● **Original article**

MOBILE TECHNOLOGY FOR RECORDING THE CLINICAL ASSESSMENT OF NEWBORNS*

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ABSTRACT: The objective of this study was to learn the opinion of nurses on the use of mobile technology for the registration of newborns' clinical assessment. A descriptive and exploratory study, with a qualitative approach, was developed in the Neonatal Intensive Care Unit of a hospital in the city of João Pessoa, state of Paraíba, Brazil. Data were collected from September to October 2014 with semi-structured interviews and subsequent content analysis. It was possible to identify three categories that highlighted the opinion of participants: Category 1 – Recognition of the importance of mobile technology for nursing records; Category 2 - Experiencing difficulties in handling the technology; Category 3 - Pointing out the tablet contributions to nursing work. In conclusion, mobile technology eases the activities of registration by nurses in addition to optimizing the time spent by these professionals in the documentation process.
DESCRIPTORS: Biomedical Technology; Automatic Data Processing; Nursing Records.

TECNOLOGIA MÓVEL PARA REGISTROS DA AVALIAÇÃO CLÍNICA DE RECÉM-NASCIDOS*

RESUMO: Objetivou-se conhecer a opinião de enfermeiros sobre a utilização da tecnologia móvel para o registro da avaliação clínica de recém-nascidos. Estudo de natureza descritiva e exploratória com abordagem qualitativa, desenvolvido na Unidade de Terapia Intensiva Neonatal de um hospital do município de João Pessoa, estado da Paraíba. Os dados foram coletados no período de setembro a outubro de 2014, com entrevista semiestruturada e posterior análise de conteúdo. Foi possível identificar três categorias que destacaram a opinião das participantes: Categoria 1 – Reconhecendo a importância da tecnologia móvel para o registro de enfermagem; Categoria 2 – Sentindo algumas dificuldades de manusear a tecnologia; Categoria 3 – Apontando as contribuições do tablet para o processo de trabalho do enfermeiro. Conclui-se que a tecnologia móvel flexibiliza a realização das atividades de registro pelo enfermeiro, além de otimizar o tempo dispensado por estes profissionais nas atividades de documentação.
DESCRITORES: Tecnologia em saúde; Processamento eletrônico de dados; Registros de enfermagem.

TECNOLOGÍA MÓVIL PARA REGISTROS DE LA EVALUACIÓN CLÍNICA DE RECIÉN NACIDOS

RESUMEN: El objetivo fue conocer la opinión de enfermeros sobre el uso de la tecnología móvil para el registro de la evaluación clínica de los recién nacidos. El estudio, descriptivo y exploratorio con enfoque cualitativo, fue desarrollado en la Unidad de Cuidados Intensivos Neonatales de un hospital en la ciudad de João Pessoa, Estado de Paraiba, Brasil. Los datos fueron obtenidos desde septiembre hasta octubre de 2014, con entrevistas semi estructuradas y posterior análisisdel contenido.
Fue posible identificar tres categorías de relieve a partir de la opinión de los participantes: Categoría 1 – El reconocimiento sobre la importancia de la tecnología móvil para los registros de enfermería; Categoría 2 – La percepción de algunas dificultades para el manejo de la tecnología; Categoría 3 –La señalización con respecto a las contribuciones de la tableta (tablet)al trabajo de enfermería. Se llega a la conclusión de que la tecnología móvil facilita la realización delregistro hecho por el enfermero, además deoptimizar el tiempo de los profesionales en el proceso de documentación de la información.
DESCRIPTORES: Tecnología en salud; Procesamiento electrónico de datos; Registros de enfermería.

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● INTRODUCTION

The accelerated modernization of science and technology has generated new ways to build knowledge and to establish relations with the world of work. It is believed that in the coming years advances in computer technology will revolutionize the processes at all levels of nursing services in health institutions, and provide operational and strategic benefits to the organization, besides the development of professional practice[1].

In this context, mobile and wireless information technologies are among the main topics currently discussed in both organizational and academic environments. The increasing application of these technologies has brought a number of issues related to their creation, choice, adaptation and advantages in using them, especially in the health field[2].

In Brazil and in the world, there are different services performed with the support of mobile technologies, including health care services. In this area, for example, these devices are used from the front desk in the emergency room, shortening the waiting list and processing clinical data, up to complete mobile services with tablet-likelaptops, associated with personal digital assistants (PDAs) and mobile phones[3].

Among the mobile devices currently used, tablets stand out for being advantageous-considered equipment due to their small size, ease of use, large storage capacity, connectivity and high processing power. They are shown to be powerful tools in activities that require mobility, such as the registration of data collection for the systematization of nursing care[4-5].

A study performed with nurses from the semi-intensive care unit of a teaching hospital, in the state of São Paulo-Brazil, showed that one of the difficulties of nurses in the use of computer tools, except mobile devices, was transferring the information collected from patients to the computer. Such difficulty was related to the distance between the hardware and the patients' bedside: the nurses recorded the patients' information on paper and subsequently transcribed it to the machine. This reflects a major problem when using fixed computers to record nursing practice, since patient care involves the mobility of nurses, enabling them to take care of several hospitalized patients[6].

Having a mobile device at hand, one can access, collect and document information about patients in their own bed, perform nursing activities and monitor the need for mobility of professionals for the patients' care. Besides, it is possible to reduce the time spent in documenting the nursing activities, and also decrease the likelihood of information loss, as data can be stored directly on the device and no more on paper, which demonstrates how converging flexibility and dynamism contribute for nursing care productivity[7].

Given the aforementioned, mobile computing emerges as an innovative technology for nursing care, through its application via mobile devices to other computers and through an integrated and planned wireless interface. The parallel use of mobile computing and the access to this kind of network will greatly assist the nursing daily routine[8].

Despite the numerous advantages obtained by their use, the application of technological tools in health and nursing is still difficult due to the lack of effective action - many managers do not understand the dynamic relationship of elements related to structure, process and result collection, often compromised by working conditions, where the maintenance of the required technology is still a serious problem[9].

Considering this, the aim of this study was to learn the opinion of nurses about using a tablet for recording the clinical assessment of newborns in a neonatal intensive care unit.

● METHOD

This is a descriptive and exploratory study, with a qualitative approach, performed in the neonatal intensive care unit (NICU) of a teaching hospital, located in the city of João Pessoa, state of Paraíba, Brazil. The unit, made up of a nursing team (six nurses and nine nursing technicians), is responsible for

the care of newborns (0-28 days old) that show clinical or surgical disorders.

To check the opinion of nurses on the use of mobile devices in the recording activities, we used a software prototype, with a database for newborns' clinical assessment, developed from the information used in forms and in nursing books of the care unit. NICU nurses handled a tablet 7" dual core Android 4.0 system connected with the unit Wi-Fi network, which remained in the unit throughout the study period during all work shifts.

During the first week of the study, a training session was performed. Initially, the professionals were presented to the system, the operation explained, and then they were suggested to get in touch for the first time with this mobile technology. Monitoring the use of the technology by nurses in at least two shifts of 24 hours in the NICU, the researchers and trained collaborators took turns to keep up with the use of the system, asked questions when necessary, and observed.

After one month handling the mobile device, five nurses were interviewed. Data were collected from September to October 2014, through a semi-structured script, which contained questions to identify: the views of the participants on the importance of working with mobile technology in the clinical assessment of newborns; difficulties in handling the tablet; and the main device contributions for nursing practice. Data were analyzed using Bardin's content thematic analysis method[10].

The inclusion criteria consisted of having an employment bond with the hospital, having been working in the NICU for at least one year, having participated in the training and having used the software at least once during the shift. One of the six nurses of the unit staff did not meet the criteria, because she was on maternity leave.

Regarding ethical precepts, the guidelines inherent to research protocol contained in Resolution No. 466/12 CNS were followed[11]. Before the study onset, the project was submitted to a research ethics committee, being approved and registered in the National Information System on Ethics in Research Involving Human Subjects, under protocol CAAE-25890914.5.0000.5183.

It is important to note that the participants did not receive any benefits or ran risk of discrimination for participating in this study. Furthermore, they were informed that they could refuse to participate or to answer any question. To ensure the confidentiality of information and to protect the identity of employees, they were identified with the letter "E" added to numbers from 1 to 5.

● **RESULTS**

With regard to the characterization of the participants, it was found that their length of profession ranged from 10 to 30 years and all of them had some kind of expertise – on education, public health, workers' health and pediatric nursing; and only one nurse had a master's degree in nursing. The time of professional practice in the unit was between 10 and 12 years.

From the understanding of the answers to the questions about the tablet use, it was possible to identify three thematic categories: Category 1 - Recognition of the importance of mobile technology for nursing records; Category 2 - Experiencing difficulties for handling the technology; Category 3 - Pointing out the tablet contributions to nursing work.

Category 1 –Recognition of the importance of mobile technology for nursing records

In this category, the researchers sought to understand the opinion of nurses about the importance of the mobile device to the NICU, where the present study was developed. Some nurses said that one of the main advantages of the tablet system was the independence from using the only one fixed device in the unit, as the following statements show:

In the ICU we have only a fixed device, that doctors are already using for a long time, and we get that dependency, it's very bad, the mobile device gives you more freedom. (E1)

The computer is for doctors to use practically all morning. Having one computer hampers a lot; if we have a tablet, a mobile system, I would just get it and sit down elsewhere. (E3)

It is clear that the care unit does not have technological resources enough for performing registration activities, forcing the nurses to postpone the documentation. But it was highlighted that the use of mobile device overcame this problem.

Category 2 –Experiencing difficulties for handling the technology

The second category aimed to identify the difficulties found by nurses when using the mobile device for recording nursing care-related information. Here are some testimonials that show different opinions in this regard:

I could move very slowly, but I could. It was really difficult to access. I think we have difficulties; it's in the beginning of adaptation. (E1)

Yes, I had difficulties. In fact, I never handled a tablet, but once it was explained I found it easy. (E2)

I just had difficulties to turn it on when it had discharged. (E3)

Other nurses did not have difficulties to handle the mobile technology:

No, I found no difficulty at all. It was fine. If I had the chance of having the machine with us, a tablet ... I think the records would be OK.(E3)

Actually, handling the tablet was not a problem.(E4)

The reports show that some nurses had difficulty in using the tablet (E1, E2), which were related to the lack of familiarity/experience with the technology and the fact that they had never used this kind of mobile technology in their work (E2). This explains the difficulty in using the device, mainly because they were touchscreen.

Category 3 –Pointing out the tablet contributions to nursing work

In the third category, it was possible to see that nurses recognize the contributions of the mobile device to register clinical and nursing care data. The possible advantages the tablet can offer, as it is a wireless technology, were also noted. Following are the main answers:

Well, I think it's very good, it's, as I said before, in the management of my time inside the unit... The tablet is faster, I have the chance to rescue what had been done and edit, increase, decrease it there. (E2)

I am not limited with the mobile, it allows me mobility.(E3)

In the healthcare area I think it is fundamental, I get time, I manage better my actions so that it is easier to keep some things, suspend some diagnoses, take hold of others makes things easy to me... The technology tool helps me a lot. (E4)

The highlighted speeches show that there is a consensus among nurses about the importance of mobile technology for information recording. The advantages mentioned refer mainly to requirements such as mobility and agility to make the documentation of information, optimizing the professionals' time. Besides, the technology enabled flexibility in the management of actions by using the tablet.

● **DISCUSSION**

The participants of the study have a significant length of profession and experience in the NICU, which suggests they have great experience and knowledge in this area, but it may also be an indicative of resistance to the implementation of a new methodology of documenting nursing records. Only

one participant had a graduate degree in their area of activity and the others did not have specific knowledge, through courses or training, in the informatics field.

The nurses emphasized the lack of sufficient technological resources for the development of documentation operations by the professional of the health unit; however, this is not just a local reality. In a study that evaluated a system developed to document the nursing practice in a hospital in São Paulo, the reports were similar to those presented by the participants of the present study. The interviewees stated that the computer is used by other professionals, so nurses can only use it after the medical appointment, and that the number of computers does not meet the demand for the use of the system, since other professionals use the equipment, which slows down the service and the use of the program[12]. In this sense, mobile applications are a great alternative to solve the problem.

Despite reporting difficulties in using the technology, the nurses stressed that they were overcome and that they corresponded to problems that are faced initially, when they were adjusting to that new reality in the work process. Proof of this is that one of the participants in her early handling, presented great difficulty in using the tablet, bearing on mind the screen sensitivity - but after some tries, handling the device evolved without more difficulties. Another study developed in a basic health unit in the city of Ribeirão Preto, state of São Paulo, where a system for mobile devices was developed aiming at the permanent education of nursing professionals, showed that 89% of participants also considered themselves as beginners regarding the ability level with computer technologies and had difficulty in using a tablet[13].

The professionals who revealed no difficulties with the technology stated that they have a technology similar to the tablet, being it a smartphone or an identical technology to that used in the study - this familiarity justify their ease of use. Authors affirm that mobile technology has become ubiquitous. Smartphones and tablets are accessible and therefore easier to use and popular among nursing professionals. According to a survey with North American nurses, from the 1,100 interviewees, over 75% said they had a smartphone or a tablet. This reality is a worldwide trend[14].

Among the advantages mentioned by nurses, they highlighted the mobility, that is, the "freedom" that mobile technology represents for professionals' locomotion. Moreover, in a previously mentioned study, 90.9% of surveyed nurses had a positive evaluation on the use of applications for mobile devices(tablets). The reasons for such explanation are convenience, flexibility of time, easiness of accessing it and of using it in any workplace, besides the fact that it is a tool that can be used in various ways and for various purposes[13].

Other authors reported that mobile devices have great advantages, among them portability (it can be transported with relative easiness), being usable and functional, of easy connectivity and communication with users and other devices. Another important point is the facility of movement that the user may have, since the mobile device fits on the palm, improves visual quality and is more comfortable, lightweight, low cost and discrete[15].

Health professionals have an increasing amount of clinical information to manage. Doing it effectively and efficiently is critical to the current context of health services. Mobile information technologies, such as PDAs and handheld computers (tablets), give them a solution to manage this information directly at the point of care. This is a faster and proactive way to collect more reliable data. These innovations can overcome challenges and make existing technology systems more efficient, improve usability, and save data in few seconds. Thus, one can have effective care when extended to the various health care facets[16-17].

In nursing, advances in informatics aim primarily at increasing the available time of professionals for health care, providing more humanized care, since with its use bureaucratic activities become more agile, and this time is reversed in direct and effective patient care. Nurses spend about a third of their time locating, seeking/searching, aggregating and processing data or patients' information[18]. Thus, mobile devices configure a strategy that can significantly decrease the time spent on documentation activities.

Computerized nursing documentation reduces the time spent on registering information, and its use through mobile devices makes it easy to input data with just one touch on the device, reducing

time spent on typing when using the keyboard[19].

It is also important to highlight the importance of integrating technology to nursing education, so that future professionals in this area can adopt advanced technological tools and take the benefits that it provides to care. A study conducted by nursing students from the Federal University of Ceará showed that in addition to enabling the proximity of scholars with different technologies, educational technological support devices were considered valuable tools, since it was possible to identify some specificities and good acceptance among future nurses, being therefore a complementary tool for classroom teaching[20].

● CONCLUSION

The informatics world undergoes constant transformation. Technological resources are present in people's lives, being used during leisure time or professional activities. In this context, mobile technology and its increasing integration to daily work require familiarity by health professionals and nursing, considering the benefits that can be taken from their use.

It was found that mobile technology eases nurses' registration activities, since data collection can be performed at bedside, with the patient, and the nursing process can be developed anywhere in the unit as the technology does not depend on wires to work.

Another advantage observed was the nurses' time optimization, since the computerization of bureaucratic activities and the mobility acquired by tablet result in more effectiveness and efficiency of nursing records, enabling time-savings that can be reversed to patient care. Moreover, it is possible to standardize essential developments to the continuity of patients' support and their evaluation by other professionals.

Limitations of the study included the reduced time the nurses had for handling the mobile technology system, the small number of participants and the use of a database that needs to be improved to suit the NICU care practice. Moreover, the study shows the reality of only one sector of the teaching hospital.

Information technologies, associated with mobile devices, can greatly contribute to the nursing work, which explains the need to invest more in research aimed to computerizing nursing records and insert new technologies into the daily life of these professionals, not only in the NICU, but in all units and nurses' workplaces.

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