

\* Original Article

## **Information and communication in practice networks as permanent education: the case of the CHG [GHC] School Station of the Observatory of Information Technology and Communication in Health Services and Systems<sup>1</sup>**

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### **Abstract**

The complexity of demands in the healthcare field requires greater plasticity in management actions involving multifaceted and trans-disciplinary approaches. The creation of spaces promoting the development and analysis of healthcare information constitutes an innovation strategy, especially when promoting the systematization of knowledge in everyday life. National policy concerning health information enabled the emergence of the OTICS - Observatory of Information Technology and Communication in Health Services and Systems (Observatório de Tecnologias de Informação e Comunicação em Sistemas e Serviços de Saúde - OTICS) project. The focus of OTICS lies in supporting new forms of healthcare management

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by using information to strengthen healthcare practice. The Conceição Hospital Group School Station (CHG-SS) [Estação Escola Grupo Hospitalar Conceição (EE-GHC)] was created within the scope of the OTICS project. This paper aimed to analytically describe an experiment performed in partnership with OTICS and the CHG [GHC] School. First, a conceptual approach was used to address the challenges of performing in highly complex, specialized scenarios, and the potential innovations of using information and associated technologies in everyday health work and management. Two different experiences were analyzed regarding the potential use of information in health surveillance technology development, focusing on the concept of holistic health: the creation of a program for health education and promotion related to toxicological events in children (PEPSET) and another based on the construction of a monitoring and tracking system for orthopedic prosthetics. Regarding PEPSET, multifocal action was taken by training community health agents and other healthcare professionals. As a result, ANVISA (National Agency of Health Surveillance) [Agência Nacional de Vigilância Sanitária] approved the methodology, making it viable for disseminating the experiment in other locations and supporting the evaluation mechanism of actions that are still under development. Since its implementation, CHG-SS [EE-GHC] has managed not only to increase the use of information for the qualification of hospital services but also to create a space for the development and analysis of projects. In doing so, it has contributed robust data destined to improve the performance and management of health surveillance within an inter-institutional network and directed toward quality in individual and collective care. In this case, integration is strengthened by inter-institutional articulation with the formation of closer structural and practical bonds between health surveillance and assistance, with the production of useful knowledge for everyday work and prospection in health surveillance. Above all, this takes place by strengthening the role that permanent education plays in healthcare.

**Keywords:** Hybrid Environments, Health Information, Knowledge Networks, Health Observatory.

## **Introduction**

In the last few years, health science has benefited from new ways of producing knowledge, which have described new perspectives in the labor world, i.e., the health production relationship. For instance, changes in the perception of health and their effects on epidemiological knowledge can be enhanced by analyzing the relationship and distribution of diseases in a socio-economic context and, particularly, the work processes and means of production that gave rise to Latin-American social epidemiology in the late 1970s (DRUMOND JÚNIOR, 2003). In the late 1980s, and especially in the mid-1990s, health work analyses began to focus on identifying certain connectivity patterns between methods of care organization and the predominance of certain technologies to operate on the same dimension as everyday care practice. Merhy (2002) became a pioneer in the field by deepening his research in a field he dubbed *labor micropolicy*, i.e., the dimension of relationships between different agents, between agents and resources, and even between agents and certain care and management organization logic. The analysis of labor micropolicy has allowed for new approaches to understand the relationships that are established daily. It has also allowed for the expansion of the analytical capacity to understand the effects of introducing certain inputs (such as information) and certain policies to the context of everyday practice.

Within the scope of policies, among the advances obtained by the Unified Health System - UHS (Sistema Único de Saúde - SUS) in Brazil in the past few years, one can find the approval of policy directed toward the area of information and communication (BRAZIL, 2003), which addressed the main critical aspects indicated by different studies, research, and analyses that had focused on management and participation organisms in the healthcare system. This policy, based on the evidence gathered from international and successful national experiments, associates the use of information itself to support the decision-making process at different levels within the healthcare system via the innovative and creative use of information and communication resources. The study and development of technologies that strengthen the scenario described by this policy are shown as actions capable of amplifying their effects. The challenge lies in understanding a double flow of construction, where one side is related to policy content and implementation and the other is related to the context of everyday service practice.

The project proposed by the Observatory of Information Technology and Communication in Health Services and Systems [Observatório de Tecnologias de Informação e Comunicação em Sistemas e Serviços de Saúde] (OTICS) has been implemented gradually. In addition, it has been considered that the use of information and information technologies in management and teaching support constitutes policies and strategies of the Unified Healthcare System (UHS) [Sistema Único de Saúde (SUS)], as reported in specialized literature and institutional documents (FERLA, 2009). More than a technological tool, the observatory intended to operate as a device for the implementation of UHS [SUS] Information and Informatics in Healthcare Policy (Brazil- 2004), in conjunction with the Education and Development for the Unified Healthcare System – Pathways for Permanent Education in Healthcare [Política de Educação e Desenvolvimento para o Sistema Único de Saúde – Caminhos para a Educação Permanentes em Saúde] (Brazil- 2003). This challenge was accepted by the observatory, arising from the need to establish a network for production, which should be multidisciplinary in character and involve several institutions with different backgrounds and geographical locations. The project was initially presented to Edict CNPq/DECIT nº 23/2006 and approved in the modality of “Research Aid” in the field of healthcare information and communication. Its primary subjects included the following: the analysis of the integrated use of systems and methodologies in healthcare information; scientific and technological information on health; and communication in health. Secondary subjects included the development of health information systems and communication evaluation methodologies or processes; the diagnosis of demands and necessities in information; the development of communication methods for the transfer of health information and technical and scientific knowledge (including information technology and virtual communication); the diagnosis of the information technology infrastructure; and the nationwide incorporation of technological innovation into healthcare information management, scientific information, and technological information processes. The inclusion of the project in the aforementioned edict is part of the research and development challenge directed toward everyday healthcare practice and, as such, only partially interacts with the disciplinary and specialized logic processes of contemporary knowledge organization. The main focus lies in the intensive interaction with everyday practice in different services and systems.

The observatory has gradually instituted itself as a tool to enhance the use of information and its technologies; it has also made technological resources available for the wider use of information in everyday UHS [SUS] activities. For example, it has fostered more horizontal

technical cooperation between local-regional health systems and institutions, developing conditions that lead to the enhancement of scientific networks. In addition, it has involved the direct and joint participation of scientific and teaching institutions, as well as healthcare services from diverse geographical locations within Brazil. Therefore, it contemplates heterogeneous contexts that correspond to a decentralizing perspective, which is in accordance with the information and communication policy. The choice of non-instrumental information concepts to support management allocated to the construction of the observatory addresses a conceptual need to re-appreciate the relationships between information technologies and between information and communication technologies as they relate to education. The emphasis should not be placed on *instruments* destined to expand the cognitive-instrumental rationality of management decision-making processes, but rather on the review of the possibilities of expanding information power, operating as a *device* for the production of new decision-making patterns, practice organization, and the construction of the healthcare system.

In this context, OTICS contacted Conceição Hospital Group (CHG) [Grupo Hospitalar Conceição (GHC)], Porto Alegre - Rio Grande do Sul, which serves as the reference for UHS [SUS] service in the region. The group comprises the following hospitals: Conceição, Criança Conceição, Cristo Redentor, and Fêmeina; there are an additional 12 health centers of the Community Health Services [Serviço de Saúde Comunitária], plus three psychosocial care centers. The group also gives support to health and cultural centers such as Culture Points [Pontos de Cultura] (GHC, 2012). The four hospitals attend to several of the population's healthcare needs; indeed, they were responsible for 35% of all admissions in the UHS [SUS] in 2009 in Porto Alegre. Nearly 16% of all outpatient procedures in UHS [SUS] hospitals in the capital city of Porto Alegre occur within the group. The moment of approximation coincided with the institutional effort to expand teaching and research activities as a strategy of institutional development at an institution designated as the CHG School (Center for Technology and Research Education in Health) [Escola GHC (Centro de Educação Tecnológica e de Pesquisa em Saúde)]. The initial outcome of this partnership resulted in the foundation of the CHG School Station [Estação Escola do GHC].

The CHG School - Center for Technology and Research Education in Health [Escola GHC (Centro de Educação Tecnológica e de Pesquisa em Saúde)] is one of the units composing the CHG [GHC] service network. Additionally, its link to teaching activities aims to strengthen timely learning in conjunction with practice in the UHS [SUS] service network. Thus, it is a concept dissimilar to that of a corporate university, which is commonly oriented toward incorporating strategic knowledge for the institutions that propose them. With UHS [SUS] principles and directions as guidelines, it aims to develop teaching, research, and extension policies and actions. Its actions aim to consolidate technical and scientific cooperation, the broadcasting and production of scientific information, and innovation in the field of healthcare. The goal is to qualify attention, management, training, and social participation in the health system and to expand the possibilities of socio-economic inclusion and development. The school has a commitment to provide training for aware citizens, mutually supportive and sustainable development, and UHS [SUS] consolidation (CHG School Station, 2012). The cooperation of the OTICS—CHG [OTICS-GHC] School cooperation is directed toward the institutional development of teaching and research, the strengthening of everyday labor and

knowledge production approaches, and the support of institutional mobilization for teaching and research, considering the specificity of dealing with a large assistance services complex.

In the present paper, a descriptive analysis of the partnership experiment between OTICS and the CHG School [Escola GHC] will be performed, first using a conceptual approach regarding the challenges of performing in such a highly complex context, i.e., the introduction of a technology school in a large-scale health assistance institution; the study also aims to analyze the potentially innovative use of information and its technologies in everyday labor and health management. The presentation of two initiatives developed under the project will serve as analytical markers of the project's reach.

### **The Perspective of the Observatory on the Strengthening and Incorporation of Technology in the Qualification of Health Care and Management**

For research and development in the field of information technology and science, OTICS was created with the goal of operationalizing proposals concerning the creation of an observatory with the ability of integrating and articulating the Ministry of Health's National Health Information Systems [Sistemas Nacionais de Informação em Saúde do Ministério da Saúde] with the National Databases [Bancos de Dados Nacionais] derived from inquiries and the census carried out by the Brazilian Institute of Geography and Statistics – BIGS [Instituto Brasileiro de Geografia e Estatística – IBGE]. OTICS also eventually broadened the scope of the aforementioned proposals by associating a new challenge — to produce and disseminate knowledge — thus contributing to the expansion of the collective intelligence on health and the healthcare system. The concept of collective intelligence proposed the use of information as a device to mobilize local explanatory networks and meaningful learning focused on the construction of shared meanings and mobilizing for action. In this case, problems concerning the function of healthcare institutions, services, networks, and services could be approached (FERLA, 2009). The general goal of the initial project was to develop and implement a Healthcare Systems and Services Communication and Information Technologies Observatory, defined as a set of technological and operational solutions, covering technological and policy-organizational matters, with the aim of qualifying the monitoring and evaluation of health indicators. The goals also included creating the means to allow for easier access and exchange of information between the different agents involved in health information (either directly or indirectly). Thus, the project aimed to establish a basis for a permanent and continuous process for management and teaching in the healthcare system.

It is necessary to emphasize that the concept of technology used in this study does not limit itself to technological instruments or equipment but rather, in agreement with the proposition by Mendes-Gonçalves (1994), it refers to “the technical links established within a work process between the operative activity and the work objectives” (p. 18) or, to state it using a different expression, the particular articulation between “knowledge and its material and non-material unfolding” (p. 20) in different production processes. Thus, it includes equipment, structured knowledge, and relationship modes that are established between the worker and the context wherein the work is carried out or, according to Merhy (2002), technologies of different origins: hard, light-hard, and light.

The concept of an “observatory” encompasses a set of technologies that can capture, process, and disseminate information and knowledge that may support the decision-making process of

a defined agent network — namely, those involved in management and teaching processes in the healthcare system. For this concrete initiative, its scope relies on technologies for the use of health indicators, processed as outlined in The Inter-agency Health Information Network (IHIN) [Rede Interagencial para Informação em Saúde (RIPSA)] in health systems and service management functions, and for their use in teaching processes. Referencing IHIN [RIPSA] output becomes necessary because it seeks, in an unprecedented way, to articulate a network of specialists, managers, and institutions that produce and consume health information to generate a consensus on the production of timely and useful indicators by standardized calculation methods; above all, however, the output should be clearly defined in terms of potential use, which would make everyday use more easily adopted in the working environment by different individuals possessing different knowledge in the healthcare field (RIPSA, 2012).

As a result of the project, an Internet portal and a set of functionalities to be used in health management and teaching were created; above all, however, a network of agents with diverse positions in both services and academia was created. Among the functionalities for teaching, one can find resources that allow for the evolution from the traditional concept of virtual learning environments (including networked and real-time activities) to a technological level of the *hybrid environments* typology (OTICS, 2012), which the project helped define. Regarding management, new tools were developed to combine databases to produce useful indicators for the performance evaluation of healthcare systems and for workers' permanent education support activities, with a variety of different formats for consultation. Thus, OTICS contributed necessary mediations to strengthen the everyday use of information in decision-making at different levels of the healthcare system.

The project also developed methods to combine databases that aided in reducing the number of indicators able to represent the situational diagnosis of healthcare systems. The project also rendered them easy to use by different subjects in all tiers (management, care, participation, and formation). These methods were applied to microdata from different information databases, allowing for access — directly through the observatory's portal — to indicators for the evaluation and diagnosis of healthcare systems and networks. Furthermore, the observatory fostered the creation of research groups and the configuration of a scientific network involving teaching, research, management, and healthcare service institutions in all regions represented in the present study. Within the scope of the project, to support the diversity of interests of the different groups of participants in the observatory, the expression "Specialized Station" was coined to refer to unique themes mobilizing the production of work technologies for focus groups originating from the fields of health information and communication. That is, specialization did not occur due to disciplinary knowledge boundaries, but rather as a result of the mobilization of a group of agents predisposed to form a network to solve everyday work problems. Such a network actively participated in the structuring of the employed solutions, technologies, and methods, as well as in the identification of experiments that would constitute a repository of initiatives of information and information technology use, and the use of resources developed in teaching and evaluation activities. This participation helped constitute scientific network support functionalities within the observatory. Comparing the initially planned goals with the outcome of the project reveals a positive balance, which includes the cognitive and material conditions for the second stage of the OTICS project. As a final remark, the project achieved a strong approximation between the use of information for

management and teaching and the design of permanent education in health, a potential outcome predicted by the National Policy of Information and Informatics for the UHS [Política Nacional de Informação e Informática em Saúde para o SUS], which initiated the project.

### **The OTICS – CHG [OTICS-GHC] Partnership and the Creation of the CHG [GHC] School Station**

In the reform process of the past 30 years, one can observe a significant diversification of institution types that constitute the Brazilian Health System among the transformations. Hospitals, predominant and central caring institutions for the past few years, have been challenged to operate in an integrated manner within a diversified health services network, which already features a predominance of other modes in the Brazilian case. From a care point of view, hospitals today have an increased responsibility to serve as back-up and technical support for the service network. They have also been progressively held responsible for training a specialized workforce, for delivering permanent education, and as a space to develop clinical research, epidemiological research, and managerial projects.

The institution of the hospital is continuously reinventing itself, claiming an important role in the healthcare system, but one that is significantly different from that played a few years ago. Within the scope of these changes, the production of new knowledge contributing to the qualification of the healthcare system appears to be a strategic investment, and it occupies a relevant place in specific UHS [SUS] policy. Moreover, producing new knowledge is a pressing challenge for the institutions that aim to lead with their performance within the healthcare service system, which operates under new conceptual and ethical bases. Hospitals need to have new decision-making systems and new institutional capabilities for the contemporary challenges posed by the UHS [SUS]. One such characteristic capability is the operation within inter-institutional networks, which requires new knowledge and tools.

As both aggregators and consumers of the densest technologies, hospitals are responsible for an extremely important portion of medical-hospital equipment, medical-surgical materials, medicinal drugs, immunobiological components, and other inputs and products consumed by the country's healthcare system, not to mention a vast array of information technology services. In this respect, the specialized literature adopts a strategic standpoint in qualifying hospital care with working process management and technology incorporation. This particular problem can become a unique asset for research and knowledge production aimed at strengthening management within the actual healthcare system context. This was partially the motivation for the approach adopted by OTICS and the CHG [GHC] School.

The increase of technological density in services and the incorporation of new technologies and practices created a need to establish mechanisms and strategies to address the demands associated with rethinking and re-structuring care models in hospitals, which focused on the user and systematic operation with other services. The proposal presented within the OTICS project is based on researching and developing alternatives, implementing methods and technologies, and producing technical and scientific information and tools for the middle and healthcare fields and, furthermore, as a support for the management of specialized health services and systems networks. The scope of service, network, and system management presents itself as a field of extreme complexity within the current health system environment, stemming from the multiple instances involved in health production and the technical-care

modeling operating within its core. In addition to changes in professional training and in programs of continuous and permanent education in health, new professions have been incorporated into the field of healthcare. More than specialized training, the development of interdisciplinary, systematic, and permanent analytical, comprehension, and evaluation skills poses a challenge for both professionals and institutions in the quest for everyday evidence-influenced decision-making. The culture of evaluation (CONTANDRIOPOULOS, 2004), defined as the incorporation of cognitive-based production systems for critical assessment in decision-making, is an increasingly pressing necessity in the context of such transformations and complexity across institutions, networks, and systems in the healthcare field.

Evaluation is the basis for institutional learning. Thus, it must incorporate participating methods, interdisciplinary actions, prospective capabilities, a sense for action, democratic characteristics, and a low level of hierarchical subordination. If based on these concepts, the evaluation can serve as an effective device for improving the performance of institutions in the context of the current healthcare system.

It is within the context of these changes that Conceição Hospital Group [Grupo Hospitalar Conceição] (which has been implementing important changes in institutional policies for the past few years) constituted teaching and research as priorities on its agenda, with the ambitious goal of becoming a center of excellence in these fields. On the one hand, this focus on teaching and research aims to continue its tradition as a reference point for the hospitals and services that it constitutes in the production of specialized services for the municipal, metropolitan, state, and Southern Brazilian regional healthcare systems. On the other hand, the institutional managerial decision aims to generate conditions to also become a reference in the fields of innovation, within a context of fast changes that involve changes in the paradigm.

The project aimed to research technology management models that could be implemented in other hospital institutions, defining criteria and criticality degrees for risk situations to create better conditions that could define follow-up and monitoring models regarding healthcare establishments' risk and quality information. Thus, research has produced systematic information to feed the evaluation processes, thus supporting decision-making processes focused on the quality of care. This research has focused on what has been described in the literature as "health care evaluation culture".

This project put to use part of the research, knowledge production, and information dissemination modes developed within the scope of the research and development project designated as Healthcare Systems and Services Communication and Information Technologies Observatory [Observatório de Tecnologias de Informação e Comunicação em Sistemas e Serviços de Saúde], which, in its initial phase, created a scientific network encompassing several researchers and institutions from all over Brazil for the analysis, systematization, and dissemination of healthcare teaching and knowledge management (FERLA, 2009) The project institutes itself as a research program for the evaluation of technology incorporation in specialized hospital care and for the production of management support knowledge and technology; the link to the CHG [GHC] School Station focused on the evaluation of management processes and technologies. The goal of the project was to research and develop management technologies for the qualification of hospital services and to disseminate information, thus initiating the implementation of a quality of care improvement system. This system also contemplates the possibility of serving as a locus for testing technologies and

strategies derived from research, developed in such a way as to permit — besides the prevention of healthcare systems' inherent risks — the identification, experimentation, and validation of innovative methodologies in health information, risk management, and service and product quality, as well as health technology evaluation (HTE) [avaliação de tecnologias em saúde (ATS)]. Its goals include safety, the rational use of products and materials, the effectiveness of provided care, the rational incorporation of technologies, and a good effectiveness/cost ratio.

The second step in this partnership relied on the development of projects in conjunction with the healthcare sectors of the CHG [GHC]. In this stage, demands from different sectors were collected, which also reflected those proposed by the Brazilian Health Surveillance Agency – BHSA [Agência Nacional de Vigilância Sanitária – ANVISA], which became a partner in the projects. In the present paper, two experiments derived from this collaboration will be described, including their respective contributions to the improvement of information technology applied to education and management. The description of the experiments performed by the CHG [GHC] School Station will not be presented by focusing on the specific results of each project but rather by focusing on its capability to construct and interact within the network and to analyze the method contributed by OTICS. The two cases reported in the present paper were chosen mainly due to their empirical diversity: one was performed in the health promotion thematic field (in close contact with basic care), while the other focused on high technological density, represented here by orthopedic transplants that point toward new strategies for health surveillance prospecting. In both cases, the production and use of information stemming from everyday work had the pretense of qualifying health care and management at the institutional level and producing technologies for cooperation with other institutions.

### **Development of Multifocal Technologies and Strategies for the Prevention of Toxic Events in Children**

Toxicological accidents constitute a relevant health problem. Using data from the Toxicological Information Center (TIC-RS) [Centro de Informações Toxicológicas (CIT-RS)], it was possible to identify an elevated rate of incidence of intoxication cases in the state of Rio Grande do Sul (circa 20,000/year), especially in children under the age of 10 (CIAT-RS, 2010). This framework constitutes not only a relevant contribution for increased budget costs in UHS [SUS] but also a concern for the population's health. Moreover, such cases straddle the line separating health surveillance and healthcare and, in particular, make abundantly clear the dividing line between exclusively normative and prescriptive technologies in health, wherein evidence generated from information on concrete risks or grievances will predominantly spark formal devices and vertical actions regarding health education, which are generally only informative in character. In the present paper, we define health surveillance as a model for care characterized by an articulate set of actions meant to control determinants, risks, and damages to the health of the population living in certain territories and as a philosophy of integral care (which includes both individual and collective approaches) with respect to health issues.

Brazil has a history of underreporting such events, with some states presenting a total lack of records (CIAT-RS, 2010). The topic of health demands requires multidisciplinary approaches

and a constant improvement in the health education process. It is necessary to note that, in such cases, education is not focused predominantly on the transmission of knowledge but rather on the production of knowledge necessary for the everyday practice of agents involved in the process. In short, the question posed initially regarded the possibility of developing new approaches for health surveillance in toxic accidents, involving institutional articulation and, within the scope of their practices, surveillance services and healthcare (especially basic care). This is an ambitious challenge because surveillance and care have tended to be associated with different institutionalization paths and strategies since the dawn of modern healthcare systems.

In a first approach to the problem, one sought to associate information and permanent education in health. The latter, understood as education linked to labor as described in Ferla *et al.* (2008), became a tool promoting the following: the articulation between teaching, labor and citizenship, the link between training, sectorial management, healthcare, and social participation; building the UHS [SUS] network as a space for professional education; and recognizing local-regional bases as political and territorial units where teaching and service structures should meet and “cooperate” to formulate integration-promoting teaching strategies. Thus, the project focused on developing and implementing a multifocal program, aimed at describing the specificities and characteristics of products involved in toxic accidents, and the development of educational and accident prevention actions. Information production and use aimed at developing surveillance technologies under the idea of integration in health.

The action was developed simultaneously with the Family Health Strategy (FHS) [Estratégia de Saúde da Família (ESF)] within the CHG [GHC] / OTICS partnership. Within the context of permanent education in health, it aimed at bringing the production of knowledge within the quotidian of the healthcare institutions closer together through their Community Health Agents (CHA) [Agentes Comunitários de Saúde (ACS)], who, from the reality they experience in the services, could increasingly empower the role of health initiatives and build conversation networks in their areas of operation. Succinctly, the project sought to include the healthcare team in the construction of a multidisciplinary and multiprofessional methodology, encompassing health promotion, improvement of notification and record systems, and permanent education and surveillance within the context of toxic events in children. As a result, a new wealth of data was deposited in the TIC-RS [CIT-RS] and other databases on the issues of toxic events, and a complete program to produce healthcare professionals was created; the project also sought interaction as a way of forming partnerships that could increase and disseminate the results of this work. Emphasis is given here to the production of information on toxic accidents, based on fieldwork by basic care team agents, integrated within their everyday work routine, allowing for interventions such as data collection, education, and analysis capabilities within the context of health. Ultimately, one could access — other than an updated database — an expanded ability to perform within the context of toxic accidents, both for the team and the general population. During the 10th United Network International Congress [Congresso Internacional da Rede Unida], a presentation about the project was made and garnered the interest of both professionals and managers, who sought to apply the project in their own localities. In conclusion, further perspectives of the project include the evaluation of the strategy being used as a means to validate the methodology and to describe the implementation steps, which would enable other managers to implement the project.

## **Development of Surveillance Technologies for the Monitoring of Orthopedic Implant Quality, Safety, and Effectiveness**

Operating at high technological density, and predominantly within the hospital institution, the project reflected on another topic concerning health surveillance. Orthopedic implants, due to their invasive nature as foreign objects in the human body, are classified as “high risk”. It is necessary that their design and maintenance meet certain quality and safety standards, seeking a reduction in their inherent risks relative to their expected benefit. Some countries keep prosthetics records, which contribute information about product safety, effectiveness, and durability and aid in identifying adverse effects; Brazil currently does not keep such records, even though ANVISA classifies these products as class III. In addition to being linked to high technological density, they are also associated with high-cost care within the UHS [SUS].

In this framework, the Ministry of Health has been prioritizing actions and studies on orthopedic implants, considering the high cost involved and the effect on the quality of life of the user population. The importance of monitoring implant quality, safety, and effectiveness is found in the possibility of identifying critical points regarding a product, its manufacturing process, its chain of distribution, surgical indication, team training, as well as the creation of process improvement opportunities. ANVISA has been receiving notifications of adverse effects associated with the use of orthopedic implants, which pose risks to patients, thus justifying the creation and implementation of new surveillance technologies regarding quality control, monitoring, and tracking within the sector. The innovation sought here refers to health surveillance techniques that allow for the visualization and intervention, in a more integrated manner, of the productive cycle of used inputs and the associated caring cycle, expanding prospection capabilities. Once more, emphasis is given to the limitations posed by restricted actions by specialized knowledge and practices, the normative and formal approach, and institutional fragmentation.

Considering the demographic transition period that Brazil is currently undergoing, which has led to an increase in the life expectancy of the population, the need for orthopedic surgery – which can enhance the quality of life of patients – is also on the rise. Such an increase in the number of surgeries also justifies the need to establish new monitoring strategies to evaluate the quality of orthopedic implants. Moreover, Conceição Hospital Group (CHG) [Grupo Hospitalar Conceição (GHC)] already has a history of implant monitoring since the group took part in a knee and hip implant monitoring project in 2006 sponsored by ANVISA.

During the same period, the Public Ministry of the State of Rio Grande [Ministério Público do Estado do Rio Grande do Sul] investigated fraud and faulty quality claims concerning implants removed in Rio Grande do Sul hospitals. The Public Ministry and CHG [GHC] signed an agreement to follow up on the actions of the aforementioned project, including follow-ups on implants removed by maintenance surgeries – because the project initially only contemplated monitoring new implants. The results obtained were forwarded to ANVISA and the Office of the Public Ministry so that these institutions could initiate their pertinent processes.

The initial project aimed to implement a mechanism to create records and monitor the quality, safety, and effectiveness of the orthopedic implants being used. To that end, monitoring of the quality of hip and knee implants available for surgeries, as well as that of implants removed by maintenance surgeries, was performed. Concomitantly, the hip and knee prosthetics record

system of the Brazilian Orthopedic Trauma Society (BOTS) [Sociedade Brasileira de Ortopedia e Traumatologia (SBOT)] was implemented, aiming to improve and expand its use. The project also sought to elaborate and validate the monitoring methodology.

The project was developed in an integrated and multidisciplinary manner, involving the CHG [GHC] and other institutions, such as municipal, state, and federal bodies of health surveillance, namely the UFRGS Physical Metallurgy Laboratory [Laboratório de Metalurgia da UFRGS (LAMEF/UFRGS)] and BOTS [SBOT]. For the monitoring process, new hip and knee implants, available at the CHG [GHC] materials center, were chosen. Implants suspected to be of sub-par quality, removed during maintenance surgeries from patients who had received them less than 10 years prior (with special priority for those implanted less than five years prior), were also selected. New implants were collected by the State Health Surveillance [Vigilância Sanitária Estadual] at a rate of five units per month and forwarded for analysis to the UFRGS Physical Metallurgy Laboratory. All products found not to be in accordance with specifications had a record created in the National Health Surveillance System (NHSS) [Sistema Nacional de Vigilância Sanitária (SNVS)]. Five removed prosthetic implants were also forwarded to the metallurgy laboratory each month, also generating a record in the NHSS in the case of irregularities.

In this stage of the project, a pilot study on the quality and safety monitoring of implants was created. Although the results analyzed were still at a preliminary stage, they were sufficient to inform ANVISA on the quality of these implants. The information system developed was modeled on an interface that exploited all of the information handled. The mandatory character of recording patient information in both the pre- and post-operative periods made the tool's strength its ability to be analyzed and implemented at a national level. The articulation and networking proposed by OTICS guaranteed an improved communication efficiency of the different agents involved in the process, thus generating more solutions with the actions performed. Based on these data, the aim was to have the system influence the qualification of surgical procedures involving orthopedic implants made available to the UHS [SUS] due to their effective monitoring. It is a goal of the project that the methods developed promote the strengthening of the prosthetic implant tracking, quality, and monitoring system, not only at the institutional level but also as a collaborative endeavor directed toward the entire healthcare network, which is focused on patient safety.

## **Conclusion**

With the increasing complexity of healthcare processes, it is necessary to create and implement creative and innovative mechanisms to handle and use information. The need to obtain structured, easy-to-access information concentrated within a single information system constitutes a challenge in several areas, not just in healthcare. The structuring of method development and transformation in the healthcare field, based on hybrid environment theories and seeking to involve several research agents and enabling a network originating from actual trans-disciplinary processes, became fundamental for generating data that supported future decision-making processes. The analytical displacement of information systems is fundamental to their use in everyday healthcare activities, and, in a certain way, it requires breaking with the tradition of large centralized systems, configured by specialized demands of specific fields

in management structures. Within the scope of this issue, developing new technologies and analyzing experiments in greater detail constitutes a promising approach.

In this context, the experience with the Conceição Hospital Group [Grupo Hospitalar Conceição] School Station has been able to not only foster the use of information to qualify hospital services but also create environments where new methods are developed to generate useful and timely information for the everyday activities of different healthcare institutions. One other determining step for the success of information use is the shared construction of information to strengthen the knowledge network in potential partnerships to solidify these new health processes. Those partnerships sponsored by ANVISA demonstrated a capability for improving the interactive process in structuring demands, with the consequent generation of intelligible information for decision-making by the executive bodies. One relevant marker of the experiment's success is represented by closer bond between the institutions involved in the project. In particular, this bond incorporates management bodies, services with different technology densities, and academia. In the specific case of health surveillance, it is of the utmost relevance to emphasize the creation of these bonds because health surveillance and healthcare have historically been separated in terms of both institutions and practices.

The OTICS-CHG [OTICS-GHC] work aims to perform, in a collaborative way, research and knowledge production regarding health surveillance within the everyday activities of services that result in knowledge dissemination, technology development, scientific network performance, and horizontal cooperation, as well as to be an agent fostering permanent health education, i.e., to qualify the everyday work routines in the healthcare system. In a preliminary analysis of the experiment developed so far, one can state that ambitious steps were taken to develop prospective technologies for health surveillance, thus overcoming the normative, disciplinary logic toward an approach closer to the idea of integration and quality care for both individual and collective users. Collaborative efforts were made to systematize the knowledge produced within the care facilities, thus honoring the existing work. This constitutes an educational strategy and development capability of system and service management by means of information and communication technologies. Thus, the proposition has contributed to expanding the power of information through communication networks, creating bonds between service, academia, and government to strengthen the UHS [SUS].

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