Investigating nurses' experiences of adopting a digital record keeping application: A mixed methods evaluation study

Abstract

Aims: To explore the experiences of nursing staff involved in the implementation of the Wales Nursing Care Record (WNCR) at one University Health Board in Wales during 2021-2022.

Methods: This mixed methods design involved six (4 district general hospitals and 2 community hospitals) of the 10 hospital sites that had taken part in the implementation of a digital nursing record across in one Health Board. A cross-sectional survey and semi-structured interviews were conducted with a variety of staff members.

Results: The key findings reported most respondents had completed the training offered by the internal implementation team; IT issues which were largely related to hardware issues rather than problems with the software; the main benefit was the improved quality of the nursing record; and key challenges and risks focused on running paper and digital systems in parallel and that other areas of nursing care are not currently included in the digital system.

Conclusions: The experiences of nursing staff while implementing WNCR were mixed. Previous research has noted autonomy as being an issue, this was not the case for this study. The improved quality of nursing records was a key benefit along with the support and training offered by the internal team. Wider IT issues and the interface with other paper-based systems were the key frustrations. Positively the learning gained from implementing WNCR is continuing to provide essential insight necessary for the effective project management for more complex clinical digital systems.

Keywords: Electronic Health Record, User Experience, EHR, Evaluation, Mixed methods

1. Introduction

The existence, usage and benefits of digital technologies in nursing care are relevant and highly important topics. Especially in the light of the ongoing discussion on technologies as possible solutions to problems such as the shortage of skilled workers and the increasing demand for long-term care (Krick et al., 2019). The use of digital technologies such as electronic health records (EHRs) has increased substantially in the last five years. As a result, we have seen several benefits. These include an acceleration in the reduction of medical errors, the provision of more effective methods of communicating and sharing information among clinicians, lowering of national health care costs, better management of patient medical records, and improvements in the coordination of care and health care quality (Kruse et al., 2016; Carey et al., 2016).

Interest in digitisation has persisted for two decades and stems in the UK, like many other healthcare systems, from early attempts to move towards an IT based assimilation of patient records. Sadly, for the NHS early initiatives such as the National Program for IT (NpfIT) and its well documented failure, seen as bureaucratic and top down (Takian et al., 2012) has resulted in caution amongst many stakeholders in progressing such systems. With the growth of Artificial Intelligence (AI) coupled with the desire for efficiency in delivery of quality care interest is reawakened (Booth et al., 2021).

There is considerable evidence to indicate that there are certain elements of an Electronic Health Record (EHR), which can lead to improved health care quality and support improvements in patient outcomes (Hardiker et al., 2019). But Gephart et al. (2015) point out that implementing an EHR across complex care systems remains a major challenge with it estimated that more than half of all systems fail or fail to be properly utilised. Progress in EHR implementation in the UK acute care sector has been particularly slow with previous negative experiences contributing to a disengaged workforce (Hardiker et al., 2019).

However, adopting an EHR is increasingly seen as not just inevitable but also preferable by many. Alsalem et al., (2018) explain that health information technology can greatly improve efficiency, patient safety and healthcare outcomes while reducing the cost and the authors note EHRs have the potential to deliver benefits such as saving cost by digitizing the data system and having a central place for providing medical data.

But moving from a paper-based system to a much more complex digitised version is generally more difficult than many planners acknowledge. It involves not just a change to a different method of note keeping, but a fundamental change to the way care is organised, recorded, and communicated. It impacts upon staff experience and engagement, often in unexpected ways (Baumann et al., 2018).

Campanella et al. (2016) suggest that there are cases where the success of an EHR is not optimal because of a noneffective implementation strategy and that cultural factors can frequently be detected in the way implementation occurs. For example, Zwaanswijk et al. (2011) suggests that health care providers' reluctance to adopt digital methodologies can stem from their reluctance to change their established way of working or from fear of losing their professional autonomy. Zamboni et al., (2020) points out the role of context and mechanisms of change, which is perhaps underexplored, but which can be significant. This is the focus of our paper. Given that many initiatives are designed and implemented in a top-down way it is

important to judge the influence of the local planning and facilitation process. There is limited, but emerging evidence based on aspects of context that play out as barriers and facilitators to digital health interventions and their implementation.

Normalisation Process Theory (NPT) also focuses on the work that individuals and groups do to integrate interventions into routine practice (May et al., 2016; Murray et al., 2016). It can help in understanding why some processes lead to practice becoming normalised while others do not. NPT proposes that implementing technology can be achieved through 'energising' four mechanisms: Coherence (understanding of reasons for implementation and potential value of the technology), Cognitive participation (preparedness to engage and commit to use the technology), Collective action (ability to do the work to use the technology) and Reflexive monitoring (how staff appraise the technology) (Scantlebury et al. 2017). It is generally accepted that NPT provides a consistent framework that can be used to describe, assess and enhance implementation potential.

The aim of this mixed methods evaluation study is to report on the issues and challenges in implementing a digital nursing record within adult in-patient services in one health board in Wales, UK with reference to the context, the implementation strategy employed, and the ease of transition from a paper-based system to a digital model. The study will identify reflective learning from the implementation process which can inform future preparation and adoption of other digital systems within clinical practice.

2. Materials and Methods

This convergent parallel mixed methods study was undertaken to evaluate the implementation of a national nursing care record by one University Health Board in Wales, UK. This involved simultaneous collection and analysis of quantitative and qualitative data. These data were collected concurrently but analysed separately and then results were compared. The results of this study were included within a larger evaluation of all Health Boards in Wales. This paper reports on the evaluation of nurses' experiences of moving to a digital record. An online survey and semi-structured interviews were undertaken with nurses and student nurses from across the organisation.

2.1 Survey design

The online survey was designed by the two members of the team having completed a review of the relevant literature. The survey consisted of 32 questions (see supplementary file) and covered four areas: workplace and role; experience of using WNCR; Impact of WNCR on patients and practice; and WNCR versus paper version The questions were reviewed by all members of the team (academics and health professionals) to ensure questions were simple to understand and unambiguous ensuring any technical terms were clearly defined. Answer categories (e.g. Likert scales) were also reviewed by the team to ensure these were balanced and meaningful to respondents. The survey was piloted with 10 randomly selected WNCR users from two inpatient wards. Following the pilot some minor changes were made to the wording and order of questions. Sixteen of the 32 questions were closed questions. The remainder open questions allowed respondents to provide information about their role and additional comments on the use of the WNCR system. The last questions asked whether respondents wished to take part in a follow-up interview and if interested to provide contact

information. The link to the online survey was distributed to potential users via email and the link and QR codes were available to nursing staff on the selected wards.

2.2 Semi-structured interviews

The semi-structured interviews were designed by two members of the team and then reviewed by all members before interviews commenced. After conducting two interviews each the two interviewers met to discuss if any changes were needed to the interview schedule, no amendments were required. The interview schedule consisted of 17 questions (see table 2) which covered background information, IT experience before using WNCR and experience of using the WNCR system. All interviews were conducted online via Microsoft Teams and consent was requested prior to starting the interview along with permission to record the interview. Transcriptions of the interviews were then downloaded, anonymised and analysed by two members of the team.

2.3 Setting

A multi-site University Health Board in Wales, UK with four acute hospital sites and six community hospitals servicing a large geographic area and a population of approximately 385,500. This is the first time a digital nursing record had been introduced in Wales. At the time of this study six of the ten hospitals had embarked on the implementation of the digital record.

The Welsh Nursing Care Record (WNCR) is a digital application that aims to standardise nursing documentation across Wales which includes patient demographic and contact details, allergies, past medical, surgical and mental health history, a comprehensive assessment based on twelve care domains, initially six risk assessments, and a patient notes section to enable contemporaneous reporting and evaluation of care. WNCR delivers one standard set of assessments and documents that have the potential to provide and enhance safe and effective care to the population of Wales, irrespective of Health Board/Trust location. The vision of the WNCR is to ensure "nurses and multi professional team members are confident and competent with using the system and they utilise data from the WNCR to drive improvements and learning across organizations in Health and Care in Wales, improving patient outcomes and experiences. Following a successful pilot in 2020, the WNCR application was deployed in all eight Health Boards and Trusts in Wales on acute and community adult inpatient wards. The system is to be utilised by all nurses caring for adult inpatients within a secondary and community hospital care setting. The implementation of WNCR commenced in 2021 and was set to be fully rolled out in the eight Health Boards and Trusts. This paper explores the experiences of nursing staff from one of the first health boards to embark on implementing WNCR.

2.4 Inclusion and exclusion criteria

Nursing staff working across 6 hospital sites that had implemented the WNCR were eligible to participate in the study. All nursing staff on these wards were invited to attend WNCR training before the system was implemented and were to be using the system as part of their roles.

Areas where the digital nursing record was not being used (Maternity, accident & emergency, outpatients, Paediatrics, Neonatal, Critical Care, mental health and Learning Disability settings) were excluded from the study.

2.5 Recruitment

A convenience sample of nurses from a variety of settings were invited to take part in the study. For the online survey, ten wards were targeted in the Health Board (HB). These wards were all included in the early stages of the implementation of the WNCR project and therefore nursing staff were able to respond to questions about the training and use of the digital system. Information sheets and the links to the online survey were provided to all nursing staff using the digital nursing record. Consent was provided at the start of the survey.

Volunteers were also sought to take part in semi-structured interviews. Nursing staff interested in taking part in the interviews provided their email address and were then contacted by a member of the research team with study information. Interviews were conducted online using Microsoft Teams at a time convenient to participants. Data collection occurred between April and December 2022 which was during the first year of implementation. Consent was sought and recorded with the permission of the respondents at the start of the interviews.

2.6 Data collection and analysis

As this was a convergent parallel mixed methods study, data from the survey and interviews were collected and analysed in parallel.

Survey – 367 participants were invited to complete an online survey consisting of 32 open and closed questions. The survey was designed by the project team and guided by previous research. Staff from Elderly Rehabilitation, Acute Medicine, Surgery, Acute Admission Assessment and Acute Stroke wards across six hospitals were invited to take part. The specialties were selected to reflect the range of circumstances surrounding the gathering of patient observations (demographics, length of stay, morbidity). In addition, some staff from other specialties replied to the call for responses. Data were collected on job roles and length of service. The survey data are reported using descriptive statistics, and anonymous quotes from the open survey questions are included where appropriate.

Online semi-structured interviews were conducted using Microsoft Teams. Participants were able to volunteer to take part in an interview by supplying their contact details at the end of the online survey. Participants were asked about their experiences of using the digital record, the training received, and suggested areas for improvement. Fourteen participants provided their contact details, with eleven interviews being conducted which lasted between 20 and 40 minutes. Three participants did not respond to the follow-up invitation to take part in the interviews. The transcripts were checked for accuracy and then coded manually by one researcher and checked by other members of the team. The thematic analysis was guided by Braun and Clarke's (2006) framework.

2.7 *Ethical considerations*: as this study was classified and registered with the Health Board as a service evaluation, additional ethical approval was not required. The aims and objectives of the evaluation study were clearly defined on the front page of the survey. Details were also provided as to how the study data were to be collected, processed and used. Consent was

required before participants could proceed to complete the survey and was recorded prior to conducting online interviews. Study data were stored on password protected computers and raw data were only accessible to the two members of the team that were responsible for anonymizing and analysing the data. Contact details were provided to all respondents should they have any questions prior to or after taking part in the study. Interview participants were free to withdraw from the study up to one week after their interview (prior to data being analysed) by informing the interviewer by email.

3. Results

Online survey results

Of the 367 staff invited to complete the survey 86 responses (*23.4%)* were received (See table 1). Of those replying 74 (*86.0%)* worked at acute general hospital sites with the remaining 12 respondents (*14.0%*) working in community hospital settings. Representation was from across specialties with 20 respondents (*23.3%*) from surgery being the largest group. Thirty-two (*37.2%*), respondents worked for the Health Board for 2-5 years while a significant number 16 (*18.5%*) worked for the HB for 16+ years. Twenty-eight respondents (*32.6%)* of respondents described themselves in the general category "nurse"; in addition, 15 (*17.5%*) were staff nurses; 13n (*15.1%*) Healthcare Support Workers (HCSW); 5 (*5.7%*) senior sisters and 6 (*6.8%*) described themselves as students. Twenty-three respondents (*26.7%*) of participants worked part-time whereas 56 (*65%*) were full-time staff. When asked how frequently participants used the digital record system, just over a third of participants (29n, *33.6%*) used it daily, 22 (*25.6%*) 2 to 3 times per week and then 23 (*26.7%*) 4 to 6 times per week. There were only 3 (*3.5%*) participants who used the system on a monthly basis which could be a result of their role or working pattern.

Insert table 1 about here

The data from the interviews and the survey were analysed in parallel and are reported separately to enhance readability of the results. First the online survey results are presented followed by the semi-structured interviews; these are organised by the key themes that were identified from both sets of data.

Training. When asked if they had attended a training session prior to using WNCR 55 (*64.0%*) respondents said that they had done so whereas 28 (*32.5%*) said that they had not attended a training session. There was no discernible pattern of site or specialty attached to these replies. When asked how prepared they felt after the initial WNCR training to use the application, of the 55 respondents that had completed training 18 (32.7%) felt fully prepared; 26 (*47.3%*) felt mostly prepared but 10 (*18.1%*) said they still had some issues with digitisation. One person (*1.8 %*) said they were "unprepared to use the technology".

IT and issues. The majority of survey respondents used the technology with great frequency; with one third of respondents (n=29, *33.6%*) using WNCR daily and 22 (*25.6%*) respondents using it 2-3 times per week. An overwhelming 73.5% said that they found the technology extremely (n=28, *32.5%*) or somewhat easy (n=35, *41.0%*) to use, whereas only 4 (*4.5%*) reported it somewhat (n=3, *3.5%*) or extremely difficult (n=1, 1.0%) to use. When asked if they encountered any IT issues while using the WNCR digital system 22 (*25.6%*) respondents said they had never had a problem; however, 49 (*57.0%*) respondents said they occasionally had difficulties and 9 (*10.4%*) said they frequently had problems; three respondents (*3.5%*)

said they encountered difficulties "every time" they used the system. Reasons for the latter were:

- *Issue with laptop and iPads with regards to WNCR application*
- *The laptops are very slow to start, and it is very frustrating, especially when you are busy.*

When asked if the technology was fit for purpose over a third of respondents (n=35, *40.7%*) said it was ideal, and 31 respondents (*36.0%)* reported a few shortcomings whereas 14 (*16.4%*) felt there were many shortcomings. Reasons for the latter included size of the digital devices, speed of login, insufficient in number of devices and the fact that not every element of the nursing record was included in the application, which resulted in using both digital and paper systems.

Benefits: When asked if timesaving had resulted from using the digital version, 12 (*13.9%*) respondents said it had increased time spent with the patient but over half of respondents (50, *58.1%* said it made no difference. Nineteen (*22.2%*) believed that the time spent with the patient was reduced and two (*2.3%*) respondents reported that IT created a barrier between themselves and the patient. Portability and speed of recording were given as reasons for time saving; delays in logon, interruptions requiring repeated logons, and limited numbers of equipment were explanations of slowdowns. Failure to assure charging means equipment is not always ready when needed. One survey respondent noted: *"We now have paper forms/care bundles/referrals and WNCR/online referrals and care bundles to complete. It needs to be all in one place to not only avoid confusion but to free up nurses to spend more time with patients".*

These replies suggests that there is misalignment between the various reporting streams.

When survey respondents were asked about the impact of using WNCR on the quality of the nursing record, 36 (*25.6%*) said that this had greatly improved and 36 (*41.9%*) said it had somewhat improved suggesting a majority vote for quality improvement. Twenty (*23.5%*) respondents claimed that quality was much the same; only 5 (*5.7%*) respondents felt that quality had decreased in some way. Reasons for improvement were essentially about clarity and ease of access; reasons for decrease stemmed from failures to complete the record.

When asked which version they preferred, 57 (*66.3%*) respondents preferred the digital version whereas 17 (*19.7%*) respondents preferred paper and 9 (*10.5%*) had no preference. Reasons for preferring the digital version included ease of use; clarity; availability / efficiency; reliability; legibility. Advantages of the paper version included the fact that it was easier to re-visit a paper version; paper was less time consuming and not liable to breakdown. However, one survey respondent noted: *"I do like both. I find the devices sometimes slow to use, generally aren't plugged in after use so are low on battery and at times have shut down halfway through completing nursing notes. I also like the fact that the paper version is easily accessible, and vital information such as NOK details can be accessed quickly rather than starting up a device".*

Also: *"It would be great if all specialities could use WNCR to report on patients as some still write in the medical notes. Medical staff should also be using WNCR now for reporting so that all information is in one place, it's always legible and nursing staff don't have to write it all again in their report".*

Benefits of WNCR

A summary of the benefits reported by survey respondents of WNCR in comparison to using the paper vision is shown in table 1 – Q24. The main benefits cited were the reduction in the use of paper (n=64, *75.2%*), legibility of the record (n=63, *74.1%*), improved access to patient information (n=49, *57.6%*) less duplication of information (n=36, *42.3%*) and able to complete the record at the bedside (n=31, *36.4%*). The user-friendliness of the system (n=29, *34.1%*), saving time (n=27, *31.7%*) and improved team working (n=14, *16.4%*) were also mentioned as being beneficial.

Challenges of WNCR

Challenges of using WNCR reported by the survey respondents are presented in table 1 – (Q26.and Q27). The main challenges were associated with IT issues (e.g. accessing the system) (n=61, *71.7%*), availability of laptops/handheld devices (n=44, *51.7%*), the system not being fast enough (n=38, *44.7%*) and WNCR not covering all aspects of care (n-35; *41.1%*). Other issues raised concerned being too focused on the computer (n=33, *38.8%*), taking too long to compete (n=21, *23.5%*), frustrations around records not being fully completed (n=20, *23.5%*) and usability of the system (n=12, *14.11%*). Minor issues raised were having oversight of the record given that some information is digital and some paper based (n=6, *7.0%*), data security concerns (n=3, *3.5%*) and limiting the scope of practice (n=3, *7.5%*).

Asked whether WNCR had made documentation of patient care "different" 43 (50%) of the survey respondents agreed that it had whereas 37 (*43.0%*) respondents claimed that there was no difference. Clarity, systematisation, and concision were the main reasons given for differences (see table 1 – Q29 &Q30).

When survey respondents were asked how WNCR could be improved it was suggested that digitisation should be broadened to include more documents; links to other files such as care plans should be standard; more and better IT equipment should be made available; and a faster operating system should be found (see table 1 – Q31).

Results of the semi-structured interviews

The 11 participants that volunteered to take part in the interviews were from both acute (n=8) and community hospital (n=3) sites, and these included sisters, staff nurses, healthcare assistant, Electronic Health Record super user, ward administrator and student nurses. The results from the interviews are presented within the themes identified from the analysis of the data. The interview questions are listed in table 2 along with sample quotations.

Insert table 2 about here

Training

When exploring the WNCR training with the interviewees, they were asked to describe their IT skills and knowledge prior to and after using the WNCR record. Table 2 (Q2 & Q14) provides quotes from some of the participants. Some participants were clearly more comfortable with using IT than others prior to WNCR. For example, one interviewee noted: *"Fairly confident because of my previous job"* (Int 5) whereas another noted her lack of confidence. *"Not very good at all. Well I can't say that.. I think I know more than I think I*

know, but I'm not confident. I use IT with trepidation" (Int 2). It is clear despite the starting point there had been a shift after the training for all interviewees, with some taking the opportunity to train others: *"I have shown others how to use it… cascaded my knowledge to others"* (Int 6). *"I have developed new skills, realized I am good at teaching others."* (Int 7).

Benefits of WNCR

Interviewees were asked about the specific benefits of using the WNCR for patients. Several of the interviewees mentioned the legibility of the information was important for the safety and timeliness of care. For example: *"More accuracy really, you are not struggling to understand people's writing. And you can decide where you need to go on the WNCR without trawling through notes and nursing records. It is beneficial for the patient because nothing gets lost, it is there."* (Int 10).

Some interviewees also mentioned having more time for the patient, for example: *"I think we are having more time for the patient. [the information] its all in front of you, and it will prompt you.. Rather than trawling through a mass of paperwork."* (Int 4).

When asked about the benefits to the team, several interviewees mentioned that it has improved team working and for those interviewees from the community hospitals had enhanced the levels of inclusion within the Health Board. For example: *"I think it's [WNCR] made everybody work closer together because nobody is scared of saying out loud if they are not sure of something."* (Int 3). Another interviewee stated: *"its made us feel included [community hospital].. We tend to be on the fringe a lot,."* (Int 6)

With one interviewee extending inclusivity to other members of the team: *"It's very simple, even for our agency workers [to access and use]."* (Int 8).

This issue of having both paper and IT systems running was also mentioned by one of the interviewees: *"I think the biggest challenge is some is still on paper and some is electronic."* (Int 6).

All interviewees spoke about the positives of using WNCR which largely referred to accuracy, timeliness and legibility. For example, one interviewee noted: *"Instant access if I'm on the telephone to somebody I can pull up a record. I haven't got to go out and hunt for notes and bits of paper that are missing and back and forth that sometimes happened before. It's all there in front of me."* (Int 7).

Several of the interviewees noted the opportunity to spend more time with their patients as a result of using the WNCR system, for example: *"I think we're having more time for the patient."* (Int 9).

Several interviewees were also keen to highlight the usability and simplicity of the system. For example: *"Information is there, it's not complicated"* (Int 1). And another interviewee noted: *"It's a system .. once you've been trained in using it. It's quite usable, is user friendly and easy to train others"*. (Int 5).

Challenges

Similar to the survey responses, the challenges raised by the interviewees were mostly around the frustrations of having to use paper and digital systems due to not all elements of the care plan being available on WNCR. For example: *"The only negative is that we want more put*

on there…..The bits that are not on are causing the frustration now." (Int 2). And similarly, from another interviewee: "*I'm just frustrated because not everything is on the system. You know the care plans. They've still got to have a paper copy.*" (Int 8).

Some of the interviewees also raised some challenges around the wider IT system which mostly referred to access to temporary users such as agency staff. Another noted: "*It would actually be nice if the social workers could have access to WNCR. Because I am having to, which I don't mind, having to edit and let them have a read. Because they need to know the patient as much as we do really, for discharge planning. So that's the only other negative.*" (Int 3). It was also noted other professions should have access notably doctors, physiotherapist, occupational therapists and pharmacy staff.

4. Discussion

This study reports on the benefits and challenges of introducing a new digital nursing record across one health board in Wales. Similar to other studies (Kim et al., 2017; Jebwab et al., 2022a). respondents were divided in the positive and negative experiences of the digital system and how it impacted their work. The change from paper based to a digital record was a big step for nursing staff at the Health Board and its introduction, adoption and monitoring has had a significant impact on their working patterns and interaction with patients. This evaluation study was conducted after a period of twelve months since the first hospital site commenced the roll out of the WNCR, when sufficient time has elapsed to ensure that staff are familiar with the process, the learning gained from this evaluation is informing future planning and preparation towards digital transformation and staff adoption of future digital systems. Not all respondents had undertaken the training in the use of WNCR which is likely to account for some of the differences in experience, although lack of training was not reported as a concern from any of the respondents which has often been reported in previous research (Eley et al., 2009; Jebwab et al., 2022b). The introduction of WNCR has highlighted the importance of thoroughly understanding the range of staff digital capabilities and ensuring that adequate support and confidence in the use of technology is invested in a team long before the rollout phase, during the initial implementation and normalising into the business-as-usual phase.

The challenges experienced by users were mainly associated with hardware issues and the need to manage paper-based and IT systems, as WNCR was the first part of the nursing record system to be digitised. There is a clear appetite among many of the respondents for other paper-based systems (e.g. care plans) that interface with WNCR to be digitized. It is anticipated that as the functionality of IT hardware improves many of the challenges highlighted here will be resolved. Improved quality of the nursing care record is a clear benefit and motivation for other systems to follow. This should be accompanied by the involvement of other staff colleagues who engage with patient assessment planning and evaluation of care and will contribute to the wider collection of data by confining it in one space using WNCR. For the benefits of WNCR and other digital systems to be fully realised there is a need for nursing staff to view these tools as facilitating decision making and multi-disciplinary care planning.

The majority of respondents appear to have embraced digitisation with confidence, and where there is a less positive response, it is usually backed by clear indicators of why, unrelated to training history. The development and availability of internal WNCR superusers across the hospitals and wards could have limited the need for all nursing staff to attend the formal training sessions. The development of superusers aligns with the recommendation that the nursing profession evolves its use of digital technology by championing and supporting those nurses that become knowledgeable in digital solutions, data analytics and virtual models of care (Booth et al., 2021).

It would appear that at this stage of roll out, only some care pathways are digitised and some remain paper based. This in itself must increase time spent logging patient assessments planning and evaluation, but we can assume that this is a temporary stage of the process and a fully IT based record system is planned. Links to files held elsewhere were suggested by several respondents as an important next step in the development of the system. Time required to adjust to using digital recording systems such as WNCR have been noted in previous research (Jebwab, 2022a; 2022b).

IT issues will always hold back progress especially hardware issues such as the speed of access, and length of log-on, can make for some frustrations and can impact the level and rate of adoption of digital systems (Kutney-Lee et al., 2019). It has been previously reported that often technology to support nursing is poorly configured or not upgraded to respond to practice and societal trends (Booth et al., 2021).

As with other research (Eley et al., 2009) this study has revealed an overwhelmingly positive adoption of WNCR with recognition of the benefits of clarity, speed, and accuracy being paramount. Many of the challenges can be met and fixed and it can be assumed that technological progress and familiarity in use on the part of users will ensure that benefits accrue while frustrations decrease. The WNCR digital records, as with other EHRs, contain a lot of valuable data which will make them useful for many other purposes not fully explored at this early stage of implementation. For example, better management of patient records, improving the quality of care, and better treatment (Kruse et al., 2016). EHRs include both structured data (e.g. patient demographics, weight, blood pressure) and unstructured data (e.g. clinical notes) with the latter being more complex to analyse (Sun et al., 2018). Moving forward as the use of WNCR grows there will be a need to ensure the necessary skills are available to ensure maximum use of these valuable patient data (Tayefi et al., 2021).

As WNCR is a new intervention, it is useful to review and discuss the findings within the four constructs of NPT (see table 3). The development of the internal WNCR team and the staged approach to the roll out programme have been instrumental in the success of WNCR. Overall, the respondents were positive about the new system. Areas of concern were mainly hardware issues that in the future could be considered under the 'collective action' stage. Despite WNCR working closely with IT colleagues often procurement of equipment can be thwarted by funding and resourcing issues.

Many of the themes gained from this evaluation are fundamental components for planning and preparation to ensure the user experience is integral.   The selection of appropriate digital devices, communication and engagement and a clear evaluation of digital capabilities are all valued by clinical and technical teams as essential prerequisites for effective and safe adoption of digital technology into clinical practice. It is inevitable that nurses joining the

profession today will continue to witness substantive change from the advancement of digital technologies during their careers (Booth et al., 2021).

Insert table 3 about here

4.1 Limitations of the study

Limitations of this study are related to the low response rate of 23.4% to the online survey. The majority of the 86 respondents worked in acute care therefore the views of those working in community settings are limited. Strategies to enhance the survey response rate included visiting wards with handheld digital devices to increase the awareness of the survey and provide some flexibility for when the survey could be completed.

Due to the low response rate, the statistical analysis is limited to descriptive analysis. To further improve the study more advanced statistical analysis could be undertaken e.g. cross tabulations to identify differences between nursing groups, their work experience and specialisms.

The interviewees were self-selected, which may introduce a source of bias, as these respondents may have been highly invested positively or negatively in WNCR. In an attempt to limit this bias, the interview schedule included both the challenges and benefits of the system. Semi-structured interviews were conducted in parallel with the survey and provided additional data to understand the four key themes identified within the study.

5. Conclusions

Undertaking this mixed method evaluative study enabled an examination of nursing staff's experiences of an organization-wide implementation of the first digital nursing record in Wales. The findings showed that the implementation was supported by a dedicated WNCR team, a formal training programme and ongoing support from a team of internal super users. These components appear to be pivotal to the positive outcomes reported in this evaluative study and are synonymous with the four constructs of NPT (Scantlebury et al., 2017).

The reflective learning from implementing WNCR and the evidence that staff react positively when the principles of Normalisation Process Theory are integral to the preparation and planning. The same health board have an ambitious digital transformation program planning the implementation of further clinical digital applications which will impact the whole organization and multidisciplinary groups of staff. Therefore, it is imperative that learning from the implementation of critical systems such as WNCR continue to be shared to ensure that opportunities for the generation of new roles and knowledge are not missed.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence this work reported in this paper.

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