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REMOTE BREAST CANCER PATIENT MONITORING SYSTEM

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ABSTRACT:

The healthcare domain is one of the fastest-growing fields for the Internetof Things and Artificial Intelligence. The advancement of medical resources is insufficient to meet the needs of remote patient monitoring and treatment. This issue is growing increasingly prevalent in developing countries. Various breast cancer screening approaches have been briefly addressed, as well as popular public databases. Following that, issues in remote monitoring system have been discussed. We also present a case study on remote monitoring system for breast cancer patients to provide enhanced solution for women in rural areas.

INTRODUCTION:

There are strong findings and recommendations in this report, but they should not be taken out of this context. The shortcomings identified in the BSA programme reflect health system wide issues that are longstanding. The health system reforms provide the opportunity for Te Whatu Ora in partnership with Te Aka Whai Ora to drive much needed reform across the entire health system [1]. The BSA programme was last formally reviewed in 2011.[This review identified a number of issues and made recommendations for improvement. Many of the issues identified in this review are similar to those identified in 2011. It is essential that these issues are addressed, and continuous quality improvement and systematic evaluation are embedded in the programme [2]. Quality improvement should “create a cycle of critical review of services”.Assurance of the programme’s quality and safety cannot depend on ad hoc reviews in response to incidents. The impactof COVID-19 on the BSA programme has been significant. Over the last decade, the coverage of the BSA programme forwāhine Māori has been persistently around 10 percentage points below that of women of non-Māori non-Pasifika ethnicities This still applies in the most recent data, with all coverage rates being reduced by COVID restrictions, with Pasifika women experiencing the greatest decrease in coverage during the pandemic (2020–2022).[3] Disruptions to services related to COVID-19 over the past two years has resulted in some 50,000 (9%) fewer women being screened compared to service levels in late 2019/early 2020 (or around 11% of eligible women, when accounting for population growth)1; these data are not reported by ethnicity. Modelling commissioned by the National Screening Unit (NSU) has predicted: screening rates will get back to pre-COVID-19 levels by December 2022; the COVID-19 backlog’ (estimated tobe 28,500 screenings missed in 2020–21 (again, these data are not reported by ethnicity), will be cleared by end June 2023; and equitable coverage2 will be achieved over a period of three years starting from 1 July 2023.[4] However, the modelling report notes that addressing the COVID-19 backlog may temporarily limit the ability to progress other objectives such as achieving equitable coverage; and it may create a long tail effect as the additional women screened in2022–23 will return every second year until they reach the maximum age of eligibility [5].The panel acknowledges the critical workforce issues that have impacted health care services during COVID-19 and continue post the pandemic, particularlyworkforce availability and wellbeing, and the challenges these continue to present for the BSA programme [6].

METHODS:

A mixed method approach was utilised for this review. As part of primary data collection, stakeholder interviews were conducted (45 individual stakeholders and seven groups) between July-October2022 [7]. A list of interviewees is set out in Appendix Two. Interviewees represented a wide range of groups including wāhine representatives, the NSU, leadproviders, screening support services, general practitioners (GPs), non-government organisations, and academic and subject matter experts [8]. Interviews were conducted via Zoom or Microsoft Teams with at least one panel member and one member of the secretariat. The interviews were semi-structured; participants were provided with a set of guide questions in advance [9]. Interviews were recorded by the members of the secretariat taking notes. After each interview, the notes were collated, rewritten using thematic analysis and emailed to the interviewees for review. A written response was received from one person who was unable to attend an interview within the review's timeframe. All data was storedon a confidential MS Teams page and was accessible to all panel and secretariat members. Secondary data collection and analysis included review of published and grey literature [10]. Grey literature included publicly available programme reports, documents provided by the NSU, BSA monitoring reports, and extracts of data obtained for the epidemiology review.[8] A list of the documents reviewed by the team is set out.

BREAST SCREENING PATH WAY :

The breast screening pathway has multiple components including: engagement with whānau, hapū, iwi, communities and service providers screening and health promotion identification and enrolment of eligible women invitation and recall of women eligible for screening every two years support to access services, including transport mammography recall to assessment for those with identified abnormalities on mammography multidisciplinary assessment for screened women[11] (i.e., additional imaging including and other modalities where necessary, clinical examination, ultrasound, biopsy, and pathology services) communication of screening results to women and their primary health care provider support and counselling for women who are being assessed referral to treatment for women with breast cancer an information system which supports the programme quality assurance, audit, monitoring and evaluation National Screening Unit Aotearoa New Zealand's three national cancer screening programmes are centrally coordinated and monitored through the NSU of Te Whatu Ora [12]. Previously the NSU was a business unit in the Ministry of Health. The NSU does not deliver the screening programmes directly, rather it is responsible for the development, monitoring and oversight of all national population-based screening programmes. The NSU contracts and funds providers to deliver screening services [13].

Data analyses Summary descriptive statistics were used to examine participant screening, recruitment, demographic and clinical characteristics. Symptom-report response rates, data completeness and reasons for non-completion were summarised. Descriptive statistics also summarised symptomreport response rates and data completeness, frequency and severity of symptoms reported and any actions generated. Audio-recordings of interviews with participants and clinicians were listened to by a researcher (HR) and those containing data of relevance to the study objectives were transcribed verbatim (targeted transcription) [14]. Textual data were analysed in accordance with the principles of thematicanalysis , in which codes were generated and applied to sections of text. Codes were reviewed and refined through discussion with the study team. Thematic analysis is a widely-used methods of qualitative analysis involving the identification and interpretation of underlying themes and concepts within the wider context of the data. The interview topic guide was iterated following discussion with the study team as data collection and participant recruitment proceeded. Analysis was conducted until thematic saturation was reached, whereby existing themes ceased to evolve and no new themes were identified [15]. Here we report the main themes within the context of a wider mixed methods study.

Frequency of reported symptoms and ePRO system actions Frequencies of symptoms reported by Centre 1 participants and associated actions triggered by the ePRO system are shown in Table 5. Of the nine Level 3 email alerts to clinicians, seven (78%) were generated in the first 3 weeks following discharge from hospital (Fig. 2). Over half (n = 43, 60%) of the 72 Level 2 actions (participant advice to call an HCP) were triggered within the first 2 weeks post-discharge, with a further 15% (n = 11) triggered after 6 weeks post-discharge. Most (n = 48, 63%) of the 76 Level 1 actions (self-management advice) were triggered after 3 weeks post-discharge, the majority of which were triggered at weeks four and five. Of the 40 forty Level 0 feedback (no participant advice required), 27 (68%) instances were triggered after 5 weeks post-discharge. An additional eight Level 3 alerts were generated from the baseline data completion prior to patients being discharged. These data were removed from the dataset post-hoc following consultation with clinicians, as they were deemed irrelevant due to patients still being in hospital.

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RESULTS :

Participant eligibility and recruitment One hundred and nine patients were screened for eligibility at Centre 1, of which 41 (38%) were eligible and invited to participate, and 29 (71%) consented. (Fig. 1). Patients who agreed to take part were similar to those who declined in terms of demographics (participants: 66% male, refusers: 50% male) or age (participants: mean age 64, range 43–81 years, refusers: mean age 59, range 30–74 years). Reasons for ineligibility included participants not undergoing their planned surgical procedure (17, 25%), having no home access to a computer/mobile device or internet (15, 22%) (Fig. 1). Seven (24%) Centre 1 participants withdrew from the study due to feeling too tired or unwell or a prolonged readmission to hospital. Approximately half (n = 15, 52%) of patients had undergone oesophago-gastric resection procedures, with an average hospital stay of 12 days. Participant demographic details are provided in Table 3. In Centre 2, 20 patients were screened for eligibility, of which 11 consented to participate. All 11 participants had undergone oesophago-gastric resection procedures (Table 3). Two (18%) Centre 2 participants withdrew from the study.

CONCLUSION :

A real-time, hospital-integrated symptom monitoring system has been developed to optimise the prompt and effective management of symptoms and complications experienced by patients after discharge following abdominal cancer-related surgery.

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