/nursing-empowered-me-to-help-others-deal-with-illness-and-improve-their-health

TO BECOME A MIDWIFE WAS TRULY A LIFE CHANGING EVENT, AS IT IS A CONCRETE WAY IN WHICH YOU CONTRIBUTE TO LIFE, TO A HEALTHY FUTURE!

Franka Cadee, midwife, head of Twin2win

https://weobservatory.com/2020/12/02/to-become-a-midwife-was-truly-a-life-changing-event-as-it-is-a-concrete-way-in-which-you-contribute-to-life-to-a-healthy-future

NURSE EDUCATION HAS BEEN AN EXCELLENT BASIC EDUCATION, WHICH GAVE MANY POSSIBILITIES IN MY CAREER. MAYBE A SAYING 'ONCE A NURSE ALWAYS A NURSE' BELONGS TO MY LIFE, TELENURSING IS KEEN PART OF MY LIFE, AND THE WORLD IS OPEN VIA NETWORKS.

Pirkko Kouri, Principal Lecturer at Savonia University of Applied Sciences, Kuopio, Eastern Finland

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"NURSES WORLDWIDE CAN UNDERSTAND OTHER NURSES – THEIR ACCOMPLISHMENTS, GOALS AND CHALLENGES. I FIND THIS ABILITY TO 'SEE' NURSING WORLDWIDE VERY GRATIFYING.

Claudia C. Bartz PhD, RN COL, USA (Retired), Suring Wisconsin USA

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THE ART OF CARING"

Rafaele Cristine Barcelos dos Santos Luz Ribeiro
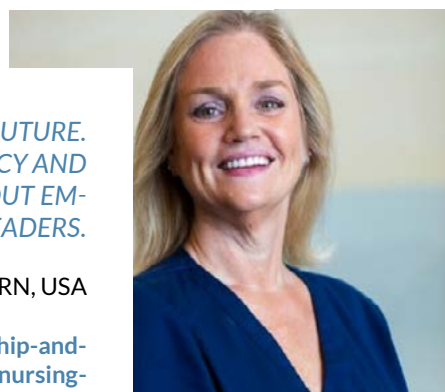Enfermeira Especialista em Bancos de Leite Humano e Aleitamento Materno IFF/ Fiocruz

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NURSE LEADERSHIP AND INNOVATION IS THE FUTURE. I BLEND ON-THE-GROUND CLINICAL NURSING WITH POLICY AND ENTREPRENEURSHIP WORK – AND I'M PASSIONATE ABOUT EMPOWERING THE NEXT GENERATION OF NURSE LEADERS.

Lisa (Macdonald) Darsch MSN RN, USA

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