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ORIGINAL

The translation of technological advancements to enhance patient safety through nursing innovations implemented at the Point of care

Traslación de los avances tecnológicos para mejorar la seguridad del paciente mediante innovaciones de enfermería aplicadas en el punto de atención

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ABSTRACT

The use of internet-based surveillance technology platforms is thought to benefit patients in nursing homes by enhancing their protection and the standard of care while also streamlining the job of the caregivers. A good strategy for creating and applying digital innovations and adapting the product or service is co-creation. The purpose of this research was to examine shared creation as an adoption method and practice, as well as to determine the enablers and challenges to the use of technological surveillance technologies in the residential setting for people with dementia and roaming behavior. An inductive content review of the qualitative and quantitative data was conducted after the data had been logically analyzed using an approach for the drivers of development. A greater number of resources were needed for the execution than those involved had expected for the gradual modifications since it constituted a major change. As a whole, the joint development technique stood out as the key enabler, leading to a more secure night surveillance system. The procedure of successfully implementing novel electronic surveillance technologies within care facilities is difficult and time-consuming, and it becomes even more challenging when the innovation enables medical professionals to fundamentally alter surgical procedures at the Point of care, opening up new opportunities for individuals and caregivers to co-create value. Long-term digitization of municipality medical services necessitates the direct integration of increasingly sophisticated IT skills into the administration and delivery of medical services as well as collaboratively creating values with those using the services and their families.

Keywords: Point of Care; Healthcare; Patients; Technology; Monitoring.

RESUMEN

Se cree que el uso de plataformas tecnológicas de vigilancia basadas en Internet beneficia a los pacientes de residencias de ancianos al mejorar su protección y el nivel de los cuidados, al tiempo que agiliza el trabajo de los cuidadores. Una buena estrategia para crear y aplicar innovaciones digitales y adaptar el producto o servicio es la cocreación. El objetivo de esta investigación era examinar la creación compartida como método y práctica de adopción, así como determinar los factores que facilitan y dificultan el uso de tecnologías de vigilancia tecnológica en el entorno residencial para personas con demencia y comportamiento itinerante. Se llevó a cabo una revisión inductiva del contenido de los datos cualitativos y cuantitativos después de analizarlos lógicamente utilizando un enfoque para los impulsores del desarrollo. Para la ejecución se necesitaron más recursos de los que los implicados habían previsto para las modificaciones graduales, ya que constituía un cambio importante. En conjunto, la técnica de desarrollo conjunto destacó como el factor clave que permitió obtener un sistema de vigilancia nocturna más seguro. El procedimiento de implantar

con éxito tecnologías novedosas de vigilancia electrónica en los centros asistenciales es difícil y requiere mucho tiempo, y se convierte en un reto aún mayor cuando la innovación permite a los profesionales médicos alterar fundamentalmente los procedimientos quirúrgicos en el punto de atención, lo que abre nuevas oportunidades para que las personas y los cuidadores creen valor conjuntamente. La digitalización a largo plazo de los servicios médicos municipales requiere la integración directa de competencias informáticas cada vez más sofisticadas en la administración y prestación de servicios médicos, así como la creación colaborativa de valores con quienes utilizan los servicios y sus familias.

Palabras clave: Punto de Atención; Asistencia Sanitaria; Pacientes; Tecnología; Monitorización.

INTRODUCTION

However, medical services are evolving due to a combination of economic forces and the widespread understanding that patient-centered care must replace dispersed treatment.[1] Many nations are forced to confront the fact that they must either slow the rise of their medical expenses or, in certain circumstances, decrease their medical expenses. Reducing comparatively expensive treatment in hospitals of all types and encouraging more individuals to be examined and handled in traditional healthcare or the community are two strategies for achieving this aim.[2] Though still in its early stages, this more traditional oriented care model may not be best served by the central laboratories approach. The idea that medical services should be organized greater around patients than the physician is at the heart of the desire to make it more patient-centered, which is also a worldwide trend.[3] A lot of patients find that centralized testing is not a comfortable procedure since it often takes multiple trips to the doctor to finish the evaluation because the procedure for testing is not always tied to the consultation procedure. This issue particularly affects those who have a chronic illness like diabetes and who need repeated blood testing and continuous surveillance. Safety for patients has emerged as the most important issue in the fast-changing healthcare environment of nowadays.[4] Medical providers want to provide patients with the best treatment possible, and technology improvements are motivated by this purpose as well.[5] Nursing staff, which are essential in providing treatment at the Point of care, belong to those in the vanguard of safeguarding patients.[6] Nurses are dedicated professionals who are always looking for new and creative methods to enhance patient safety. This focuses on how technology developments are being translated into healthcare technologies that will improve safety for patients at the Point of care. By using technological advances, nurses are developing fresh and efficient methods for avoiding mistakes, reducing complications, and giving patients individualized care. The incorporation of these technological advances, from electronic health records (EHRs) and smart devices to e-health and artificial intelligence (AI), has changed nursing practice and had a significant influence on the outcomes of patients.[7]

Finally, there is a tremendous opportunity to change patient safety via the translation of technical breakthroughs into healthcare improvements. Nurses may use Technology to improve patient outcomes, streamline care delivery, and reduce mistakes by being aware of and adopting these developments. In order to offer better, more secure treatment at the Point of care, it is crucial to embrace innovation.[8] The size of the point-of-care device marketplace worldwide and its yearly growth rate is depicted in figure 1. This Paper seeks to highlight the amazing breakthroughs occurring at the convergence of technological advances and nursing.

Dugstad et al.[9] examined co-creation as a method of implementation and activity and to determine the enablers and challenges to the use of online surveillance technologies in residential settings for people suffering from dementia and wandering behavior. Murray et al.[10] highlighted the issues facing Paper-based analytical devices in order to promote careful and thorough design throughout the identification and description phases, ideally leading to an increase in the overall amount of devices that reach the Point of care from the benches. Angehrn et al.[11] got an understanding of present Artificial intelligence applications in the medical sector as well as Chinese regulatory necessities. Taddeo et al.[12] presented immunosuppressive medications' benefits, drawbacks, and suggested applications. The promise of Point of care in the days of customized treatment is then discussed and offers a revised review of missing requirements and technology options for the creation of Point of care equipment for surveillance. Moehling et al.[13] explores current LAMP innovations that have been field-validated with samples from clinical studies as well as the front-end L design practices for point-of-care applications, comprising managing samples and multiple signals interpretation approaches. Heidt et al.[14] investigated institutions through patient care in the clinical setting, and a comprehensive overview of possible Point of care hurdles should be created. O'Connor et al.[15] evaluated certain issues that need to be resolved in order to enhance the creation, application, and efficiency of primary care diabetic point-of-care clinical decision systems in the years ahead.

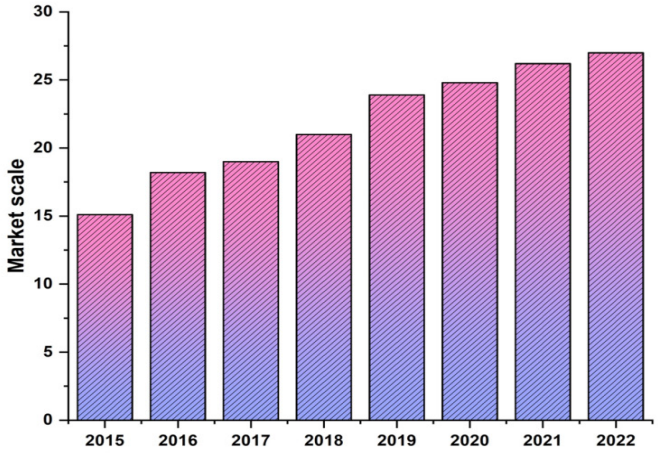

Figure 1. Size of the point-of-care device marketplace worldwide and yearly growth rate

METHODS

The study used a transformative investigative approach with a long-range case study methodology. Engagement of the investigator in undertaking project planning and designing tasks, assistance in sharing information and reflection procedures during training sessions, and engagement in the execution of action research. Conferences, webinars, and the collective advisory presentation of early findings from research influenced the recurrent innovation procedures.[16]

The smart night-time monitoring approach

The Virtual Night-time Monitoring Technology initiative, which was a joint collaborative research and innovation initiative started by a network influenced by "the triple helix" and created online tools for municipality medical facilities, served as the foundation for the current study.[17] The suppliers organized a scheme for execution using government sector-sponsored promotional schemes that reduced the financial risk for the municipality in order to penetrate the growing marketplace of municipality medical centers. The strategy for execution included a number of collaboration activities that combined interactive design techniques with services and human-centered design concepts. As shown below, workshops were a key setting for shared creation throughout execution. The execution of this project was supervised by an orchestrator in collaboration with a task committee made up of the regional project directors and suppliers. Local legislators within each municipality formally decided to participate in the initiative based on planning by local senior management. The dementia-related wards in nursing facilities were the organizational blocks of implementation, one per region, inside the regional medical facilities. It was expected that night shift caregiver, such as certified nurses and medical professionals, would be the primary users of the surveillance device. The technological surveillance framework was installed in 65 locations. The system was made up of a web-based interface that was developed on a cloud-based solution with cutting-edge "Internet-of-Things" software.[18] This software was able to manage and combine information from different device standards and enabled the incorporation of devices like bed-exit or doorway detectors made by various producers, for example. As a result, the system included a special feature that allowed caregivers to use multiple tools at once on their preferred desktops, tablets, or mobile. When predetermined events happened, such as a resident getting out of bed, an instant messaging (SMS)-mediated notification informed caregivers.[19] The interface enabled changes to be made at any moment to meet the requirements, behavior, and dementia development of specific residents, especially the timeline and sequence of information from various sensors. These features weren't provided by any other surveillance technology devices on the marketplace at that Point in time. After setting up, the development of user interfaces for the programs and management systems that each region has selected, as well as the incorporation of the appropriate sensor technologies, would proceed. The surveillance equipment complied with data protection and privacy regulations as well as the regulatory structure for utilizing detectors to track people with dementia.[20] The intervention must seem to be the least intrusive choice, avoid or reduce the patient's likelihood of harm, and be logical in relation to the underlying risk. It should be expected that the person being treated would have consented to the action. If the patient objects to the action, the clause is not applicable.

Contributors and information

The information came from 20 interviews, strategy papers, feedback from participants, training procedure information from eight local conferences, and countless sessions of training. The gatherings included planning committee meetings, task team discussions, neighborhood employee gatherings, homeowner and associated data discussions, supplier and individual municipality discussions, and Technology and medical facility conferences. Data was not gathered from clients or family members, nor was it gathered in care facilities.

Meetings

Respondents (n = 170) from the local medical center participated in the sessions. Eighty employees, including ten information technology professionals, 20 contractors, 14 university researchers, five non-governmental organizations, ten additional public sector organizations, 40 financing organizations, and five outside specialists. Seminars were guided by the orchestrator and investigators, with scientists and other subject matter specialists introducing a topic that had been chosen in advance by the research team. Then, everybody involved took part in co-creational activities connected to the subject, which helped the execution process advance. The outcomes of these activities were recorded by the investigators, who promptly made them accessible to the individuals. Additionally, in training sessions, suppliers and regional project leaders provided updates, and investigators provided early study findings. There were chances for brainstorming and setting priorities for ideas, conversations, as well as knowledge sharing. Typically, the sessions ran for three days, with an evening social gathering. The venues of the workshops were near the participant communities.

Interview

The sample included two discussion groups—one with the suppliers (n = 5) and another with healthcare professionals (n = 10)—as well as 20 individual interviews (n = 18). Twenty interviews were conducted. Participants were interrogated multiple times in one year. Private conversations were conducted at the respondents' preferred location, often at their place of employment. The focus group interviews were done in environments that promoted co-creation. A "grand tour" inquiry was asked at the beginning of the discussions to gather the interviewees' opinions about the way the project was carried out and their own involvement in it.[21] The informants were then questioned about two primary issues: if demand for fresh capability had evolved and the manner in which it had been addressed; and whether there had been any modifications to HCP employment circumstances or organizational structure. The interviews were taped, informal, and completely documented.

Analysis of data

Information gathered from personal interviews was analyzed using content analysis techniques. “Measurement Instrument for Determinants of Innovation" structure components were mapped to the recorded interview in the initial stage, which included logical qualitative evaluations. Medical personnel, who are seen as the implementing users throughout the adoption of technological advances in bigger medical facilities, are assessed by the MIDI approach, which incorporates the technological procedure and plan. The model additionally includes four broad categories of important factors. The innovation section contains factors including accuracy, difficulty, and portability. Advantages, job responsibilities, expertise, and patient feelings regarding fulfillment are all included in the list of acquiring users. Parameters including administrative involvement, employee capability, assets, knowledge, and outcome review are included in the grouping for organizational characteristics. In order to understand the core meaning of the content, the following phase was an inductive study of the same material using the MIDI framework in parenthesis. Informants' descriptions of how the newly developed activities have affected them. Multiple iterations of the inductive investigation were carried out, the latter of whom were unaware of the outcomes of phase 1. The goal was to categorize obstacles and facilitators according to topics. Because information was complicated, physical layout and organization was required. The information extracts have been generated and divided into individual parts as a result. The data was rearranged and classified, and this research produced the key themes. The third and last phase included looking at experimental information, process information, and strategy papers to continue the investigation of procedures that were shown to be crucial for execution. As a result, information from the analysis of texts, findings, and questionnaires was combined. In order to create divisions in the form of enablers and obstacles aggregated the information. The categories and subcategories were then further distilled into a temporal perspective.

By working together as an investigation group throughout all stages of the study, risks to authenticity were mitigated by ensuring open communication and a thorough understanding of the context. With the use of three different researchers, the study's dependability was increased. The association's members added an additional layer of conversation and reflexivity regarding the facts and their interpretation of the multidisciplinary thoughts and discussions. To address concerns about dependability, thorough explanations of the study process were presented.

RESULT AND DISCUSSION

We were able to pinpoint each of the MIDI framework's variables via the argumentative evaluation of the interview data. Further insights were supplied by the analysis, although Subcategories for each of the five main categories of innovation obstacles and facilitators were discovered, i.e., elements, procedures, and activities that either proved to promote adoption when accomplished or hinder adoption when not. An outline of the Technological Night-time Surveillance training attendees' subjects is shown in table 1 and depicted in figures 2 and 3. In order to promote growth and ultimately effective execution, explanations of the enablers and obstacles that were encountered and overcome throughout the collaboration processes are provided in the categories and subcategories that are presented.

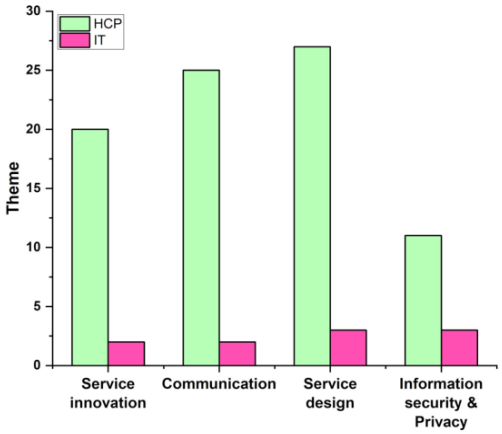

Figure 2. Technological Night-time Surveillance training attendees' subjects

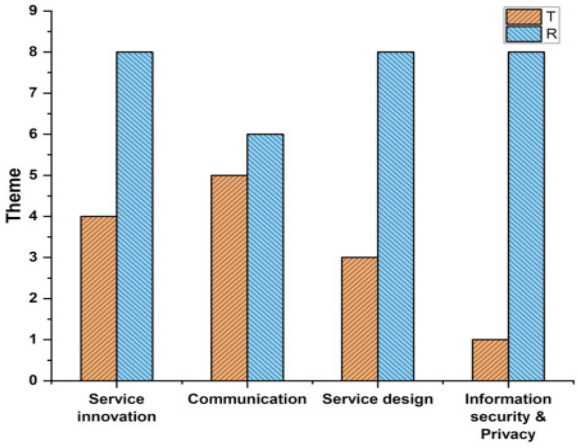

Figure 3. Technological Night-time Surveillance training attendees' subjects

Table 1. Outline of the Technological Night-time Surveillance training attendee's subjects

Theme	Participants				
	HCP	IT	T	R	Other
Service innovation	20	2	4	8	6
Communication	25	2	5	6	2
Service design	27	3	3	8	6
Information security and privacy	11	3	1	8	3
Routines, documentation and technology	20	3	5	4	
Service innovations and ethics	16	3	2	4	2
Implementation issues in digital surveillance technology	18	1	10	6	14
Results and dissemination	44	4	6	10	6

The implementation brought together players with great internal knowledge consistency but substantial knowledge barriers .groupings by language acquisition, analysis, and motive. The introduction of Technology was new to care providers, making education harder and competence slower. An assortment of tactics and practices supported competency development that transformed most care professionals from having little technical understanding to naturally utilizing it, allowing them to concentrate on their residents. Healthcare professionals need to have faith in the surveillance equipment, infrastructure, co-workers, and themselves to make secure utilization of the technological advances, which promotes the thought that a secure working atmosphere helps caregivers deliver better care and especially care for dementia patients.[22] Both danger and trust are considered when making choices. Healthcare professionals thought the device was dangerous for people living there, which slowed deployment. Risky scenarios during IAT implementation show how to care. Facility executives and employees are expert risk analysts who decrease risk while promoting dementia individuals to remain independent and reducing care load. However, medical professionals and their management were unable to analyze electronic surveillance technologies' dangers, which prevented balanced execution choices to ensure patient safety. In the early deployment phase, their lack of technical skills and poor problem-solving techniques made it difficult to identify technological issues. The healthcare facilities adopted control methods from the suppliers. Competence building and regular reflections promoted security consciousness and a secure environment.[23] According to a shared creation of value viewpoint, relationships between service providers, such as medical and information technology should be best supported by a partnership that encourages the incorporation of resources in ways that are mutually advantageous. Because the medical provider's services heavily depended on dispatches from the I.T. assistance, the assistance and offerings from the I.T. service were incorporated into the ecosystem of the medical service. The I.T. services' developed procedures and processes were mostly unaware of the key characteristics and requirements of healthcare facilities.[24] The I.T. services were hesitant to offer assistance to internal skill transfer and sharing creation efforts throughout installation, which reduced the ability of the municipal organizations that depended on their competence to absorb new information. This ongoing network unsteadiness, which is a significant obstacle in digital health service installations, hampered the process at every stage. The inability to alter I.T. methods of operation and the unwillingness to address system delays and outages, which are amongst the main reasons for nurses' unfavorable views about health I.T., hindered care delivery and had an unfavorable reinforcing impact.[25,26]

Nursing staff and suppliers teamed together as a remedy since the majority of I.T. support employees did not actively participate in the deployment. As a result, the suppliers fulfilled the supporting function and helped create a trustworthy execution environment that was friendly for modification.

This study examines shared creation techniques as a newly developed technique while using electronic surveillance technologies over a four-year period in long-term residential facilities for dementia patients who are night owls with the goal of identifying hurdles and enablers. According to the report, introducing surveillance equipment into nursing facilities requires unprecedented creativity and a digital revolution. The major discovery, which was earlier unidentified, is that by acknowledging the inbuilt sluggishness of significant shifts and by using co-creation techniques among tasks and occupations, the difficult task of the digital evolution of medical care may be effectively supported. Transformation in services and quality management are some of the elements that showed to help or hinder execution depending on their completion. The most notable enabler during execution was the co-creational approach, while the most enduring obstacle was caused by a confluence of unstable technology systems and the I.T. assistance service's resistance to taking part in the shared creation of norms.

CONCLUSION

When a new electronic surveillance technology enables healthcare professionals to make significant behavioral changes, the process of successfully implementing it into medical services is hard and takes time. Changed clinical procedures at the Point of care and provide fresh opportunities for residents and their family members to co-create value. Most of the gains realized in this initial stage of the digital shift were dependent on the timing and joint-creation initiatives inside the group. The current hospital care environment, which depends on an external services division to supply I.T. expertise, layout, and assistance, is unsustainable. The municipal medical system is being digitally transformed, which calls for increasingly sophisticated I.T. skills to be directly incorporated into the delivery of treatment and value creation with service users, residents, patients, and their relatives.

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Writing - proofreading and editing: Ram Kumar Garg, Hina Thakkar, Kavina Ganapathy.