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Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: a Study at the Health Centers Group Tâmega II – Vale Do Sousa Sul

Carla Lourenço

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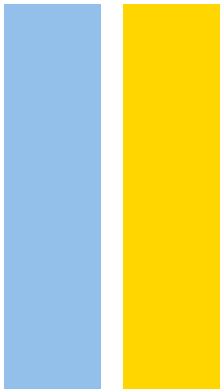

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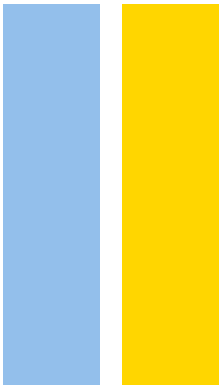

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ABSTRACT

Nursing Information Systems (NIS) in electronic support are used in the majority of care facilities across the nation. Therefore, the evaluation of NIS success is essential, with "User Satisfaction" being one of the main dimensions to be evaluated in order to measure the success of information systems. Thus, the theoretical framework that supported the study was "The DeLone and McLean Model of Information Systems Success" (1992; 2003).

The study aimed to describe the level of satisfaction of Nurses as users of NIS in Electronic Support in the ACeS Tâmega II – Vale do Sousa Sul.

The investigation carried out was framed in a quantitative paradigm, with a descriptive, exploratory, and cross-sectional approach.

The data collection instrument used was the *"NIS User Satisfaction Questionnaire",* and the data were collected between November 2022 and January 2023.

The study was carried out at the Health Centers Group (ACeS) Tâmega II – Vale do Sousa Sul, where the records are, essentially, carried out electronically, in the SClínico® application. SClínico® is *"the most used Electronic Health Records (EHR) system within the Portuguese National Health Service".*

The study population corresponded to all nurses working at ACeS Tâmega II – Vale do Sousa Sul: 159 nurses. A sample of 98 participants was gathered. The data obtained was subject to statistical analysis, using descriptive and inferential procedures.

Overall, nurses at ACeS Tâmega II – Vale do Sousa Sul were moderately satisfied with the NIS they used. The two dimensions in which nurses were less satisfied were related to "Technical Support and Training" and "Equipment: Speed, Quality and Quantity". Aspects related to "Architecture, Language, Decision Support (Nursing Process) and Graphics" and "Information Sharing" were the dimensions in which users were most satisfied. It was also found that the higher the level of prior training with the NIS, the higher the level of satisfaction with *"Equipment: Speed, Quality and Quantity"; and* the higher the level of prior training, the lower the level of satisfaction with *"Information Sharing"*.

The results deserve reflection not only at the ACeS scale but also at the Regional Health Administration, to improve the areas where the levels of satisfaction with the NIS were lower, allowing the improvement of Electronic Health Records, which will have an impact on the level of care provided.

KEY WORDS: Electronic Health Records, Nursing Information System, Users Satisfaction

RESUMO

Os Sistemas de Informação em Enfermagem (SIE) em suporte eletrónico são utilizados na maioria das unidades de saúde do país. A avaliação do sucesso dos SIE é assim essencial, sendo a "Satisfação do Utilizador" uma das principais dimensões a ser avaliada no sentido de medir o sucesso dos sistemas de informação. Assim, o referencial teórico que sustentou o estudo foi o *"Modelo de Sucesso dos Sistemas de Informação"* de DeLone & McLean (1992; 2003).

O estudo teve como objetivo descrever o nível de satisfação dos Enfermeiros enquanto utilizadores dos SIE em Suporte Eletrónico no Agrupamento de Centros de Saúde (ACeS) Tâmega II – Vale do Sousa Sul. A investigação realizada enquadra-se num paradigma quantitativo, com uma abordagem descritiva, exploratória e transversal.

O instrumento de colheita de dados utilizado foi o "Questionário de Satisfação dos Utilizadores dos SIE", e os dados foram recolhidos entre novembro de 2022 e janeiro de 2023.

O estudo foi realizado no ACeS Tâmega II – Vale do Sousa Sul, onde os registos dos enfermeiros eram, essencialmente, efetuados em formato eletrónico, na aplicação SClínico®. O SClínico® é considerado um Sistema de Registos de Saúde Eletrónicos (RSE) e é *"o sistema de RSE mais utilizado no Serviço Nacional de Saúde Português"*.

A população do estudo correspondeu a todos os enfermeiros do ACeS Tâmega II – Vale do Sousa Sul: 159 enfermeiros. Foi recolhida uma amostra de 98 participantes. Os dados obtidos foram submetidos a análise estatística, por meio de procedimentos descritivos e inferenciais.

De forma global, os enfermeiros do ACeS Tâmega II – Vale do Sousa Sul mostraram-se moderadamente satisfeitos com o SIE que utilizavam. As duas dimensões em que os enfermeiros se mostraram menos satisfeitos relacionaram-se com o "Suporte Técnico e Formação" e com os "Equipamentos: Rapidez, Qualidade e Quantidade". Os aspetos relacionados com a "Arquitetura, Linguagem, Apoio à Decisão (Processo de Enfermagem) e Grafismo" e "Partilha de Informação" foram as dimensões em que os utilizadores se mostraram mais satisfeitos. Verificou-se também que quanto maior o nível de formação prévia com o SIE, maior o nível de satisfação com os "Equipamento: Rapidez, Qualidade e Quantidade"; e quanto maior o nível de formação prévia, menor o nível de satisfação com a "Partilha de Informação".

Os resultados merecem reflexão não só à escala do ACeS como também da Administração Regional de Saúde, no sentido de melhorar as áreas onde os níveis de satisfação com os Sistemas de Informação em Enfermagem foram mais baixos, permitindo a melhoria dos Registos de Saúde Eletrónicos, o que terá impacto ao nível dos cuidados prestados.

PALAVRAS-CHAVE: Registo de Saúde Eletrónico; Sistema de Informação em Enfermagem; Satisfação dos Utilizadores

TABLE OF CONTENTS

TABLE INDEX

FIGURES INDEX

ACRONYMS AND ABBREVIATIONS

- ACeS: Health Centers Group
- ARS: Regional Health Administration
- BTS: Bartlett's Test of Sphericity
- CIDESI-ESEP: Centre for Information Systems and ICNP™ Research and Development of Nursing School of Porto
- EFA: Exploratory Factor Analysis
- EHRs: Electronic Health Records
- EMR: Electronic Medical Record
- ESEP: Nursing School of Porto
- HIS: Health Information Systems
- ICNP™: International Classification for Nursing Practice
- IS: Information System
- IT: Information Technology
- KMO: Kaiser-Meyer-Olkin Test
- MEDCIDS: Department of Community Medicine, Information and Health Decision Sciences (Faculty of Medicine, University of Porto)
- NIS: Nursing Information System
- OE: Portuguese Nurses Order
- PDS: Health Data Platform
- PHRs: Personal Health Records
- SAM®: Physician Support System
- SAPE®: Nursing Practice Support System
- SNS: National Health Service
- SPMS: Shared Services of The Ministry of Health
- UCC: Care Unit in the Community
- UCSP: Personalized Healthcare Units
- URAP: Unit of Shared Assistance Resources
- USF: Family Health Unit
- USP: Public Health Unit

INTRODUCTION

Healthcare systems are constantly evolving and are influenced by multiple changes [1].

Adoption of Health Information Systems (HIS) is changing how healthcare is provided. HIS is a collection of procedures used to help healthcare organizations be more effective and efficient in carrying out their duties and achieving their goals [2]. According to SPMS, E.P.E. (Shared Services of the Ministry of Health), the development of service-providing activities in the fields of information and communication systems and technologies is made possible by HIS. They also promote cooperation and the sharing of knowledge and information. They are crucial to the health system's transformation, which aims to increase citizen and professional satisfaction while enhancing accessibility, effectiveness, quality, and continuity of service [3].

Regarding "Nursing Information", the consensus-based opinion is that is crucial for health governance today [4]. Such relevance arises from Information Systems' (IS) significance for clinical decisions, for the continuity and quality of treatment, for management, training, research, and decision-making processes, in addition to the legal and ethical requirements of IS [4].

Despite this acknowledgment, it seems that nursing care is only just beginning to become visible in statistics, indicators, and official health reports. Because of this fact, it is difficult to quantify and confirm their influence on improvements in population health [4].

However, the Portuguese Ministry of Health has implemented several initiatives to encourage and promote the development of software that will support the nursing information subsystem. As a result, it is critical to make sure that HIS incorporates data linked to nursing care [4].

Since the 1990s, a group of professors from the current ESEP – Nursing School of Porto, has dedicated a significant part of their research to the problematic of Nursing Information Systems (NIS) [5]. This continued work allowed Portugal to stand out internationally as a pioneering country in the use of information technologies by nurses [6].

According to Campos [5] e Moura [7], the major reengineering process of the NIS in the Portuguese context, derived from the pioneering works of Silva [8] [9] and Sousa *et al.* [10], with the aim of developing nursing information and documentation systems based on four essential axes:

- The inclusion of classified professional languages, in particular the *International Classification for Nursing Practice - ICNP™;*
- The parameterization or definition of specific contents at the scale of each care unit, in order to satisfy the specific "needs" of users (nurses);
- The incorporation in the structural matrix of systems of referential integrity principles of different data or information items;
- The (progressive) incorporation of NIS "in use" in the Health Information Network.

Nowadays, the vast majority of care units in the country uses IS supported by information and computer technologies [5]. Currently, at the level of ARS North – Northern Regional Health Administration, namely ACeS (Health Centers Group) Tâmega II – Vale do Sousa Sul, NIS (as SClínico®) are used by nurses of this organization. SClínico® is considered an Electronic Health Records (EHRs) system.[11] The use of EHRs has substantially increased during the last years, allowing the growth in quality of the healthcare services and, at the same time, to control their costs [11].

Understanding the value and effectiveness of IS management actions and IS investments is crucial for measuring the success or effectiveness of IS [12]. However, objectively measuring the success of implementing an IS is difficult to achieve [5].

As to the evaluation of the HIS, specifically, it is necessary to consider that these range from simple to complex systems. Evaluation of these systems is essential to ensure successful adoption and a favorable influence of HIS on healthcare delivery [2]. HIS evaluation may be defined as *"(…) the act of measuring or exploring properties of a health information system (in planning, development, implementation, or operation), the result of which informs a decision to be made concerning that system in a specific context."* [13]. Nevertheless, it is highly advised for decision makers and consumers to conduct a thorough review of HIS due to its complexity and difficulty [14] [15].

The NIS are a crucial part of HIS. Thus, assessing the satisfaction of its users - the nurses - is vital. The present study will contribute to a better evidence-based administration of IS policy by gaining knowledge about nurses' satisfaction with their IS and, eventually, identifying the areas or domains in which such levels of satisfaction are lower [7].

Thus, it is justified to study the problem within the scope of a Master's Degree in Medical Informatics. It is in this context that the present dissertation arises: to obtain the title of Master in Medical Informatics, with the objective of analyzing the level of satisfaction of Nurses as users of IS and Nursing Documentation in Electronic Support at ACeS Tâmega II - Vale do Sousa Sul.

Assuming, then, that it is important to study nurses' satisfaction with their IS, it is important to mention the theoretical framework applied in this dissertation.

DeLone and McLean propose a model for evaluating the success of IS. This model is widely recognized and accepted by the scientific community [7]. Initially (1992), the model proposed six dimensions to assess the success of IS: system quality; information quality; use of the system; user satisfaction; individual impact and organizational impact [16]. A decade later (2003), with the literature review carried out by the authors, they updated the model. The main changes include the integration of the dimensions "*service quality*", "*intention to use*" and the joining of the

dimensions "individual impacts" and "organizational impacts" into a single dimension called "net benefits" [12].

One of the main dimensions to be evaluated to measure the success of IS is user satisfaction [17]. Doll and Torkzadeh (1988) define user satisfaction as *"the affective attitude towards a specific computer application by someone who interacts with the application directly"* [18]. The relevance of this dimension lies in the fact that high levels of user satisfaction lead to high levels of user performance.

The interdependence of the various dimensions with *"user satisfaction"* was, from the outset, proposed by DeLone and McLean [16]. System usage and user satisfaction are direct precedents of individual impact, and this impact on individual performance can also influence organizational impact.

The dissertation was written in the English language. Thus, the presentation and discussion of the results and the questions in the questionnaire are also presented/translated into English. However, the documentation prior to the study (dissertation project and necessary authorizations requested), as well as the data collection instrument, were written/implemented in Portuguese.

Regarding its structure, this dissertation is organized in three parts. The first part refers to the delimitation of the problem under study, where a bibliographic review was carried out related to the theme of IS and NIS, and with the evaluation of information systems, with special focus on the Model of Information Systems Success from DeLone and McLean [12] [16], used as a reference in the development of this work.

The second part describes the methodology used in the investigation, namely: purpose and objectives; type of study and study design; the study context; the population and sample; explanation on the data collection instrument; and procedures for collecting, processing and analyzing data.

The third part presents and discusses the results of the study and highlights the main syntheses and recommendations.

1. PROBLEMATIC UNDER STUDY

There are several explanations for the high level of interest in the clinical information and communication process, including the complexity of the healthcare environment, the requirement to demonstrate efficacy in clinical practice, and the ongoing transformation of healthcare institutions with the introduction of informatics [19].

Healthcare nowadays would be difficult to envision without information and communication technologies. Since it has been around for several years, information technology (IT) in healthcare has become widely used and has the power to significantly change how healthcare is organized, provided, and their outcomes [13]. By streamlining operations, improving the accuracy and efficiency of procedures, and lowering the possibility of human errors, it has the potential to alter both the delivery of healthcare and the working environment in the healthcare sector [20].

In this area, it is also important to consider the economic impact on organizations and national health systems. As stated above, with organizations making substantial investments in IS with the expectation of having a positive effect, there has been an upward trend in the usage of IT in clinical settings [21] [22]. A growing body of research suggests that many of these systems are not functioning properly, though. The costs of these system failures, which are difficult to estimate and are rarely acknowledged, have been attributed on a number of variables, as *"(..) ineffective ongoing communication, competency of users, intuitiveness of the system design, system acceptance and change management procedures"* (Lorenzi & Riley 2000 and Alexander *et al.* 2007 cited by Courtney, Alexander and Demiris, 2008) [21]. The development and implementation of IS in accordance with an organizational architecture are very challenging tasks that involve a number of organizational and technical difficulties that must be appropriately taken into account. Due to the context and the variety of actors, the unique nature of IS in the health sector requires cautionary measures in its application [23].

Now reporting specifically to Nursing, IT has been introduced in the past years in many healthcare institutions, to support nurses in their daily work [24]. In accordance with Currel and Urquhart (2003, cited by Oroviogoicoechea *et al.*, 2008) [19], nurses are acknowledged as "key collectors", "generators", and "users" of patient/client information because of their crucial role in coordinating the care provided by the team and in delivering 24-hour care [19]. With benefits like accessibility, readability, completeness, decision-support, and access to knowledge bases, IT can therefore be a very useful tool [19].

As for the Portuguese panorama, the use of electronic NIS has been increasing at a high rate. In the last decade, Portuguese health units/organizations have made a strong investment in the area

of their IS, namely, in clinical IS – essential resources for everyday activity of, for example, physicians and nurses [5].

1.1. Health Information Systems, Electronic Health Records and Nursing Information Systems

Health Information Systems (HIS) allow the cooperation, the sharing of knowledge and information, as well as the development of service provision activities in the areas of IS, and technologies and Communication. They play an important role in the reform of the health system, having as main objectives the improving accessibility, efficiency, quality and continuity of care and increasing satisfaction of professionals and citizens [25].

Organizations depend increasingly on IS supported by computer technology and data networks in the governance of their business, and it is essential to ensure their continuous operation in a reliable and efficient way [5]. To ensure leadership in the transformation process, which effectively positions the IS as systems capable of supporting health professionals to fulfill their mission with quality and efficiency, health organizations must adapt and evolve concurrently with the various actors in the healthcare sector [23].

Towards an adequate definition/integration of concepts, it is also important to clarify the introduction of the concept Electronic Health Records (EHRs) in this dissertation. The terms electronic health records (EHRs), personal health records (PHRs) and electronic medical record (EMR) are often used interchangeably in the literature [26].

Currently, the term EHR is widely used and describes the concept of a comprehensive, cross-institutional, and longitudinal collection of a patient's health and healthcare data [27]. According to ISO (2009, cited by Caligtan & Dykes, 2011) [26], EHR is *"a repository of health information gathered across the longitudinal electronic record of the patient. Information is generated by one or more encounters in any care delivery setting and the ownership of the record can be the healthcare organization, provider, or patient".* It can also be considered as a digital version of a patient's paper chart, containing information about a patient's medical history, diagnoses, medications, allergies, immunizations, laboratory test results, and other health-related information. The EHR is designed to be a comprehensive record that can be shared among healthcare providers in different settings [28].

Some of the advantages of EHRs include the potential to increase healthcare providers' productivity and effectiveness, which could lead to better patient outcomes [29], as well as the improvement of knowledge flow and access [30]. Also, well-designed EHRs may increase patient safety [31] [32]. Patient Safety is a central aspect when it comes to the delivery of high-quality healthcare services. The growing complexity of healthcare systems and the resulting increase in

injuries to patients in healthcare institutions, gave rise to the discipline of Patient Safety, that seeks to prevent and minimize risks, errors, and harm to patients during the delivery of healthcare [33].

Before considering specifically the NIS, is important to define the area of Medical Informatics (field in which this dissertation is included). Medical Informatics can be defined as *"The study and application of methods to improve the management of patient data, medical knowledge, population data and other information relevant to patient care and community health"* [34]. The rise of Nursing Informatics as a discipline within nursing is proof that nurses are taking a growing interest in informatics studies and research [19]. As an example, in America, Nursing Informatics was approved in 1992 as a nursing specialty by the American Nurses Association and can be defined as *"The use of technology and/or a computer system to . . . process . . . and communicate timely data and information in and across health care facilities that administer nursing services and resources, manage the delivery of patient and nursing care, link research resources and findings to nursing practice, and apply educational resources to nursing education*" (Saba and McCormick, 1996, 2001 cited by Saba, 2001) [35].

Considering now the NIS, they can be referred to as *"computer systems that manage clinical data from a variety of healthcare environments and made available in a timely and systematic frame to aid nurses in improving patient care*" [36]. NIS make it possible: for relevant patient data to become available; processes information to assist management activities; offers a thorough automated information processing system for all phases of nursing; and creates care plans for patients and families [36].

NIS are an important tool for assisting nurses in making decisions, enabling improved continuity, accessibility, and quality of information about the treatment provided, but they are also crucial for the effective management of health services [37].

In the opinion of Silva (2006, p. 34), a pioneer nurse and researcher in the field of clinical nursing information systems in Portugal, in order to study the NIS, one must consider, first of all, *"(...) people, the organizational structures and the processes of collecting, processing and using information"* [5]. People, in this particular, are nurses who are "users" of information systems. It is in this line that the present research path is situated.

The most widely used NIS in use on ACeS Tâmega II - Vale do Sousa is SClínico®. SClínico® is considered an EHR system [11]. Indeed, SClínico® is *"the most used EHR system within the Portuguese National Health Service"* [11]. Thus, the use of this concept (EHR) in the dissertation.

As already mentioned, most public health services use clinical information systems in electronic form. Regarding the professional activity of nurses, different information systems are in use, although the vast majority of hospital inpatient services and ACeS functional units use SClínico®

(SClínico Hospital® and SClínico Primary Health Care®), has seen below (*1.1.1.: SAPE® – Nursing Practice Support Syste and SClínico®*).

1.1.1. SAPE® (Nursing Practice Support System) and SClínico®

According to Campos [5], the work of Sousa *et al.* (1999) and Silva (2001), professors and researchers at ESEP, were decisive for specifying the structure and data model that formed the basis of SAPE® (Nursing Practice Support System). In global terms, the system conceived by Silva (2001) and Sousa *et al.* (1999) was based on some principles:

- *Incorporate an area related to the documentation of nursing interventions that result from the prescription of other technicians and another area that reports the autonomous dimension of the professional practice of nurses;*
- *Organizing, managing and processing information regarding the autonomous professional practice of nurses, in particular what refers to diagnoses, autonomous interventions and nursing outcomes;*
- *Contain a nursing classification – the ICNP™ – for the purpose of naming diagnoses, autonomous interventions and nursing outcomes;*
- *Integrate content parameterization requirements appropriate to the local needs of each unit and, eventually, necessary for the viability of indicators related to the professional practice of nurses, aiming the quality of care;*
- *Allow the use of natural language – free text – so that the adequate description of the care and needs of clients is not limited;*
- *Minimize duplication of information;*
- *Ensure referential integrity of data and different items of information;*
- *Promote accessibility to data, information and knowledge.*

Along this route, further applications appeared, some of which attempted to incorporate aspects described by that author [5].

The applications to support clinical activity have been developed using the experience of physicians, nurses and health professionals to better adapt applications to market needs [38]. SAPE® was the previous electronic NIS on which the SClínico® is based. SClínico® is the computer system developed by the SPMS for the institutions of the National Health Service (SNS). Its main objective is to standardize the electronic clinical record, in order to uniformize the clinical information collected in the various health institutions [39].

The launch of SClínico® took place on September, 2013 and its main innovations were the integration of the Physician Support System (SAM) and SAPE in a single software, and the change of the layout [39].

The fact that there are particularities to be taken into account in the hospital environment and others in primary healthcare, led to the emergence of two "forms" of the applications [38]. Consequently, SClínico® currently has two versions: SClínico Hospital®, which is installed in more than 50 Hospitals and Institutes and works with the "Sonho V2" database; and SClínico Primary Health Care®, present in more than 300 functional units, which operates under the "Sonho-CSP" database. The advantage of these two versions is that the graphic layout and data collection method can be better adapted to the type of work of each health professional [39].

In particular, as for the SClínico Primary Health Care®, it was launched at the beginning of 2014 [39] and was born from the vast experience with two previous applications used by thousands of physicians, nurses and other health technicians: SAM and SAPE [40]. It has grown to be a single application, common to all healthcare providers and patient-centric, being used by more than 13000 professionals [40].

Regarding some of the specificities associated with nursing records, in this application, the nursing professional can prescribe/consult the nursing interventions based on the diagnosis identified; consult the work plan for the intervention foreseen in a given contact; consult the parameterization and coding tables of the nursing activity; among others [38].

In the specific context of ACeS Tâmega II-Vale do Sousa Sul, the most widely NIS in use and on which the present study is focused is the SClínico Primary Health Care®.

This IS allows access to varied clinical information of the patients, the use and sharing of data with health professionals from different areas and the systematization of the data. As a result, it is possible to standardize procedures and data gathered at the national level, improving the effectiveness and efficiency of health professionals' work as well as their ability to share information with multidisciplinary teams and provide patients with better support, assistance, and follow-up [40].

1.2. Evaluation of Information Systems

Since IS are expensive, deciding whether to implement one requires a variety of procedures aimed at determining whether one is necessary and, after installation, whether it is operating successfully [41].

Additionally, concerns about the state of the economy and growing competition lead to efforts to reduce expenses, which forces companies to assess the costs and advantages of technology. As a result, these organizations are interested about the return on their investments [42].

Likewise, IS should be thoroughly assessed in order to learn from it, to enhance the system, to support future decision-making, to justify costs, and to demonstrate that the system is secure for users and patients [24].

However, there is limited agreement among practitioners or academics on how to most effectively measure the impact of IS on organizations [22]. The evaluation of an IS, more specifically, an HIS, is complex and can be defined as the act of measuring or exploring its properties *"(in planning, development, implementation, or operation), the result of which informs a decision to be made concerning that system in a specific context"* [13]. When evaluating an HIS, it is important to considered that evaluation is based on comparison (for instance, it may compare the situation before and after the system was introduced) and that many different evaluation factors can be distinguished, such as the impact on the working conditions of healthcare workers, potential savings, or even the potential impact on patient outcomes [43].

Generally, two approaches to the evaluation of clinical IS exist, an objectivist approach and a subjectivist approach (Friedman & Wyatt 1997; Van Bemmel & Musen 1997 cited by Bürkle,2001) [43] and, according to Campos (2012) [5], there are three main dimensions that can be incorporated in the evaluation of information systems: users; technical operability (Hardware / Software) and the strategic or governance potential.

However, the works of DeLone & McLean (1992; 2003) [12] [16], aimed at defining a model for evaluating the success of information systems, are, in this area, unavoidable and a crucial reference.

1.2.1. The DeLone & McLean Information Systems Success Model

Although studies evaluating the success of IS have been conducted for decades, their scope and methodology have varied [22].

Firstly, success is considered to be a dynamic [44] and multidimensional concept which encompasses system, individual and organizational factors [19]. As a result, different stakeholders have varied definitions of successful implementation, and context is essential as well [19]. Considering this unpredictability, it is not entirely certain that an implementation process that worked in one organization will work in another [44].

Still, the DeLone and McLean IS Success model is most widely cited and has been a valuable contribution to the understanding of IS Success [22].

IS success is a multi-faceted concept that includes a number of interconnected and interdependent elements [45]. Since IS can be evaluated at several levels, it hasn't been completely clear or precisely stated how to quantify IS success. DeLone and McLean, however, had a significant breakthrough in 1992 when they performed a thorough analysis of the literature on IS success and presented a model for IS success [46]. As shown below, in the initial model proposed (in their 1992 paper), they identified six dimensions or components of IS success: system quality, information quality, use, user satisfaction, individual impact, and organizational

impact. Still, these six dimensions are not independent success measures, but are interdependent [42].

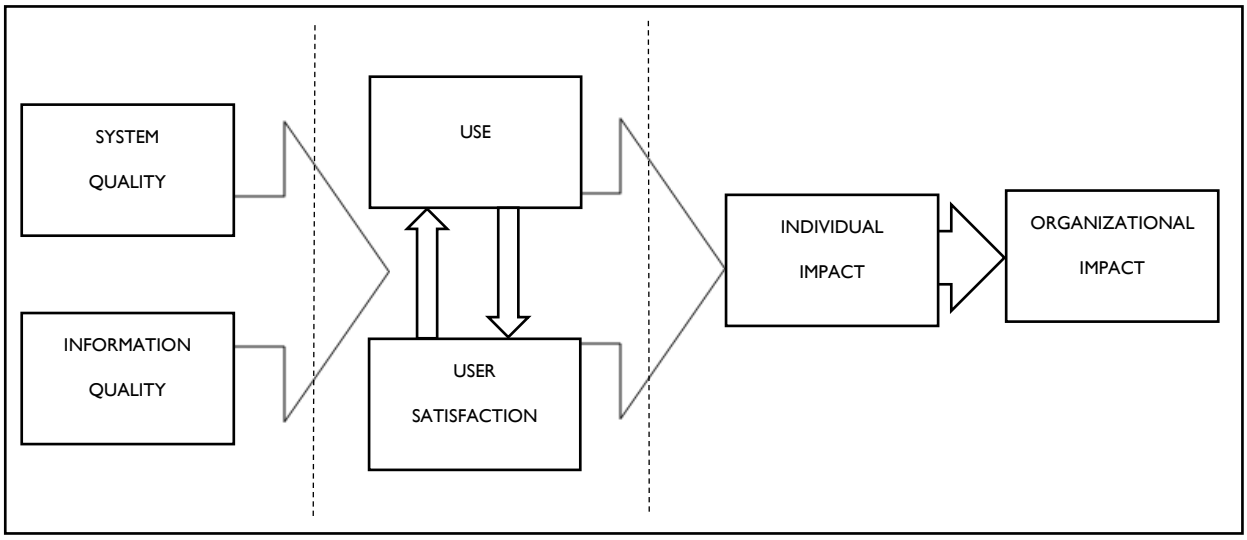


Figure 1: Scheme of the DeLone & McLean IS Success Model (1992) [16]

The initial IS success model required additional validation, thus DeLone and McLean suggested an updated model based on a review of the literature [46]. DeLone & McLean evolved their original model in a subsequent article after reviewing empirical investigations conducted after 1992 in order to take into consideration the suggested modifications to their model [42].

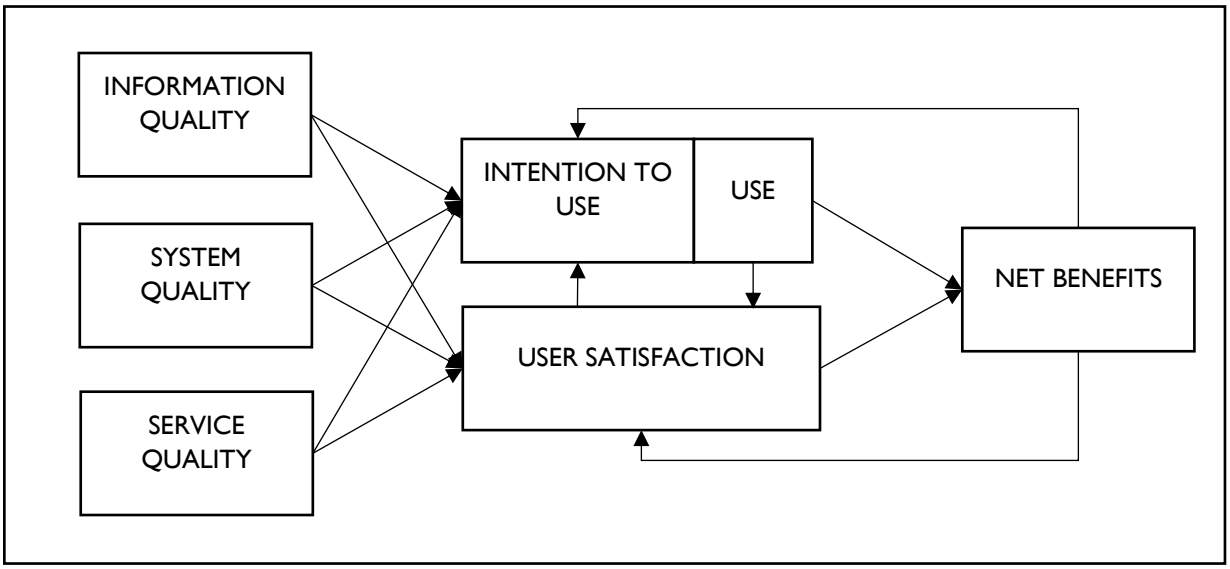


Figure 2: Scheme of the Updated DeLone & McLean IS Success Model (2003) [12]

Thus, as also demonstrated above, the primary differences between the original and updated models included: the addition of service; the addition of intention to use (to measure user attitude); and the merge of individual impact and organizational impact into the net benefits construct [46].

The DeLone & McLean model has also been found to be a useful framework for organizing IS success measurements [42]. *"The model has been widely used by IS researchers for understanding and measuring the dimensions of IS success, which include:*

- *"System quality: the desirable characteristics of an information system (for example: ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times).*
- *Information quality: the desirable characteristics of the system outputs; that is, management reports and Web pages (for example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability).*
- *Service quality: the quality of the support that system users receive from the IS department and IT support personnel (for example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff).*
- *System use: the degree and manner in which staff and customers utilize the capabilities of an information system (for example: amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use).*
- *User satisfaction: users' level of satisfaction with reports, Web sites, and support services.*
- *Net benefits: the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations (for example: improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development)."*

The authors also mention in their 2008 article [39] that the organizational context affects how the DeLone & McLean model can be used in practice. Therefore, the researcher who wants to use the model must be familiar with the organization and IS that is being studied. The types of measurements that are employed for each success dimension will depend on this [42].

From the revised model proposed by DeLone & McLean (2003) [12] it is intended to now highlight the dimension of "User Satisfaction". This option to approach this dimension with more emphasis is based on the centrality that it has in the context of the present investigation.

1.2.2. User Satisfaction: Central Aspect of the Success of Information Systems

The evaluation of the processes of implementation and maintenance of IS, as described above, can be carried out using different strategies and references. DeLone & McLean's model constitutes an essential theoretical framework for IS assessment processes, given its multidimensionality.

As we have seen, investigations based on that model can be conducted taking as reference only some of the dimensions (that are interdependent). "User Satisfaction" is one of the dimensions that should be studied, in particular, when it comes to evaluating IS that have already passed the phases of the Systems Development Life Cycle: *"preliminary analysis, system analysis, system design, programming, testing, implementation and maintenance"* [47] [48], as is the case of SClínico®. Indeed, "User satisfaction has been considered as the measure of information system effectiveness success" [49].

The measurement of satisfaction has had a long history within the IS discipline [50]. Given the enormous rise in the number of organizational employees using computers for work and the resulting requirement to assess the effectiveness of such usage, "user satisfaction" is an issue that is becoming more and more relevant. This has helped "User Satisfaction" become perhaps the most widely used single measure of IS success [51], and is often used as a replacement measure of IS effectiveness [52].

User satisfaction is a possible quantifiable, generally accepted proxy for utility in decision-making, and is viewed as a subjective indicator of system success; it replaces the often absent quantitative indicators of IS efficacy [41].

Therefore, "User information satisfaction" can be defined as the *"extent to which users believe the information system available to them meet their information requirements*" [41]. Melone (1990) (cited by Bergersen, 2004) [51], *"concluded that an individual's perceptions of the computer system and related activities are predictive of the success of the computer system, and that user satisfaction is an affective attitude toward all the various activities surrounding an end-user's interaction with a computer-based information system".*

In his 2004 article [51], Bergersen mentions the various studies carried out with regard to user satisfaction that illustrate that user satisfaction is used as a measure of a systems success. The author also refers that user satisfaction is proved to have a strong relationship with user participation and that there is evidence that the users' expectations towards the system will play an important role in how satisfied they will become.

Thus, considering the above, it is demonstrated why the focus, in the present investigation, on the dimension "User Satisfaction".

As previously mentioned, the satisfaction of IS users is an increasingly pressing issue, considering the huge growth in the number of health professionals and, in particular, nurses, who, within the services, use IS in their daily workplace, to which Portugal is no exception.

Determining the perceived level of satisfaction with the system and, at the same time, identifying the determining factors of this satisfaction, is the key to improving users' perception of the IS [5].

A question that imposes itself, when we intend to evaluate the satisfaction of users of the IS is how to do it. In this context, several questionnaires were created in the area of user satisfaction with IS [53], being the use of questionnaires a common reality in the context of NIS evaluation [19].

Taking into account the wide range of instruments available to assess the satisfaction of IS users, it was decided to use the instrument developed by Campos (2012) [5] in the present investigation. The author refers in her study that the option not to use any of the instruments described in the previous literature was not based on their lack of fidelity: the main weakness of those instruments was linked to their content validity, that is, with the specific items of information under consideration. The author found that a significant part of the available instruments was aimed at "general satisfaction" with the system. On the other hand, after reviewing the instruments and respective investigations, the author found that very few studies focused on nurses' satisfaction as users of a nursing information and documentation system.

Indeed, we also consider that, when our intention is to assess nurses' satisfaction with the NIS in use, the various instruments available are insufficient. It was found that a significant part of the available instruments, with the exception of the one developed by Campos (2012) (and later applied in several studies), is aimed at "general satisfaction" with the system. With the research carried out in the literature ([18], [19], [24], [54]), we concluded that very few instruments focused specifically on nurses' satisfaction, as users of a nursing information and documentation system, and hence the option for the questionnaire developed by Campos (2012) – "User Satisfaction of Nursing Information Systems Questionnaire".

1.3. Study Justification

The theme for this research work emerged from the convergence of factors not only academic but also professional.

Academically, it allows to answer to the imperative of preparing a Master's dissertation in Medical Informatics: *"(…) a field concerned with the management and use of information in health and biomedicine"* [55]. Especially when compared to other medical sciences, is still a "young" field [56], having only been established in the decades after the 1940s advent of the digital computer

[34]. Medical Informatics has a multidisciplinary nature, which interacts with various fields (including, for example, the clinical sciences, the public health sciences, or computing sciences) [34], and it is also a heterogeneous field, with individuals of diverse backgrounds and skill degrees [55].

As for professional factors, the researcher works daily with NIS and, primarily, with SClínico® at ACeS Tâmega II – Vale do Sousa Sul. The mission of the ACeS is to ensure the provision of primary healthcare to the population in its geographical area of influence and, as its attributions: to develop activities to promote health and disease prevention; provide care in illness and link to other services for continuity of care; develop activities of epidemiological surveillance, health research, control and evaluation of results; and participate in the training of different professional groups in their different stages (undergraduate, graduate and continuous) [57].

Thus, considering the mission and values defended by ACeS, and all the investment made by the ACeS in IT, it is intended that this work may contribute to the optimization of the NIS in use in ACeS.

According to Moreira [17], we can only evolve, in terms of quality of care and organizational success, by knowing and evaluating the success of IS, with a view to ensure their alignment with the organization's strategic objectives. However, and according to Rogers *et al.* [58], considering the role of nurses in healthcare, there is still lack of evaluations of NIS in the literature.

It is also evident that the use of modern IT offers tremendous opportunities (for example, to reduce clinical errors or to increase the efficiency of care) [59]. However, there are also threats associated with IT in healthcare: modern information systems are expensive, and when they fail, patients and employees might be impacted [15]. Therefore, evaluating IT in healthcare is a crucial process [60], offering information and improving decision-making by applying the knowledge created to address difficulties [61].

The evaluation of IS, which includes the dimension of user satisfaction [5], has several dimensions and can be done based on multiple paradigms. One of the most important difficulties in the field of IS has been identified as measuring the effectiveness of IS. Numerous studies have been performed to investigate this problem. The most appropriate set of variables to use when evaluating users' perceptions of IS success is still under intense debate [62]. *"Success", then, is a multi-dimensional concept, which can be defined rather differently by the different involved parties, and which evolves over time"* [44].

Therefore, and considering all the above, it seems relevant to develop this research to describe the level of satisfaction of nurses as users of NIS in electronic support in the ACeS Tâmega II – Vale do Sousa Sul and, ultimately, to contribute to the improvement of the IS in use.

Thus, for the present investigation, the objectives presented below were defined.

1.4. Purpose and objective(s)

Having regard to the above, the present work aims to describe the level of satisfaction of Nurses as users of NIS in Electronic Support in the ACeS Tâmega II – Vale do Sousa Sul.

It is intended to highlight the importance of evaluating the success of NIS from the user's perspective and its usefulness in improving healthcare. It is also intended to highpoint strengths and areas for enhancement in the IS under study, through informative summaries on aspects or dimensions to be improved.

2. MATERIAL AND METHODS

Below is the description of the purpose and objective(s); type of study and aspects related to its design; the context in which the investigation was carried out; the population and sample; the data collection instrument used; and explanation of the procedures inherent to the collecting, processing, and data analyses.

2.1. Type of study

This study is inserted within the quantitative paradigm, with a descriptive, exploratory, and cross-sectional approach.

Quantitative research makes use of quantification, both in the collection and in the treatment of information, using statistical techniques, aiming at results that avoid possible distortions of analysis and interpretation, and allowing a greater margin of safety [63] [64]. Quantitative data are characterized as objective, valid and reliable and, typically, the samples are composed of a large number of individuals, selected randomly, and must be representative of a population for which the results are generalized. Data collection is generally carried out through questionnaires and data is analyzed using descriptive and analytical statistical techniques [65], which is in line with what was carried out in the present study.

As for descriptive studies, they describe the reality and can be a very important management tool in health systems [66].

Cross-sectional studies allow the visualization of the situation of a population at a given moment, as snapshots of reality [67]. They describe the situation at a given moment, with the main advantages being its low cost, its easy feasibility and the speed with which the data obtained can be returned [66].

2.2. Study design

This stage depends on the nature of the investigation problem, in this case, the present work aims to describe the level of satisfaction of Nurses as users of NIS in Electronic Support in the ACeS Tâmega II – Vale do Sousa Sul. The study design refers to the logical plan elaborated and used by the researcher to obtain answers to the research questions. The elements that constitute it are: the sample, the conditions under which the data will be collected, the data collection methods and the choice of analysis method [68].

Thus, taking these elements into account, the present research study included a first step of reviewing the literature on the problem under study.

Afterwards, the phase of "field work" progressed, where data collection was carried out. The "*Questionnaire on User Satisfaction of Nursing Information Systems"* was selected as the data collection instrument, already validated by Campos (2012) [5] (appendix 1).

Initially, it was considered feasible to study the entire population, that is, all nurses from ACeS Tâmega II - Vale do Sousa Sul who used electronic nursing information and documentation systems. Then, and following similar directions used in other studies ([5] [7] [17] [69]), it was defined as inclusion criteria the nurses who had been working for more than three months in the functional units of the ACeS. However, as expected, it was not possible to collect the "opinion" of all nurses in the defined sample. In fact, 98 nurses out of 159 possible answered the questionnaire, that is 61,64%.

The analysis and interpretation of the results obtained also accompanied the preparation of this report.

2.3. Study context

Portugal has seven ARS: North, Centre, Lisbon and Tagus Valley, Alentejo, Algarve, Azores and Madeira [70]. Each of these ARS has several ACeS under its purview: *"public health services with administrative autonomy, made up of several functional units, which group one or more health centers, and whose mission is to guarantee the provision of primary healthcare to the population of certain geographic area"* [71]. ACeS Tâmega II - Vale do Sousa Sul, it's located in the northern region of Portugal, and has its headquarters in the municipality of Penafiel. It is under the responsibility of ARS North and has as its area of influence the municipalities of Paredes, Penafiel, and Castelo de Paiva.

It is constituted of several functional units (appendix 2), with a total of 449 employees, of which 159 are Nurses (according to data provided by the Nursing Direction of ACeS Tâmega II – Vale do Sousa Sul).

SClínico® is in use, in all UCC (Care Units in the Community); in all UCSP (Personalized Healthcare Units); in all USF (Family Health Units); in the USP (Public Health Unit); and in the URAP (Unit of Shared Assistance Resource).

There are several applications accessible via the ARS North Intranet. However, the use by nurses of each of them is residual, hence the present study focuses only on this EHR (SClínico®).

SAPE® was implemented in ACeS in the late 90's, early 2000's (according to data provided by the SAPE Group of the ARS North).

Training actions were carried out on the use of SAPE® and on the classified language (ICNP™) in its backend. As of 2014, instead of SAPE®, SClínico® was implemented/used (according to data provided by the SAPE Group of the ARS North).

This system was implemented, from the beginning, in all functional units of ACeS and is currently in use in all units.

In view of the above, at this stage in which we are witnessing the use of NIS in electronic form in most of the healthcare facilities, it is pertinent to advance for an evaluation process of them.

2.4. Population and Sample

Population (or universe) is the set of animate or inanimate beings that have at least one characteristic in common [72]; it is a collection of elements or subjects that share common properties, defined by a set of criteria [68]. Sample is a subset of the population, it is a part of the whole [72]; it is a subset of a population or a group of subjects that are part of the same population and must be representative of the target population [68].

The population of this study, as previously mentioned, corresponded to all nurses from ACeS Tâmega II - Vale do Sousa Sul who used electronic nursing information and documentation systems and, as an inclusion criterion, who had been working for more than three months in the ACeS functional units. The size of the population eligible for the study corresponded to 159 nurses.

Later, more precisely in 3.1., the characterization of the sample is described in greater detail.

2.5. Data collection instrument: *"Nursing Information Systems User Satisfaction Questionnaire"*

The questionnaire is a measurement instrument that translates the objectives of a study with measurable variables, helping to organize, normalize and control data, in such a way that the information sought can be collected in a rigorous way [68]. Is one of the most used data collection methods requiring, on the part of the subjects, written answers to a set of questions [68]. It can be delivered and collected in person, by conventional mail or by email and is probably one of the fastest and cheapest methods for obtaining data [73]. The questionnaires can have different levels of structure: they can contain closed questions, in which the subject is submitted to choices of possible answers; or open questions, that ask for written answers from the subjects [68].

Thus, the questionnaire was the data collection instrument selected for the present study, more specifically, the *"Nursing Information Systems User Satisfaction Questionnaire"*. This questionnaire was constructed and used for the first time by Campos in 2012 [5].

The choice of this questionnaire over other possible instruments was linked to several factors: since its construction and use for the first time in 2012, it has already been applied in several studies ([5] [7] [17] [69] [74]); puts the focus on users and NIS [17]; and the researchers

responsible for developing the questionnaire are part of the CIDESI-ESEP (Centre for Information Systems and ICNP™ Research and Development of Nursing School of Porto – Centre accredited by the International Council of Nurses).

According to Campos [5], the entire process of creating the questionnaire was based on a thorough analysis of the relevant literature, including a close examination of DeLone & McLean's Successful Model of Information Systems (2003) and the identification of the various pertinent areas of user satisfaction. Campos began by defining a preliminary version of the contents and the questionnaire model (a process shared ate the time with another Master's student), and then moved on to a review process by a team of NIS specialists. That team of specialists then divided the questionnaire into two sections and independently examined each section. The questions included were initially examined from a technical, grammatical, and semantic point of view at the ESEP, with eight specialists present, before a general agreement was established. Subsequently, after elaborating the changes resulting from the collective meeting of the panel, the instrument was then forwarded to each expert for a personal review in an effort to refine some of the aspects, but no significant revisions were made.

The final consensual version was delivered to the ESEP's Information Systems Services to carry out the design of the instrument, using the Cardiff Teleform® software.

The questionnaire presents questions mostly closed, consisting of three sections: characterization of the respondent (sociodemographic data, training/use regarding the NIS); characterization of the NIS in use in the nursing department; and a group of 46 questions centered in the satisfaction of users/nurses about the NIS in use, covering the areas described in the literature review and agreed upon by the experts.

The questions related to user satisfaction were essentially operationalized using a Likert scale. Regarding the closed questions, the questionnaire has 5-point Likert scales for response, with the score "1" being defined as "little satisfied" and the score "5" as "very satisfied", in an increasing logic of level of satisfaction, in which intentionally, there is no neutral midpoint.

It should be noted that the Likert scale consists of asking subjects to indicate whether they more or less agree or disagree with a certain number of statements, choosing between five possible answers [68].

2.5.1. Validity and reliability of the data collection instrument

Fidelity and validity are essential characteristics that determine the quality of any measuring instrument. Fidelity is a precondition for validity, that is, if a measurement instrument does not give constant scores or values from time to time, it cannot be useful to achieve the proposed objective. However, fidelity is not a sufficient condition to establish validity: an instrument can

measure a phenomenon constantly and not be valid, that is, not measure the phenomenon that it wants to measure [68].

Fidelity (or reliability) [75], designates the precision and constancy of the results they provide. For example, a measurement scale is faithful if it gives identical results in similar situations. Fidelity exists to varying degrees and is expressed as a correlation coefficient (*r*), ranging on a scale from 0.00 (for no correlation) to 1.00 (for perfect correlation) [68].

Fidelity can be estimated by four means: stability; internal consistency; equivalence and harmonization of measurements from different observers [68]. Considering the fact that we are dealing with a self-report instrument (questionnaire), which collects data in a cross-section, it will only be of interest to focus on internal consistency [7]. Internal consistency (or homogeneity) [75] corresponds to the homogeneity of the items of a measurement instrument. It is estimated by evaluating the correlations or covariance of all statements of an instrument examined simultaneously. This operation indicates how each utterance is linked to the other utterances in the scale. The more the statements are correlated, the greater the internal consistency of the instrument [68]. The main techniques to assess internal consistency are: half/half fidelity, Cronbach's alpha coefficient, Kuder-Richardson coefficient (KR-20) and inter-item correlation. However, Cronbach's alpha (α) is the most commonly used technique to estimate the internal consistency of a measurement instrument when there are several choices for establishing scores (as in the Likert scale). Its value varies from 0.00 to 1.00 (a higher value denotes greater internal consistency) and will be higher if the scale includes several items. The reassessment of (α), whenever the instrument is used, is considered as a step of methodological rigor of the study under development [68] [75].

For better interpretation, the results of (α) are operationalized as follows: <0.6: not acceptable; [0.6 and 0.7[: Weak; [0.7 and 0.8[: Fair; [0.8 and 0.9[: Good and [0.9 and 1]: Excellent [75] [76] [77].

In the present study, the value of Cronbach's alpha coefficient determined was 0.982, which is in line with the findings in previous studies (see 3.1.).

It should be noted that although a very high Cronbach's alpha coefficient can indicate high correlations between the items on the scale, it can also indicate redundancy of one or more items [78]. However, often, the existence of some redundancy between items may derive from the fact that there are issues that are strongly correlated but, strictly speaking, valid and distinct from the point of view of their specific content [17].

As for validity, it refers to the extent to which the instrument or empirical indicator measures what it should measure [68]; that is, it is the degree of precision (assurance) with which the

instrument measures what it is supposed to [75] [79]. It can be estimated in several ways: content validity, criteria validity and construct validity [68] [75].

In our study, it is important to emphasize in a special way the validity of the instrument's content [17]. Content validity refers to the representability of the set of statements that constitute the concept to be measured [68], that is, it reveals how representative the instrument's questions are within the universe of all the questions that could be asked about a specific theme [75] [79]. Indeed (and in more detail described in the study by Campos in 2012) [5], the robustness of the instrument used in the present study derives from the extensive and solid literature review carried out in the conceptual phase of the questionnaire development, from the theoretical framework adopted (which is very consistent and widely recognized – DeLone & Mclean Model) and the use of a panel of experts who, in a quantitative logic, through measures of agreement, reinforced the content validity of the questionnaire [17].

2.6. Procedures for collecting, processing and analyzing data

Initially, authorization to use the questionnaire was requested from its authors (appendix 3).

This was followed by the requests for formal authorization from the Clinical and Health Council of ACeS Tâmega II – Vale do Sousa Sul and from the Ethics Committee of ARS North (appendix 4; appendix 5) to conduct the study.

Prior to sending the informed consents requests (appendix 6) and the questionnaires by ACeS internal mail, the respondents were informed, via institutional e-mail, about the scope of application and the purpose of the questionnaire, as well as the guidelines for filling it out and the timing for answering the questionnaires (appendix 7). Thus, each of the participants had about 15 days to respond to the questionnaire, in the place they considered most opportune.

After confirmation by the ACeS Nursing Executive Board of the number of professionals in each unit, and according to the defined criteria, for each ACeS functional unit, the number of necessary questionnaires and informed consents (these lasts sent in duplicate: one for the researcher and one for the participant) were forwarded via internal mail and accompanied by an envelope, in which they were placed, anonymously and confidentially, after being filled in. Afterwards, each functional unit sent their sealed envelopes containing the informed consents and questionnaires by ACeS internal mail to the researcher's functional unit.

The deadline for the delivery of completed questionnaires had to be extended. Data collection ended up happening between early December 2022 and early February 2023. This was due to the fact that it was a time of multiple holiday periods for several professionals, wish led to various nurses not filling the questionnaires at the requested time. Some nurses were also on medical leave or maternity/paternity leave.

As for the questionnaires, they were prepared in the Cardiff Teleform® software, through the services of the Information Systems Services of ESEP.

The questionnaires were submitted to optical reading, through the Cardiff Teleform® software at ESEP. This automated process allowed a significant reduction: in data collection and analysis time; of possible errors regarding the manual entry of data; of material and human resources in the process.

Then, the computer program itself inspected the data, to detect aberrant information. Despite this automatic process, the data were also inspected by the research team, to rule out possible errors or aberrant information. The errors found were few. These detected errors were related to the difficulty of the software used in reading some handwriting.

After this procedure, the data were processed in a password-protected database in IBM SPSS® program, version 28.0.0.0, for statistical analysis.

In terms of approach for analyzing and discussing the results, it was decided to follow similar strategies to previous studies to facilitate/optimize the potential for comparability of the results obtained.

In view of the extent of data, it was decided to resort to exploratory factor analysis (EFA) of the questions. EFA was designed to allow the reduction of initial data, allowing the search for latent variables (factors) that have relevant explanatory power. This analysis makes it possible to describe a set of variables (or items), which are common elements among the various items [75] [80]. With this procedure, we tried to make the analysis and discussion of the results more comprehensible.

Statistics allows, with the help of descriptive statistics, to summarize numerical information in a structured way in order to obtain a general picture of the variables measured in a sample [68]. Therefore, statistical analysis procedures considered convenient were used for the purpose of constructing an exposition aimed at the objectives of the study.

2.7. Ethical Considerations

In carrying out the study, the ethical and legal precepts inherent to a research process were respected. Several procedures were ensured to guarantee respect for ethical standards regarding the protection of personal data, rights and interests of participants. Thus:

- Formal authorization was requested from the Clinical and Health Council of ACeS Tâmega II – Vale do Sousa Sul and from the Ethics Committee of ARS North (appendix 4; appendix 5);

- Participants signed the informed consent to participate in the study after being informed about the study and were free to withdraw from the study at any time without any need for justification, and without this implying any consequences for themselves;
- The data collected were processed and analyzed without the possibility of relating the data to the participants;
- All data were used only for this study and not for other purposes;
- The paper questionnaires were kept in a safe place whose access was only known to the researcher;
- Paper questionnaires will only be kept for the time prescribed by law for research work and subsequently destroyed;
- The data were processed in a password-protected database in IBM SPSS® program, version 28.0.0.0.
- The data collected were adequate to the objectives of the study and correspond to what is strictly necessary to achieve these same objectives;
- Technical and organizational measures were taken to process data securely.

In the entire process of data collection, data processing and data analysis, confidentiality, anonymity, and respect for the voluntary collaboration of the study participants were guaranteed. There was no threat to the safety of the participants and no incentive or reward mechanism were used for eventual study participants: each of the nurses who decided to answer the questionnaire did it so voluntarily and informed. Those who made the decision not to participate in the study had their wishes respected.

3. PRESENTATION AND DISCUSSION OF RESULTS

This chapter intends to proceed with the presentation and discussion of the results, bearing in mind the objective of the study (as above mentioned): to describe the level of satisfaction of Nurses as users of NIS in Electronic Support in the ACeS Tâmega II – Vale do Sousa Sul.

Descriptive and inferential statistical analysis procedures were used, and the results are presented in two parts. The first part refers to the characterization of the sample, using descriptive statistical analysis. In the second part, the results related to user satisfaction with the NIS in use are presented, grouped into dimensions emerging from the EFA. Also in this part, it is presented the inferential statistical analysis on the influence of the variables of characterization of the respondents.

As previously mentioned, in terms of strategy for analyzing and discussing the results, we chose to follow strategies similar to previous studies to facilitate/optimize the potential for comparability of the results obtained.

3.1. Reliability (Cronbach's Alpha Coefficient)

As mentioned above, in the present study, the value of Cronbach's alpha coefficient determined was 0.982, as shown in table 1, which is considered *"Excellent"* ([75] [76] [77]), and in line with the findings in the studies referenced in table 2.

Table 1: Value of Cronbach's alpha coefficient

Number of items	Cronbach's Alpha
70	0.982

Table 2: Value of Cronbach's alpha coefficient from previous studies

Study	Cronbach's Alpha
Campos (2012) [5]	0.972
Moreira (2014) [17]	0.979
Moura (2015) [7]	0.979
Silva (2016) [74]	0.978

3.2. Sample Characterization

The population of this study, as previously mentioned, corresponded to all nurses from ACeS Tâmega II - Vale do Sousa Sul who used electronic nursing information and documentation systems and, as an inclusion criterion, who had been working for more than three months in the ACeS functional units. The size of the population eligible for the study corresponded to 159 nurses and the NIS in use at the ACeS was the SClínico®.

Of the 159 questionnaires distributed, 98 were filled out and returned voluntarily (table 3).

Regarding the inference potential of the results for the origin population, although the sample is not probabilistic (it is an accidental or convenience sample), it represented 61,64% of the target population of the study, which is quite significant for the analysis and discussion of the results. Although it was not possible, as initially intended, to study the entire population, the size of the sample gathered allows to have a precise idea of the satisfaction of nurses at ACeS Tâmega II – Vale do Sousa Sul with their NIS.

Descriptive statistical analysis was used to characterize our sample.

Table 3: Absolute and relative frequencies of delivered and received questionnaires

NIS	Delivered	Received	
SClínico®	N	N	%
	159	98	61.64

Considering the questions presented in the questionnaire, a characterization of the sample participants was carried out, describing the qualitative variables – table 4 (*"Sex", "Professional Category"; "Had training before the implementation of the NIS in use in the department"; "The training was given by whom"; "Has he been or is a trainer/parameter/facilitator")* and quantitative variables – table 5 *("Age"; "How long have they performed functions in the department"; "Hours of training attended"; "How long have you been using the NIS you mentioned").*

Table 4: Sample characterization according to qualitative variables

VARIABLE	N		%
Sex	Female	80	84.2
	Male	15	15.8
Professional Category	Nurse	56	57.1
	Graduated Nurse	11	11.2
	Specialist Nurse	30	30.6
	Head Nurse	0	0
	Other	1	1.0
Had training before the implementation of the NIS in use in the department	Yes	27	28.4
	No	68	71.6
The training was given by whom	Nurses	15	60.0
	Others	10	40.0
Has he/she been or is a trainer/parameter/facilitator	Yes	5	5.7
	No	83	94.3

Our sample consisted of 98 respondents. As shown in table 4, for some variables, not all respondents gave an answer, which explains the difference in the number of respondents in each question. The sample is mainly characterized by female individuals (84,2%), the remainder being male (15,8%), in a total of 98 individuals. Regarding the professional category, the highest

percentage of respondents were nurses (57,1%), followed by specialist nurses (30,6%). These data are in accordance with those referred by the Portuguese Nurses Order (OE) (2022) [81]. Regarding the training of nurses to use the NIS in use, only 28,4% were trained, considering that the highest percentage (71,6%) did not have any type of formal training. From here it can be seen that many users "learned" to use the NIS in an informal and everyday logic.

As for the question, which alludes to the fact that the respondent is or has been a trainer/parameterizer/facilitator only 5,7% of the respondents said yes.

Regarding the question *"Which NIS have you used?",* there was a diversity of responses, with examples being Alert®, GestCare®, Trace COVID®, JMED®, MedicineOne®, SINUS®, SAPE®, TAONet®, Vacinas® or SiiMA®. Curiously, *"Nursing notes on paper"* was also referred. About the NIS used in ACeS, the most used is SClínico®, the only one on which this study focuses.

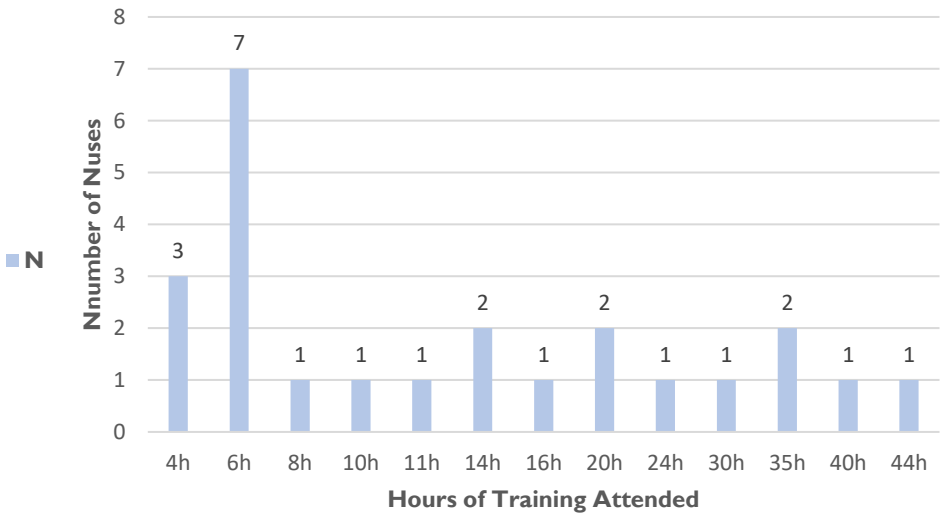
Regarding the characterization of the sample considering the quantitative variables (table 5), the participants had on average 41,44 years old, with the oldest individual being 62 years old and the youngest individual 23 years old. The respondents have been working in the department, on average, for about 12,62 years.

Table 5: Sample characterization according to quantitative variables

VARIABLE	N	Min	Max	*M*	*DP*
Age	98	23	62	41.44	8.49
How long have they performed functions in the department	98	0	33	12.62	9.15
Hours of training attended	24	4	44	15.63	12.58
How long have you been using the NIS	77	0	22	9.05	5.49

As stated above, only 28,4% of the nurses (27 nurses) had training before the implementation of the NIS in use in the department (table 4). Of these, on average, they had 15.63 hours of training attended, ranging from 4 to 44 hours of prior training (table 5). However, as can be seen from figure 3, of the 27 nurses who received previous training, only 24 answered the question *"How many hours of training have you attended?".* The standard deviation is high, varying the number of training hours attended from a minimum of 4 hours to a maximum of 44 hours, with a significant percentage of nurses having attended 6 or less hours of training.

Figure 3: Hours of Training Attended by the Nurses



Regarding the question *"How long have you been using the NIS",* the average is 9.05 years and varies between less than one year (at least 3 months, which is an inclusion criterion in the study) and 22 years (table 5).

3.3. Satisfaction of Users of Nursing Information and Documentation Systems – Global Satisfaction Score

From the outset, it seemed important to calculate a global score of nurses' satisfaction with the NIS in use, on the ACeS (table 6).

Table 6: Overall user satisfaction level with the information system

Variable	*N*	Min	Max	*M*[1]	*SD*[2]
Global Satisfaction Score	98	1.09	4.84	2.41	.57

This also allowed a comparative analysis with previous studies (table 7 and figure 4).

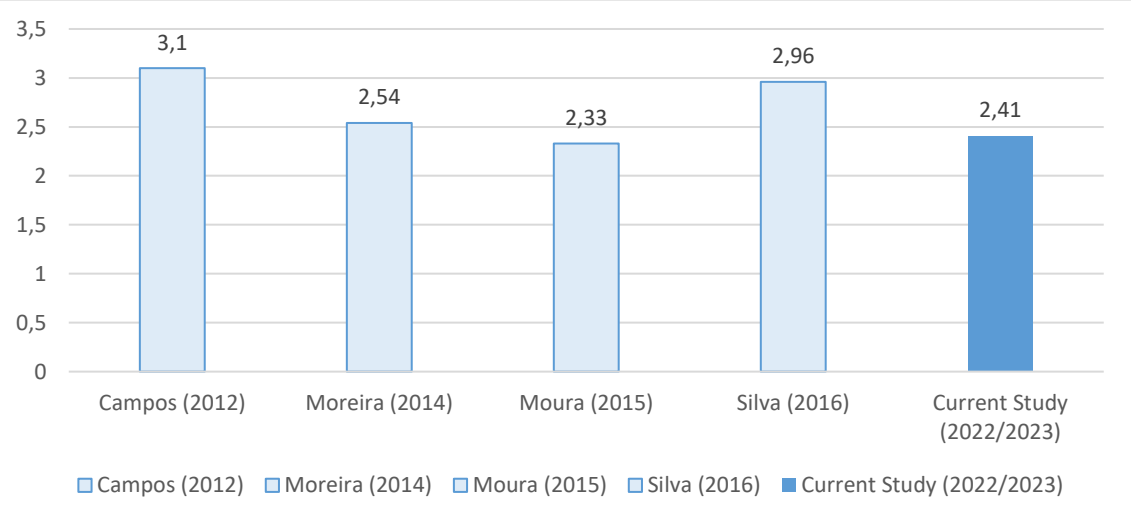
Table 7: Global Satisfaction Score from previous studies

Study	Global Satisfaction Score
Campos (2012) [5] [3]	3.10

[1] *M*: Mean
[2] *SD*: Standard Deviation
[3] Global Satisfaction Score with SAPE®/SClínico® (in this study, results for other information systems were also presented)

Moreira (2014) [17] [4]	2.54
Moura (2015) [7]	2.33
Silva (2016) [74]	2.96

Figure 4: Global Satisfaction Scores



The computation of the aforementioned *"Global Satisfaction Score"* of the users of the NIS in use was conducted following the same terms that previous studies adopted: the average, ignoring the nulls, of all the questions operationalized in the adopted Likert scale and which are part of the third part of the questionnaire. Therefore, the *"Global Satisfaction Score"* with the system corresponds to the average of participants' responses, excluding any null values. In other words, it is calculated by summing the scores given by each subject for every item and then dividing this sum by the total number of valid responses received, rather than by a fixed number of scale items. This score translates, therefore, a global vision of the nurses' satisfaction with SClínico®. It is a value expressed on a continuous quantitative scale, ranging from 1 to 5.

Carrying out a global analysis of nurses' satisfaction with the NIS in use, on a scale of 1 to 5, considering that score 1 corresponds to "little satisfied" and score 5 to "very satisfied", that is, on average, 2.41. The calculated result is lower than that found by Campos [5], Moreira [17] and Silva [74] but higher than that found by Moura [7].

It can thus be seen that the studies carried out in primary healthcare environment (the current study and the one by Moura), obtained lower global satisfaction levels than those implemented at the hospital level.

[4] Global Satisfaction Score with SAPE®/SClínico® (in this study, results for other information systems were also presented)

Several factors may be considered here: is SClínico Hospital® better adapted to the needs of nurses than SClínico Primary Health Care®? Could these levels of satisfaction be linked only to a statistical factor associated with the sample size (samples were considerably smaller in studies carried out in primary healthcare than in hospital studies)? Can primary care nurses be more "demanding" with the NIS than hospital nurses? These are interesting questions but beyond the scope of this study. However, it would be relevant, with additional studies, to study these factors. As shown in table 6, our respondents demonstrated an average Global Satisfaction Score with the NIS of 2,41, which is lower than what can be deemed satisfactory (2,5). This assertion deserves to be evaluated and the subject of reflection at ACeS.

Considering this finding, a strategy was laid out that would allow to determine which aspects or dimensions of user satisfaction stand out the most, both positively and negatively. In this stage, it was thought how appropriate it would be to advance to a method of results aggregation. The goal was to organize the results in a way that was easier to understand. Thus, a factor analysis process was conducted.

3.4. Users Satisfaction with the NIS in Use: Exploratory Factor Analysis (EFA)

Given the size of the data collection instrument used, we decided to apply Exploratory Factor Analysis (EFA).

EFA is a technique that is part of factor analysis and whose overarching objective is to identify the underlying relationships between the measured variables. It is a statistical technique that studies correlations between a large number of variables, grouping them into factors. This technique allows data reduction, identifying the most representative variables or creating a new set of variables, much smaller than the original (Hair *et al.*, 2009 and Kirch *et al.*, 2017, cited by Hongyu, 2018) [82].

However, in EFA, it is necessary to verify if its application is valid for the chosen variables. For this, two evaluation methods are most commonly used: the Kaiser-Meyer-Olkin (KMO) Test and the Bartlett Sphericity Test (Dziuban, Shirkey, 1974, cited by Hongyu, 2018) [82].

The KMO index, also known as the sample adequacy index, is a statistical test that indicates how suitable the application of the EFA is for the data set (Hair *et al.*, 2009; Lorenzo-Seva; Timmerman; Kiers, 2011, cited by Hongyu, 2018) [82]. KMO can range from 0 to 1. As a rule for interpreting KMO indices, values lower than 0.5 are considered unacceptable, values between 0.5 and 0.7 are considered mediocre; values between 0.7 and 0.8 are considered good; values greater than 0.8 and 0.9 are considered great and excellent, respectively (Hutcheson; Sofroniou, 1999; Pereira, 1999, cited by Hongyu, 2018) [82].

As for the Bartlett Test (Bartlett's Test of Sphericity - BTS), in the extreme situation of perfect independence between all variables, the correlation matrix reduces to the identity matrix. This means that the variables do not group together to form any constructs and, therefore, the construction of factors loses all meaning. The BTS has this situation as its null hypothesis and, if it is rejected, it can be concluded that there is some kind of association between the variables and that they may, in fact, jointly represent one or more latent traits. Therefore, the BTS must be statistically significant ($p < 0.05$) [83].

Thus, in general, the results of the KMO test and BTS tend to be uniform, accepting or denying the possibility of applying the EFA. (Dziuban; Shirkey, 1974, cited by Hongyu, 2018) [82].

Thus, after applying the KMO test, the result obtained was .780, which allowed us to verify the adequacy of the sample. As for BTS, the result obtained was $p<.001$ (table 8).

The results obtained for the two measures (KMO test and BTS) indicated that the EFA would be adequate.

Table 8: KMO and Bartlett's Sphericity Test

KMO and BTS		
Kaiser-Meyer-Olkin Test (KMO)		.780
Bartlett's Test of Sphericity (BTS)	**Approximate chi-square**	5660.334
	df	2415
	Significance	<.001

Subsequently, a factor analysis process was carried out using the analysis of factors by extraction with the principal components method, with a fixed number of factors to be extracted (forcing it to 5 Factors), by *Varimax Rotation* and *Kaiser Normalization*, excluding missing values by the *Listwise Method*. With this option, we sought to understand to what extent the five domains or dimensions presented by Campos (2012) [5] were capable of comparison and confirmation. This mathematical process explained 61.557% of the Variance (appendix 8). Some questions, although showing slightly higher saturation values in other factors, were allocated to the most theoretically consistent dimension. For example, by EFA, Q29.5 was initially allocated to the "*Equipment: Speed, Quality and Quantity*" dimension and Q29.1 was allocated to the "*Benefits and Security*" dimension. However, for theoretical reasons, they were allocated to the dimension "*Architecture, Language, Decision Support (Nursing Process) and Graphics".*

From the process described in the previous paragraph, the five dimensions determined had similarities to those found in the works of Campos (2012), Moreira (2014), Moura (2015) e Silva (2016) (table 9). However, with some differences, so that the comparative power of the results with previous studies can be considered relative. These differences may be associated not only

with the sample size but also with the context in which the study was carried out (Primary vs. Hospital healthcare).

Table 9: Dimensions of analysis of the satisfaction of users of the NIS in use (result of the 5-factor forced factor analysis)

Study	Dimensions
Current Study (2022/2023)	Equipment: Speed, Quality and Quantity
	Architecture, Language, Decision Support (Nursing Process) and Graphics
	Benefits and Security
	Information Sharing
	Technical Support and Training
Campos (2012) [5]	Nursing Process
	Information security and maintenance
	IS support mechanisms
	Technical Aspects
	Benefits
Moreira (2014) [17]	Nursing process and Benefits
	Information Sharing
	Support and Training
	Graphics and Security
	Equipment: speed, quality and quantity
Moura (2015) [7]	Nursing process and Benefits
	Information Sharing
	Support and Training
	Graphics and Security
	Equipment: speed, quality and quantity
Silva (2016) [74]	Information Sharing
	Structure and content of information necessary for decision making
	NIS support structures and contributions
	Security, data protection, and technical and training support
	Graphical presentation of data

To facilitate the comparison of the distribution of questions by the 5 domains in the different studies, a comparative table was prepared with the aggregation of questions by domains (appendix 9).

Let us now focus on the results obtained in this study as a result of the factor analysis performed.

3.5. Dimensions of Users Satisfaction with the NIS in Use

In possession of these 5 dimensions of satisfaction of the users of the NIS in use in the ACeS, the results will be presented considering each of the questions that embody each of the dimensions and, naturally, the global satisfaction score calculated for each of the 5 satisfaction areas.

For the analysis of descriptive statistics, the metric nature of the variables was considered, and the observed minimum and maximum values are presented, as well as the measure of central tendency (mean) and measure of dispersion (standard deviation) of the data (table 10).

The score for each factor was calculated considering the average of the responses given by each participant across the items within that particular dimension.

Table 10: Descriptive statistic for total score and for each of the five Dimensions

Dimension	Number of items	Min	Max	*M*	*SD*
Equipment: Speed, Quality and Quantity	7	1.00	4.86	2.10	.76
Architecture, Language, Decision Support (Nursing Process) and Graphics	14	1.00	4.86	2.66	.67
Benefits and Security	24	1.08	4.83	2.43	.66
Information Sharing	16	1.13	4.88	2.57	.62
Technical Support and Training	9	1.00	4.89	1.95	.70
Total Score	70	1.09	4.84	2.41	.57
N = 98 **(Note:** N is 98 because all subjects gave some information for items in each factor and for the total score).					

The number of items and Cronbach's Alpha for each of the five dimensions are also presented (table 11).

Table 11: Number of items and Cronbach's Alpha per Dimension

Dimension	Number of items	Cronbach's Alpha
Equipment: Speed, Quality and Quantity	7	.884
Architecture, Language, Decision Support (Nursing Process) and Graphics	14	.945
Benefits and Security	24	.956
Information Sharing	16	.935
Technical Support and Training	9	.893
Total Score	70	.982
N = 98		

In the following tables, the questions are presented in the order of the questionnaire and not by their "weight" in the extracted factors (that can be seen in appendix 8).
The corresponding graphics are also presented to better understand the data distribution.

3.5.1. *"Equipment: Speed, Quality and Quantity"*

From the literature review, there is ample evidence that the speed of information processing and the ease of use are associated with the users satisfaction with IS [49] [84] [85].
Aspects related to processing speed and ease of use have also been widely considered in studies on the evaluation of information systems [12] [16] [42].
The literature also points to the number of terminals, their availability, and the quality of the equipment as factors that affect the satisfaction of IS users [51].
As is evident in table 12, this is one of the two dimensions (being the other dimension *"Technical Support and Training"*), in which the average value calculated (2.10) is below the average score found for global satisfaction with the NIS in use (2.41).

Table 12: Satisfaction with the "Equipment: speed, quality and quantity"

Dimension	*N*	Min	Max	*M*	*SD*
Satisfaction with the *"Equipment: speed, quality and quantity"*	98	1.00	4.86	2.10	.76

This reveals an important aspect: the two dimensions where users are least satisfied are associated with areas that are extrinsic to the NIS itself [7]. Thus, it can be said that this aspect associated with the equipment should be considered at the ACeS level towards improving user satisfaction with their NIS.
In this dimension, seven questions related to the equipment (either quality and quantity) and the processing speed of the NIS were included (table 13).

Table 13: Descriptive statistics of questions related to the "Equipment: speed, quality and quantity"

Question	*N*	Min	Max	*M*	*SD*
Q30.1 Considering the response readiness (processing speed) of the NIS in use: Regarding the time you spend/spent in carrying out the documentation of care	98	1	5	1.95	.93
Q30.2 Considering the response readiness (processing speed) of the NIS in use: Regarding the speed of registration, recording and data reservation	96	1	5	1.92	.97

Q30.3 Considering the response readiness (processing speed) of the NIS in use: Regarding the speed of access to information already documented by nurses	96	1	5	1.93	.95
Q30.4 Considering the response readiness (processing speed) of the NIS in use: Regarding the speed of access to information already documented by other health professionals	98	1	5	1.91	.95
Q31. Regarding the number of terminals (computers) available to carry out documentation on the NIS in use	96	1	5	2.53	1.10
Q32. Regarding the quality of the terminals (computers) available to carry out documentation on the NIS in use	97	1	5	2.11	1.05
Q44. Regarding the ease of use of the NIS in use	95	1	5	2.44	.85

As for the questions, specifically, the items in which the level of satisfaction was lower are associated with the speed of access to information already documented by other health professionals, and with the speed of registration, recording and data reservation. Translating it into daily practice, users/nurses often say that "the system is slow" and, perhaps, that is exactly what is demonstrated here by these results.

On the other hand, with higher levels of satisfaction in this dimension, is the number of terminals (computers) available. This result could be revealing of the investment made by ACeS in equipment.

Also, with higher levels of satisfaction, is the ease of use of the NIS. This is a very positive result since, as mentioned by Chirchir *et al.* (2019), *"(…) user performance is as its best when the system is perceived as more useful and easy to use"* [86].

In this specific dimension, it is possible to compare the results obtained in the present study with the previous studies, such as Moreira (2014) [17] and Moura (2015) [7] since the questions allocated in this dimension are very similar. Thus, in the present study, the level of satisfaction in this dimension is higher than in the aforementioned studies.

Hardware and software problems are a source of daily dissatisfaction on the part of users (such as, for example, prolonged processing times, frequent breakdowns of computers and printers or terminals in insufficient quantity). In addition, another aspect to be considered, within the institution itself, there are sometimes significant differences in the number and quality of terminals, differing from department to department (or from health center to health center).

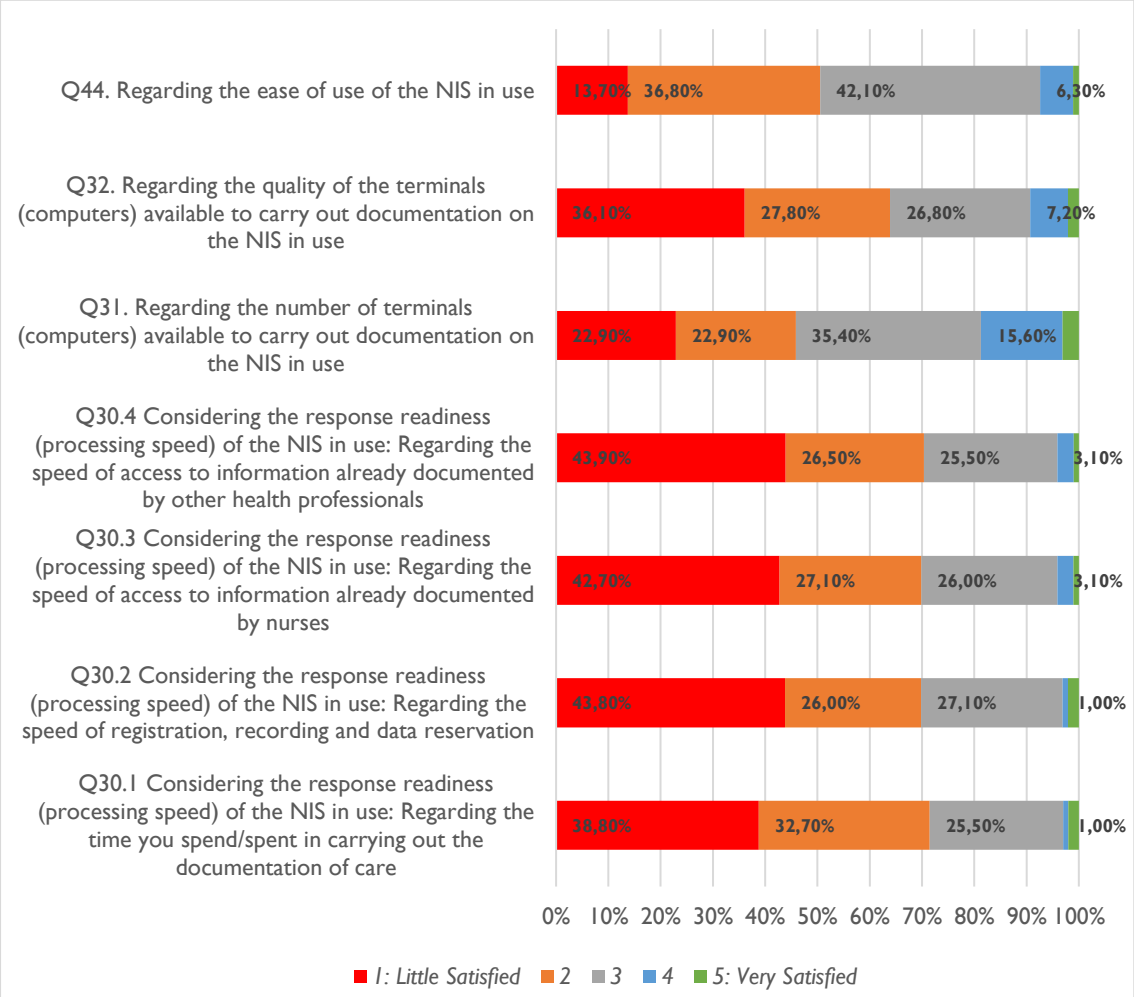
In this dimension, the quality of technical support services can be decisive and here, a big difference exists between Primary Healthcare and Hospitals: usually, at hospital level, technical support services are located at the building(s). At the level of health centers, services are shared

and, normally, do not operate in the building(s) itself. In addition, technical support services are often undersized for the real needs of users and the number of terminals.

The results in this specific dimension require reflection by ACeS/ARS to increase user satisfaction.

The figure below is shown to better understand the data distribution (in a scale of 1 to 5, considering that score 1 corresponds to *"little satisfied"* and score 5 to *"very satisfied"*).

Figure 5: Questions related to the *"Equipment: speed, quality and quantity"*



	1	2	3	4	5
Q30.1	38.8%	32.7%	25.5%	1.0%	2.0%
Q30.2	43.8%	26.0%	27.1%	1.0%	2.1%
Q30.3	42.7%	27.1%	26.0%	3.1%	1.0%
Q30.4	43.9%	26.5%	25.5%	3.1%	1.0%
Q31.	22.9%	22.9%	35.4%	15.6%	3.1%
Q32.	36.1%	27.8%	26.8%	7.2%	2.1%
Q44.	13.7%	36.8%	42.1%	6.3%	1.1%

3.5.2. *"Architecture, Language, Decision Support (Nursing Process) and Graphics"*

This dimension focuses on some of the basic and fundamental aspects of the "core" of the Nursing discipline.

"The common thread uniting different types of nurses who work in varied areas is the Nursing Process" – the essential core of practice to deliver holistic, patient-focused care [87]. The Nursing Process functions as a systematic guide to client-centered care with five sequential steps: assessment, diagnosis, planning, implementation and evaluation [88]. The nursing process, which incorporates standardized nomenclature, provides a useful framework for the documentation of nursing care in electronic support [89].

Thus, regarding the standardized nomenclature/classified language – International Classification for Nursing Practice (ICNP™) – The Portuguese Nurses Order (OE) (2007) [4], defined that the NIS and electronic records should include the mandatory use of the ICNP™. The ICNP™ *"classifies patient data and clinical activity in the domain of nursing"*, and has a *"formal foundation that is used to compose and represent diagnoses, interventions, and outcomes in a polyhierarchy"* [90]. There are a number of benefits associated with the use of ICNP™ such as *"increase nursing visibility, ensure safety and enhance quality"* [91].

As is known, *"IS provide nurses with a variety of resources to facilitate their work. Nurses' use of IS changes the way they collect assessment data, and plan and implement patient care"* [92]. As for the "Decision Support", the introduction in IS of structures to support decision-making in nursing was carried out with the aim of helping nurses in their clinical decisions (Hirdes *et al.*, 2008 cit. by Teixeira *et al.*,2012) [93]. Therefore, the genesis of these IS must be based on theoretical assumptions frameworks and the use of a common language (as mentioned above), which allows standardized and systematized records (Lyerla *et al.*, 2008 cit. by Teixeira *et al.*,2012) [93].

In this dimension, "Graphics" were also included. "Graphics" refers to the graphical presentation of the (different) interfaces in the IS [5] and has been frequently contemplated in research on the evaluation of IS [16] [19]. Information Design is a very relevant aspect and refers to *"the science and practice of designing forms, reports, computer screens, etc., so that the information they contain can be found rapidly and interpreted without error"* (adapted from Sless, 1994) [34]. This is an important area of research developed more in medicine than in nursing [19] and, to be taken into account, that content design is one of the essential requirements for the successful implementation of an IS [94].

In the context of the present study, it was in this dimension, with a set of 14 questions, in which the nurses from ACeS Tâmega II - Vale do Sousa Sul were most satisfied with the NIS in use – *M:* 2.66 (table 14).

Table 14: Satisfaction with the "Architecture, Language, Decision Support (Nursing Process) and Graphics"

Dimension	*N*	Min	Max	*M*	*SD*
Satisfaction with the *"Architecture, Language, Decision Support (Nursing Process) and Graphics"*	98	1.00	4.86	2.66	.67

In this dimension, were included questions related to Graphics and to the Nursing Process, more specifically the architecture of the NIS; the classified language used in the NIS and the principles of referential integrity between the entities of the care plan (diagnoses, nursing interventions and outcomes); and the potential of the system to support the clinical decision process (table 15).

Table 15: Descriptive statistics of questions related to the *"Architecture, Language, Decision Support (Nursing Process) and Graphics"*

Question	*N*	Min	Max	*M*	*SD*
Q1.1 Regarding the language used in the NIS in use for the construction of statements... of Nursing diagnoses	98	1	5	2.86	.80
Q1.2 Regarding the language used in the NIS in use for the construction of statements... of nursing interventions	97	1	5	2.91	.82
Q3. Regarding the importance attributed to "Nursing Diagnoses", in the architectural structure of the NIS in use	96	1	5	2.90	.93
Q4. Regarding the importance attributed to "Nursing Interventions", in the architectural structure of the NIS in use	97	1	4	2.92	.98
Q6. Regarding the association between a specific diagnosis, the respective interventions and nursing outcomes	95	1	5	2.66	.94
Q7.1 Regarding the level of support for clinical decision-making, provided by the NIS in use, in the identification... of Nursing diagnoses	96	1	5	2.68	.88
Q7.2 Regarding the level of support for clinical decision-making, provided by the SIE in use, in the identification... of Nursing interventions	97	1	5	2.78	.88
Q7.3 Regarding the level of support for clinical decision-making, provided by the NIS in use, in the identification... of Nursing results (change in diagnostic status / term of diagnoses)	97	1	5	2.58	.89
Q13. Regarding the mechanisms/devices for managing access by other professionals to the documentation available in the NIS in use	98	1	5	2.89	.93
Q29.1 Regarding the graphical presentation of the interfaces ("Displayed Pages") in the NIS in use: From the "initial customer assessment"	98	1	5	2.48	.89
Q29.2 Regarding the graphic presentation of the interfaces ("Displayed Pages") in the NIS in use: From the "client's care plan"	97	1	4	2.47	.80

Q29.3 Regarding the graphic presentation of the interfaces ("Displayed pages") in the NIS in use: From the client's "documentation of the execution of autonomous Nursing interventions"	96	1	5	2.47	.83
Q29.4 Regarding the graphical presentation of the interfaces ("Displayed pages") in the NIS in use: From the client's "documentation of the execution of interdependent Nursing interventions"	98	1	5	2.48	.83
Q29.5 Regarding the graphic presentation of the interfaces ("Displayed pages") in the NIS in use: From the "Documentation of the evolution / results of Nursing"	97	1	5	2.33	.77

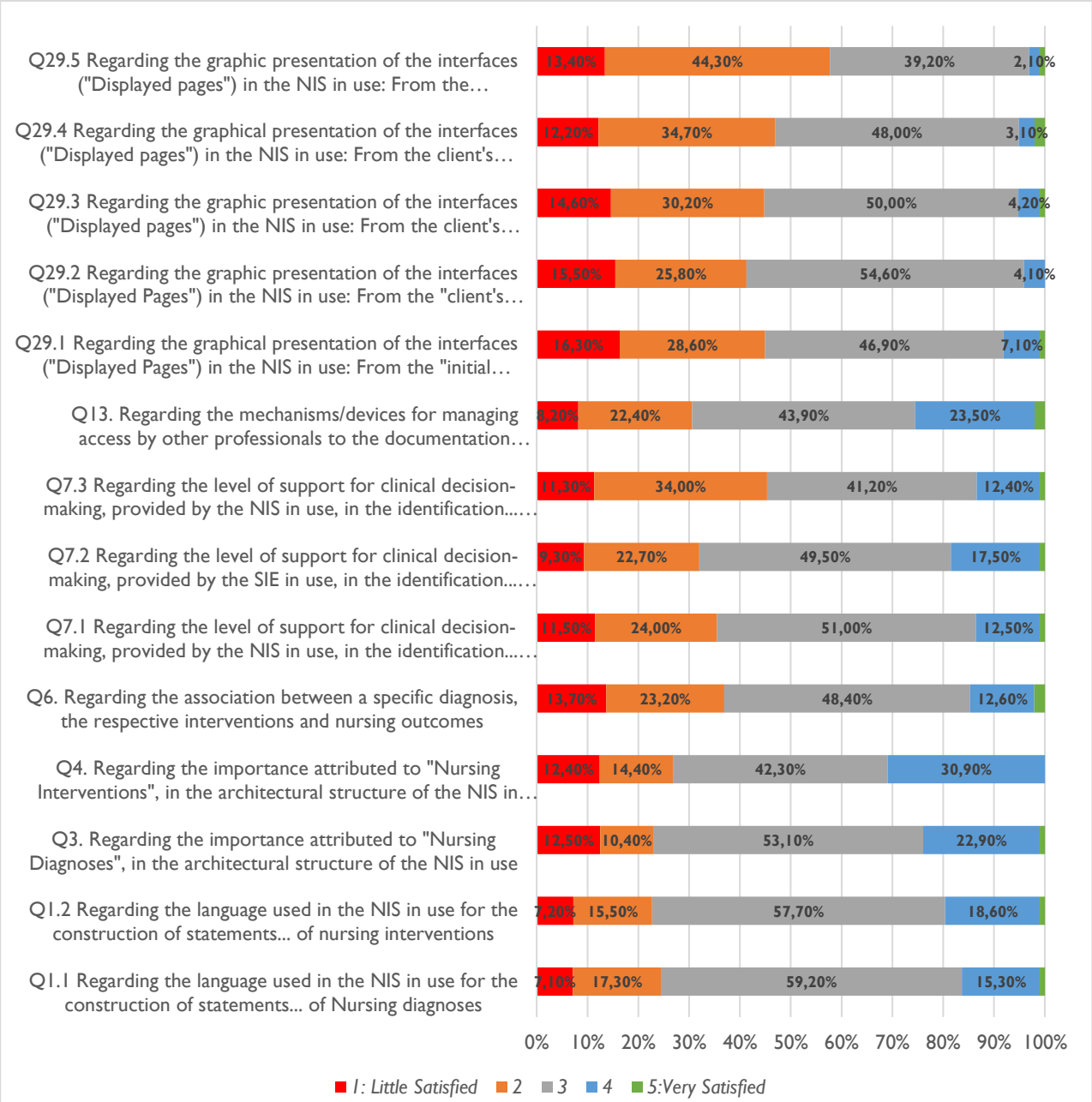
Although it is in this dimension that users were most satisfied with the NIS in use, it is visible that in terms of Graphics (from Q29.1 to Q29.5), the level of satisfaction is lower compared to the aspects associated with "Architecture, Language, and Decision Support (Nursing Process)" (from Q1.1 to Q13). It should be noted that in terms of graphics, the item in which satisfaction is lowest (Q29.5) is related to the graphic presentation of the "Documentation of the evolution / results of Nursing". This is a relevant aspect in the sense that users are not satisfied with the graphics of an essential aspect that makes it possible to turn visible the health gains sensitive to nursing care.

The questions associated with Architecture, Language and Decision Support (Nursing Process) achieved higher levels of satisfaction. However, in this "subgroup" (from Q1.1 to Q13), the question with the lowest score (Q7.3) was also associated with the Nursing Results, more specifically, with the level of support for clinical decision-making, provided by the NIS in use, in the identification of Nursing results.

With regard to graphics, comparing with previous studies (Moreira, 2014 and Moura, 2015) [17] [7]), and considering that the dimensions in these studies also covered other issues that go beyond graphics, the results are similar to the present study.

The figure below is shown to better understand the data distribution (in a scale of 1 to 5, considering that score 1 corresponds to *"little satisfied"* and score 5 to *"very satisfied"*).

Figure 6: Questions related to the *"Architecture, Language, Decision Support (Nursing Process) and Graphics"*



	1	2	3	4	5
Q1.1	7,1%	17,3%	59,2%	15,3%	1,0%
Q1.2	7,2%	15,5%	57,7%	18,6%	1,0%
Q3.	12,5%	10,4%	53,1%	22,9%	1,0%
Q4.	12,4%	14,4%	42,3%	30,9%	0,0%
Q6.	13,7%	23,2%	48,4%	12,6%	2,1%
Q7.1	11,5%	24,0%	51,0%	12,5%	1,0%
Q7.2	9,3%	22,7%	49,5%	17,5%	1,0%
Q7.3	11,3%	34,0%	41,2%	12,4%	1,0%
Q13.	8,2%	22,4%	43,9%	23,5%	2,0%
Q29.1	16,3%	28,6%	46,9%	7,1%	1,0%

Q29.2	15,5%	25,8%	54,6%	4,1%	0,0%
Q29.3	14,6%	30,2%	50,0%	4,2%	1,0%
Q29.4	12,2%	34,7%	48,0%	3,1%	2,0%
Q29.5	13,4%	44,3%	39,2%	2,1%	1,0%

3.5.3. *"Benefits and Security"*

The benefits refer to the impacts that the use of the IS entails [7]. NIS *"are computer systems that manage clinical data from a variety of healthcare environments and made available in a timely and orderly fashion to aid nurses in improving patient care"* [36]. With the implementation of NIS in services, there are several expected benefits: make relevant patient data available in a usable form so patient care problems can be solved; process information to support management functions; provide a comprehensive automated information processing system for all phases of the nursing process; or develop care plan for families and patients [36].

However, the benefits of the NIS will only be achieved if they are based on and supported by the fundamental values of the Nursing profession. For this to happen, it is essential that nurses can overcome the difficulties in using Information Technologies and that research in the field of Nursing Informatics is promoted (McBride, 2005 cit. by Azevedo, 2010) [95].

As mentioned in previous studies, in the field of "Benefits", it was possible to integrate aspects related to the contributions of the NIS regarding "Information Sharing". And, according to the model by DeLone and McLean (2003), "Information Sharing" could easily be seen as a benefit. However, in the results aggregation model that was adopted, "Information Sharing" was conceived as a per se dimension of ACeS nurses' satisfaction with their NIS.

Regarding "Security", it is important to understand what is referred to when talking about "Information Security: it refers to the *"protection of information systems against unauthorized access or modification of information, during its storage, processing or transmission, and against denial of service to authorized users or provision of service to unauthorized users, including the measures necessary to detect, document and counter such threats"* [96]. Thus, an information system is considered secure if it has the following characteristics: confidentiality, in the sense of allowing access only to authorized users; integrity, that is, the guarantee that the information is correct; and availability, which means the possibility of using the information when it is needed [97]. In fact, some authors argue that 5 pillars can be considered: availability, integrity, authentication, confidentiality, and nonrepudiation [98].

"Benefits and Security" is one of the three dimensions in which the average level of satisfaction value calculated (2.43) is slightly above the average score found for overall satisfaction with the NIS in use (2.41) (table 16).

Table 16: Satisfaction with the "Benefits and Security"

Dimension	*N*	Min	Max	*M*	*SD*
Satisfaction with the *"Benefits and Security"*	98	1.08	4.83	2.43	.66

In this dimension, questions related to the benefits and Security of the NIS were added, as can be seen from the consultation of the set of 24 questions that make up this dimension of user satisfaction (table 17).

Table 17: Descriptive statistics of questions related to the "Benefits and Security"

Question	*N*	Min	Max	*M*	*SD*
Q1.3 Regarding the language used in the NIS in use for the construction of statements... of nursing results	98	1	5	2.48	.91
Q2. Regarding the importance attributed to the "Initial Nursing Assessment", in the architectural structure of the NIS in use	95	1	5	2.63	1.07
Q5. Regarding the importance attributed to "Nursing Outcomes", in the architectural structure of the NIS in use	96	1	5	2.57	.98
Q8. Regarding the alert devices/mechanisms available in the NIS in use (e.g. allergies, drug interactions, …)	98	1	5	2.61	1.10
Q9. Regarding the ability of the NIS in use to represent the care effectively provided to the client	98	1	5	2.20	.91
Q10. Regarding the ability of the NIS in use to carry out content / parameterization updates, depending on the specific needs of the department	98	1	5	2.33	.95
Q11. Regarding the ability of the NIS in use to carry out updates based on scientific evidence	98	1	5	2.38	.93
Q14. Regarding the maintenance of customer data ("file") over time in the NIS in use	98	1	5	2.73	.93
Q15. Regarding the overall level of security/protection of NIS customer data in use against misuse "by outsiders" (hackers)	93	1	5	2.69	.96
Q16. With regard to the overall level of security/protection of NIS customers' data in use, against misuse "by authenticated users" (already documented data that can be changed by another professional)	95	1	5	2.75	.86
Q17. Regarding the security mechanisms that prevent the documentation of aberrant data in the NIS in use (e.g.: "Body temperature =60°C")	98	1	5	2.42	1.06
Q18. Regarding the possibility of documenting the information reported as relevant to the exercise of the professional activity	95	1	5	2.52	.87
Q19. Regarding access to information necessary for the exercise of professional activity	94	1	5	2.64	.91
Q28. Regarding the frequency of content updates / parameterization of the NIS in use, depending on the specific needs of the department	81	1	5	2.40	.85

Q35. Regarding the contribution of the NIS in use in promoting the efficiency of the nursing care provided to the client	97	1	4	2.37	.93
Q36. Regarding the contribution of the NIS in use in promoting decision-making capacity and autonomy in the exercise of their professional activity	97	1	5	2.43	.88
Q37. Regarding the contributions, of the use of the NIS in use, in the productivity of the exercise of their professional activity	94	1	5	2.35	.96
Q38. Regarding the contributions provided by the NIS in use in promoting training and research in nursing	97	1	5	2.33	.85
Q39. Regarding the contributions of the SIE in use to promote health gains for clients	97	1	5	2.39	.88
Q40. Regarding the number of indicators related to nursing care that are generated from the NIS in use	97	1	5	2.44	.88
Q41. Regarding the quality of indicators related to nursing care that are generated from the NIS in use	97	1	5	2.25	.94
Q42. Regarding the contributions of the NIS in use in promoting communication between the institution's different management levels (e.g. Head Nurse, Director)	96	1	5	2.23	.85
Q43.1 Considering any indicators related to nursing care that are generated by the NIS in use: Regarding the use of the information documented in the human resources management strategy	96	1	5	2.23	.90
Q43.2 Considering any indicators related to nursing care that are generated by the NIS in use: Regarding the use of the information documented in the strategy for managing material resources in the department	95	1	5	2.21	.87

From the consultation of the previous table, it is evident that the questions can be divided, theoretically, into two subgroups: questions related to "Benefits" (Q1.3, Q2., Q5., Q8., Q9., Q10., Q11., Q17., Q18., Q19. , Q28., Q35., Q36., Q37., Q38., Q39., Q40., Q41., Q42., Q43.1, Q43.2); and questions related to "Security" (Q14., Q15., Q16.).

From the analysis of the questions that made up this dimension, those referring to "Benefits", it was inferred that their nature was close to the aspects of the "Benefits" dimension of the model proposed by DeLone & Mclean (2003) [12].

Questions Q1.3, Q2., Q5 could, at first glance, have been allocated, for theoretical reasons, to the dimension "Architecture, Language, Decision Support (Nursing Process) and Graphics". However, it made sense to remain in the "Benefits and Security" dimension since, also in theoretical terms, these three questions can be interpreted as benefits associated with the NIS in use. In addition, due to the results of the EFA itself (and respective saturation), these three questions fall under the present dimension.

Considering the two large subgroups - Benefits and Security - it is possible to verify that the average satisfaction is higher in the questions associated with Security, which leads us to a scenario of "low satisfaction" of nurses with the Benefits of the NIS in use. This lower level of satisfaction with the "Benefits" may be associated with the incipient production of indicators and, therefore, less visibility of health gains sensitive to nursing care.

It can also be seen that the question with the lowest satisfaction score is Q9 (which belongs to the subgroup of questions associated with "Benefits"). This is an interesting point and one that should be a reason for reflection since users consider that the NIS in use has a low ability to represent the care actually provided to the client and here, once again, an essential aspect that makes it possible (or, in this case, not possible) to turn visible the health gains sensitive to nursing care.

On the other hand, the question with the highest mean of satisfaction was Q.16, which reveals that users are quite satisfied with the overall level of security/protection of NIS customers' data in use, against misuse "by authenticated users".

Regarding "Security", after analyzing the questions that constituted this sub-dimension, it was also found that it could be compatible with the aspects that make up the "System Quality" dimension of the model proposed by Delone & Mclean (2003) [12]. Data maintenance can be seen as an integral aspect of the "System quality" dimension associated with reliability (2003).

In comparative terms, the average level of user satisfaction in the present study, in this dimension, is below the results obtained in previous studies [5] [7] [17] [74]. However, this may be due to the fact that the dimensions are not exactly cross-referenced, so the comparative power becomes low.

The figure below is shown to better understand the data distribution (in a scale of 1 to 5, considering that score 1 corresponds to *"little satisfied"* and score 5 to *"very satisfied"*).

Figure 7: Questions related to the *"Benefits and Security"*

	1	2	3	4	5
Q1.3	16,3%	30,6%	42,9%	9,2%	1,0%
Q2.	15,8%	30,5%	32,6%	16,8%	4,2%

Q5.	19,8%	17,7%	49,0%	12,5%	1,0%
Q8.	22,4%	18,4%	35,7%	22,4%	1,0%
Q9.	23,5%	40,8%	28,6%	6,1%	1,0%
Q10.	24,5%	26,5%	41,8%	6,1%	1,0%
Q11.	19,4%	32,7%	40,8%	5,1%	2,0%
Q14.	10,2%	26,5%	44,9%	16,3%	2,0%
Q15.	14,0%	20,4%	51,6%	10,8%	3,2%
Q16.	6,3%	30,5%	48,4%	11,6%	3,2%
Q17.	22,4%	31,6%	30,6%	12,2%	3,1%
Q18.	14,7%	28,4%	48,4%	7,4%	1,1%
Q19.	11,7%	29,8%	42,6%	14,9%	1,1%
Q28.	17,3%	30,9%	48,1%	2,5%	1,2%
Q35.	20,6%	32,0%	37,1%	10,3%	0,0%
Q36.	17,5%	28,9%	47,4%	5,2%	1,0%
Q37.	23,4%	27,7%	40,4%	7,4%	1,1%
Q38.	16,5%	41,2%	36,1%	5,2%	1,0%
Q39.	18,6%	30,9%	44,3%	5,2%	1,0%
Q40.	13,4%	39,2%	39,2%	6,2%	2,1%
Q41.	24,7%	34,0%	34,0%	6,2%	1,0%
Q42.	20,8%	40,6%	34,4%	3,1%	1,0%
Q43.1	25,0%	32,3%	38,5%	3,1%	1,0%
Q43.2	23,2%	37,9%	34,7%	3,2%	1,1%

3.5.4. *"Information Sharing"*

As mentioned above, bearing in mind the framework proposed by DeLone & Mclean (2003) [12], "Information Sharing" could be seen as one of the "Benefits" of NIS. However, here it has a status of its own.

The problem of sharing information can be seen from different perspectives: multidisciplinary, between professionals of the same discipline, within the scope of the same department or in the logic of articulation of different departments or institutions (Sousa, 2006, cit. by Moreira, 2014) [17].

There are several studies that highlight the relevance of NIS in promoting continuity of care through information sharing. (Silva, 1995, 2001; Sousa *et al.*, 1999; Pereira, 2001, 2007; Sousa, 2006; Mota, 2010 cited by Moreira, 2014) [17].

Nurses, in their daily practice, process and document a lot of information which, in addition to ensuring the production of documentary evidence of care, is a resource for management, training and research processes and for promoting continuity of care. Part of the information collected, processed and documented by nurses in the care relationship may be useful for other professionals. Thus, the NIS must be capable of enhancing the sharing of information since the quality and continuity of care strongly depend on the quality with which data is produced and shared in the IS [99].

Another important issue in this field is related to the lack of interoperability between the existing EHR, which constitutes an obstacle to the sharing of information. Interoperability may be defined as the *"ability of different information systems, devices and applications (systems) to access, exchange, integrate and cooperatively use data in a coordinated manner, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally"* [100]. The "Information Sharing" among different levels of healthcare, has a link to the quality, efficiency, and safety of care provided to a patient; and the lack of interoperability between HIS reduces the quality of care provided to patients and wastes resources [101].

One of the requirements of HIS is the need for an integrated patient record that allows health professionals' entry and access to data from different places at the same time (Ball *et al.*, 2003 cit. by Oroviogoicoechea, 2008) [19]. Hence, it's important to mention that in Portugal, since 2012, a platform developed by the SPMS has been available - the Health Data Platform (PDS). The PDS provides a computer platform that, dynamically and at a given time, gathers and presents the user's health information. Allows the sharing of health information, centered on the user, oriented towards supporting the fulfillment of the mission of health professionals; and it also allows the virtual accompaniment of the citizen, in his space-time mobility, materializing whenever his access is required at a given point. Currently, it interconnects all the Health and Hospital Care units of the SNS, with over 600 different databases [102]. It should be noted that SClínico® allows health professionals, namely nurses, to access the PDS. This feature may have contributed to the fact that this dimension was the second with a higher level of satisfaction.

The average satisfaction score of users with "Information Sharing" (2.57) is above the overall satisfaction score (2.41), being, as stated above, the second dimension with higher overall average satisfaction score (table 18).

Table 18:Satisfaction with the "Information Sharing"

Dimension	*N*	Min	Max	*M*	*SD*
Satisfaction with the *"Information Sharing"*	98	1.13	4.88	2.57	.62

In the data collection instrument, there was a set of questions (Q. 20.1 to Q. 24.3) that focused on the issue of "Information Sharing" (table 19). The factorial analysis process undertaken generated a dimension where this group of questions was added. In addition to these questions, another question also emerged associated with this dimension: Q.12. This specific question could, at first sight, theoretically, be allocated to the "Benefits and Security" dimension. However, it made sense to remain in the "Information Sharing" dimension since also, in theoretical terms,

this question can be interpreted as an information sharing issue. In addition, due to the results of the EFA itself (and respective saturation), this question falls under the present dimension.

Table 19: Descriptive statistics of questions related to the "Information Sharing"

Question	*N*	Min	Max	*M*	*SD*
Q12. Regarding the individual access mechanisms to the client's clinical file (password, user restrictions) of the NIS in use	96	1	5	3.31	1.00
Q20.1 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, by Nurses... Regarding the content of the shared information	97	1	5	2.72	.81
Q20.2 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, by Nurses... Regarding the amount of information shared	98	1	5	2.77	.82
Q20.3 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, by Nurses... With regard to the comprehensibility of the information	98	1	5	2.37	.87
Q21.1 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, between Nurses and other health professionals (e.g.: doctors): With regard to the content of the shared information	97	1	5	2.33	.85
Q21.2 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, between Nurses and other health professionals (e.g.: doctors): With regard to the amount of information shared	96	1	5	2.66	.84
Q21.3 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, between Nurses and other health professionals (e.g.: doctors): With regard to the comprehensibility of the information	97	1	5	2.43	.88
Q22.1 Regarding the sharing of information documented by other health professionals (e.g. Doctors) in your information system in use: With regard to the content of the shared information	96	1	4	2.49	.77
Q22.2 Regarding the sharing of information documented by other health professionals (e.g. doctors) in your information system in use: With regard to the amount of information shared	97	1	5	2.30	.79
Q22.3 Regarding the sharing of information documented by other health professionals (e.g. Doctors) in your information system in use: With regard to the comprehensibility of the information	95	1	5	2.57	.78

Q23.1 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses… With regard to the content of the shared information	96	1	5	2.28	.89
Q23.2 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses… With regard to the amount of information shared	96	1	4	2.68	.80
Q23.3 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses… With regard to the comprehensibility of the information	97	1	5	2.58	.73
Q24.1 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses and other health professionals: With regard to the content of the shared information	96	1	5	2.28	.94
Q24.2 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses and other health professionals: With regard to the amount of information shared	98	1	5	2.66	.95
Q24.3 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses and other health professionals: With regard to the comprehensibility of the information	96	1	5	2.64	.94

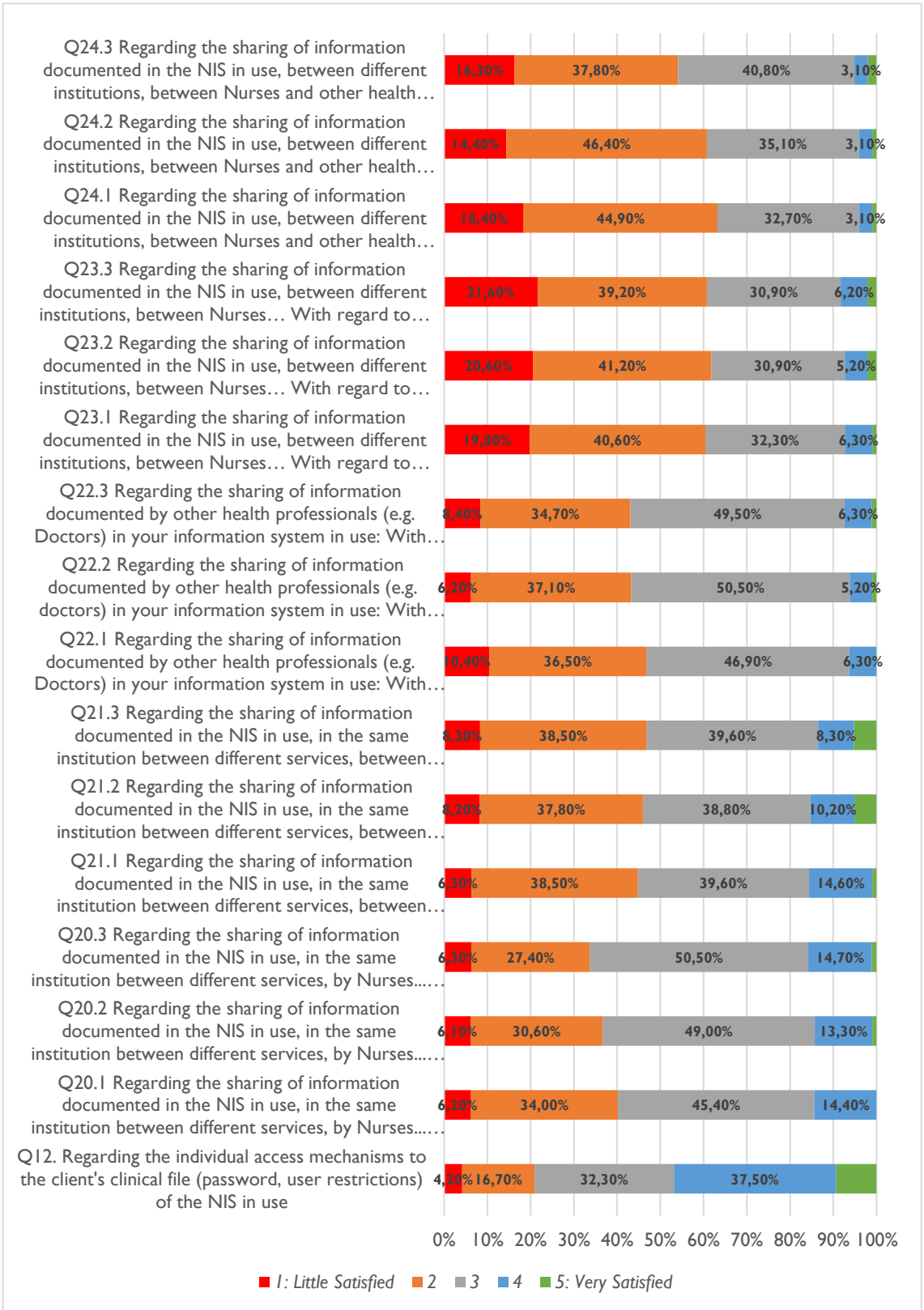
As seen in table 19, it's also in Q12. that the average level of user satisfaction is higher. As already mentioned, this question can also be related to security issues and, therefore, meets the highest level of satisfaction found in the subgroup of issues associated with Security in the dimension "Benefits and Security".

On the other hand, questions 23.1 and Q24.1 are the questions with the lowest average satisfaction level. This reveals that users are not satisfied with the content of the shared information between different institutions, namely, between nurses and between nurses other health professionals. These results go in line with the fact that, in daily practice, it is common to verify that, every so often, the sharing of information between institutions is hampered by a series of factors: flaws in terms of interoperability between computer systems/applications; diversity of languages/nomenclatures; various technical difficulties (such as lack of terminals or obsolete equipment). Furthermore, it is important to understand what information content the different health professional groups should share, to promote the quality and continuity of care. However, this is already out of the scope of this dissertation.

In comparative terms, the current study presents, in this dimension, an average global satisfaction level below the studies by Campos (2012) [5] and Silva (2016) [74], but above the studies by Moreira (2014) [17] and Moura (2015) [7].

The figure below is shown to better understand the data distribution (in a scale of 1 to 5, considering that score 1 corresponds to *"little satisfied"* and score 5 to *"very satisfied"*).

Figure 8: Questions related to the *"Information Sharing"*



	1	2	3	4	5
Q12.	4,2%	16,7%	32,3%	37,5%	9,4%
Q20.1	6,2%	34,0%	45,4%	14,4%	0,0%
Q20.2	6,1%	30,6%	49,0%	13,3%	1,0%
Q20.3	6,3%	27,4%	50,5%	14,7%	1,1%
Q21.1	6,3%	38,5%	39,6%	14,6%	1,0%
Q21.2	8,2%	37,8%	38,8%	10,2%	5,1%
Q21.3	8,3%	38,5%	39,6%	8,3%	5,2%
Q22.1	10,4%	36,5%	46,9%	6,3%	0,0%
Q22.2	6,2%	37,1%	50,5%	5,2%	1,0%
Q22.3	8,4%	34,7%	49,5%	6,3%	1,1%
Q23.1	19,8%	40,6%	32,3%	6,3%	1,0%
Q23.2	20,6%	41,2%	30,9%	5,2%	2,1%
Q23.3	21,6%	39,2%	30,9%	6,2%	2,1%
Q24.1	18,4%	44,9%	32,7%	3,1%	1,0%
Q24.2	14,4%	46,4%	35,1%	3,1%	1,0%
Q24.3	16,3%	37,8%	40,8%	3,1%	2,0%

3.5.5. *"Technical Support and Training"*

As mentioned above, the existence of a technical team to support information systems and their users, contributes to the success of IS [17]. However, sometimes, the IS departments do not have enough staff to meet the demand. [23].

On the other hand, IT training forwards nurses' attitudes towards computerized systems [54]. User training is needed to obtain the maximum benefit from the end-user computing environment. Not spending enough resources on educating the users may have severe consequences which can result in decreased productivity and other organizational costs [51].

Already in Lobo's study (2015) on the nurses' perspective on the NIS, was referred that the respondents recognized that the user support services were inadequate. Also, nurses felt difficulties in using the NIS in daily practice in terms of the inadequacy of technological resources, and the lack of computer training and training in the computer application itself [103].

In this specific dimension, it can be said that it was compatible with the aspects that integrate the "Service Quality" dimension of the model proposed by Delone & Mclean (2003) [12].

This dimension deserves special attention, as it is clearly below the global average score calculated (table 20).

Table 20: Satisfaction with the "Technical Support and Training"

Dimension	*N*	Min	Max	*M*	*SD*
Satisfaction with the *"Technical Support and Training"*	98	1.00	4.89	1.95	.70

In this dimension questions Q25.1 to Q27., as well as questions Q33. and Q34 were aggregated.

The first questions clearly refer to the technical support perceived by nurses using the NIS; while questions 33 and 34 refer to the nurses' satisfaction with the training for using the NIS (table 21).

Table 21: Descriptive statistics of questions related to the "Technical Support and Training"

Question	*N*	Min	Max	*M*	*SD*
Q25.1 Regarding the technical support mechanisms of your institution's "informatics service" to the NIS in use... During office hours	97	1	5	1.97	.95
Q25.2 Regarding the technical support mechanisms of your institution's "informatics service" to the NIS in use... Outside office hours	93	1	5	1.75	.92
Q26.1 Regarding the technical support mechanisms for the NIS in use: With regard to face-to-face technical support	96	1	5	1.75	.87
Q26.2 With regard to technical support mechanisms for the NIS in use: With regard to technical support by telephone	98	1	4	1.95	.89
Q26.3 With regard to technical support mechanisms for the NIS in use: With regard to technical support by e-mail	97	1	5	2.13	.97
Q26.4 Regarding the NIS technical support mechanisms in use: With regard to the system's own help mechanisms (e.g. helpdesk)	98	1	5	2.32	1.01
Q27 Regarding the daily support of nurses who train/facilitate/parameterize the NIS in use	94	1	5	2.14	.90
Q33 Regarding the previous training that you had the opportunity to attend on the use of the NIS in use	93	1	5	1.81	.86
Q34 On ongoing training (if any) regarding the use of the NIS in use	86	1	5	1.70	.86

As it is possible to verify, it is in this dimension that the question with the overall lowest average of satisfaction occurs (Q34.; *M*: 1.70). That is, nurses at ACeS Tâmega II are extremely dissatisfied with "on ongoing training (if any) regarding the use of the NIS in use". This may reveal that the model/strategies supporting the use of the NIS was (is being) manifestly "insufficient" from the users' perspective [7].

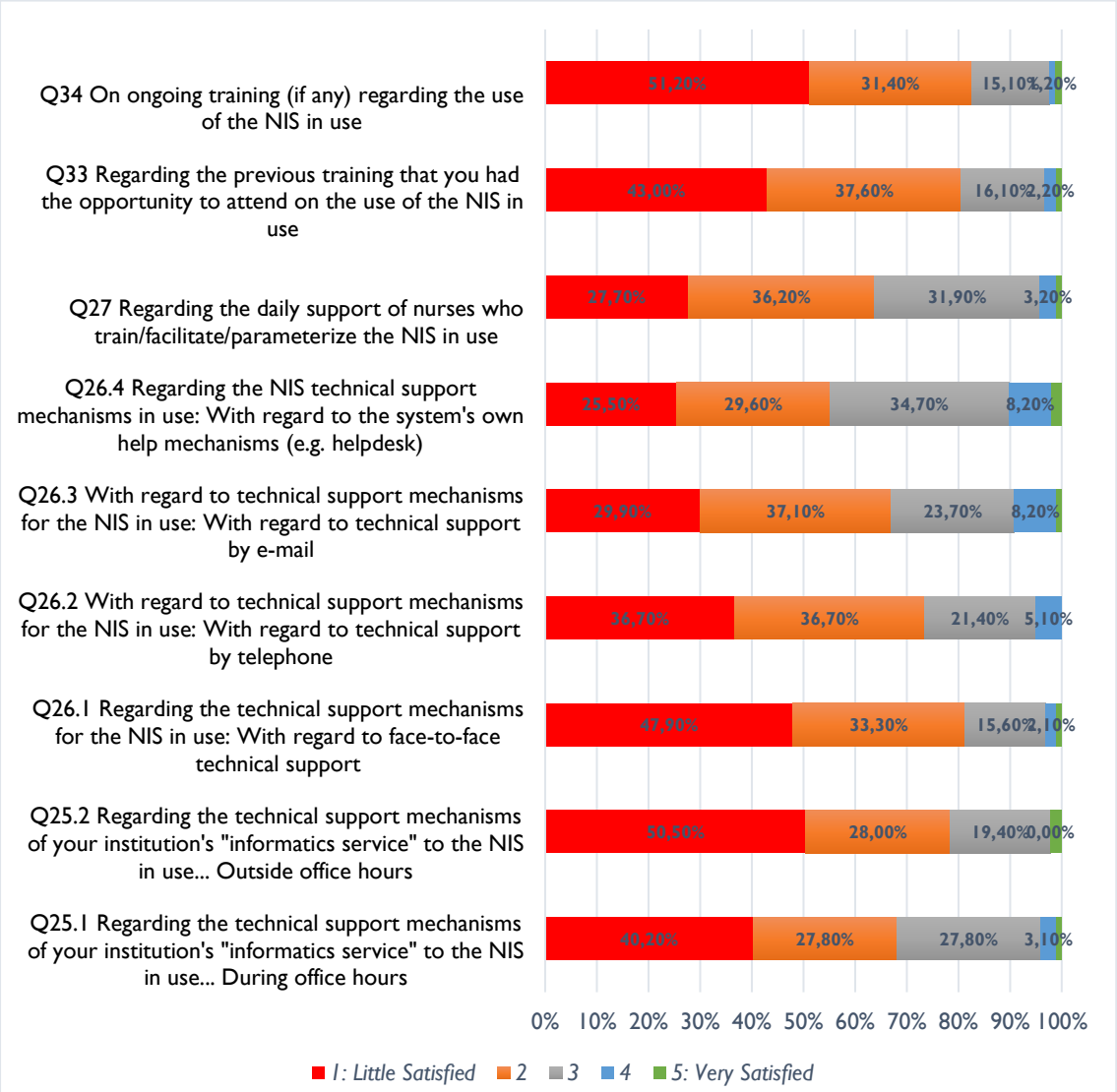
It's in question Q26.4 that the average level of satisfaction is higher in this dimension. Thus, nurses are satisfied with the NIS technical support mechanisms regarding the system's own help mechanisms (e.g. helpdesk).

In comparative terms, the current study presents, in this dimension, an average global satisfaction level below the studies by Campos (2012) [5] and Moreira (2014) [17], but slightly above the study by Moura (2015) [7].

Thus, it is possible to verify that the studies carried out at the level of primary healthcare (the present study and the study by Moura [7]) show lower levels of satisfaction with technical support and training, while the studies carried out at the hospital level ([5] [17]) show higher levels of satisfaction in this dimension. This may be associated with the fact that hospitals often have "dedicated" training and technical support teams on site and with "easier access"; while at the level of primary healthcare this does not occur, with training teams and technical support far from places where effective care is provided.

The figure below is shown to better understand the data distribution (in a scale of 1 to 5, considering that score 1 corresponds to *"little satisfied"* and score 5 to *"very satisfied"*).

Figure 9: Questions related to the *"Technical Support and Training"*



	1	2	3	4	5
Q25.1	40,2%	27,8%	27,8%	3,1%	1,0%

Q25.2	50,5%	28,0%	19,4%	0,0%	2,2%
Q26.1	47,9%	33,3%	15,6%	2,1%	1,0%
Q26.2	36,7%	36,7%	21,4%	5,1%	0,0%
Q26.3	29,9%	37,1%	23,7%	8,2%	1,0%
Q26.4	25,5%	29,6%	34,7%	8,2%	2,0%
Q27	27,7%	36,2%	31,9%	3,2%	1,1%
Q33	43,0%	37,6%	16,1%	2,2%	1,1%
Q34	51,2%	31,4%	15,1%	1,2%	1,2%

3.6. Differences in the *"levels of satisfaction"* with the NIS

To describe what happened in the sample, descriptive statistics summarize the data. On the other hand, inferential statistics are computed to extrapolate the results from a sample to the complete population. Therefore, to achieve the best possible representation of the population of interest, inferential statistics depend on adequate sampling techniques. The basis of inferential statistics includes the theory of probability and the procedure of hypothesis testing [104].

Thus, it seems important to differentiate the two broad categories of statistical tests: Parametric Tests and Nonparametric Tests [105].

Nonparametric statistics are used for variables that don't have a normal distribution and usually used for variables at the nominal or ordinal level of measurement. Parametric statistics, the most widely used method of inferential statistical analysis, requires that the variables be assessed at the interval or ratio level [104] and they commonly use a normal distribution for their sample data [105].

Researchers can draw conclusions about their sample data using several statistical significance tests included in inferential statistics. Depending on their intended use, these tests can be categorized into three fundamental groups: assessing relationships, assessing differences, and making predictions. The study question or research design chosen by the investigator influences the choice of procedure, in part [104].

Thus, in this study, despite the data distribution being normal in the satisfaction values, when considering the grouping variables (e.g.: sex) the distribution is not homogeneous in the groups, with a great disparity in the constitution of the categories. Therefore, we used non-parametric tests, namely Mann-Whitney *U,* Kruskal-Wallis and Spearman Rho.

3.6.1. Differences depending on the *"Sex"* of the respondent

An analysis was performed to test whether there are statistically significant differences in the level of total satisfaction and in the dimensions according to sex (table 22).

Table 22: Differences in the "levels of satisfaction" with the NIS, depending on the "Sex" of the respondent

	Sex	N	Ranks	Sum of ratings	Mann-Whitney *U*	Sig
Equipment: Speed, Quality and Quantity	Feminine	80	48.75	3900.00	540.000	.540
	Masculine	15	44.00	660.00		
Architecture, Language, Decision Support (Nursing Process) and Graphics	Feminine	80	47.76	3821.00	581.000	.846
	Masculine	15	49.27	739.00		
Benefits and Security	Feminine	80	48,77	3901.50	538.500	.530
	Masculine	15	43,90	658.50		
Information Sharing	Feminine	80	49,00	3920.00	520.000	.414
	Masculine	15	42,67	640.00		
Technical Support and Training	Feminine	80	50,38	4030.00	410.000	.052
	Masculine	15	35,33	530.00		
Total Score	Feminine	80	48,86	3908.50	531.500	.484
	Masculine	15	43,43	651.50		

To analyze whether there are differences in the variable *"levels of satisfaction"* between the male and female groups, the Mann-Whitney U test was applied, which presented a U test statistic of U=531,500, *p*=,484, indicating a difference statistically not significant between feminine and masculine respondents.

3.6.2. Differences depending on the *"Previous training attended"* by the respondent

An analysis was performed to test whether there are statistically significant differences in the level of total satisfaction and in the dimensions according to the *"Previous training attended"* (table 23).

Table 23: Differences in the "levels of satisfaction" with the NIS, depending on the "Previous training attended" by the respondent

		N	Ranks	Sum of ratings	Mann-Whitney *U*	Sig
Equipment: Speed, Quality and Quantity	Yes	27	48.07	1298,00	916,000	,987
	No	68	47.97	3262,00		
Architecture, Language, Decision Support (Nursing Process) and Graphics	Yes	27	45.56	1230,00	852,000	,585
	No	68	48.97	3330,00		
Benefits and Security	Yes	27	47,98	1295.50	917.500	.997
	No	68	48.01	3264.50		
Information Sharing	Yes	27	52.24	1410.50	803.500	.344
	No	68	46.32	3149.50		
Technical Support and Training	Yes	27	44.22	1194.00	816.000	.399
	No	68	49.50	3366.00		
Total Score	Yes	27	47.43	1280.50	902.500	.898
	No	68	48.23	3279.50		

To analyze whether there are differences in the variable *"levels of satisfaction"* between respondents who had and did not have previous training, the Mann-Whitney U test was applied, which presented a U test statistic of U=902,500, *p*=,898, indicating a difference statistically not significant between respondents who had and did not have previous training.

It should be noted that, as mentioned above, as few nurses have had previous and short-term training, the differences may not stand out.

3.6.3. Differences depending on the respondent *"being or having been a trainer"* for the use of the NIS

An analysis was performed to test whether there are statistically significant differences in the level of total satisfaction and in the dimensions according on the respondent "being or having been a trainer" (table 24).

Table 24: Differences in the "levels of satisfaction" with the NIS, depending on the respondent "being or having been a trainer" for the use of the NIS

		N	Ranks	Sum of ratings	Mann-Whitney *Rho*	Sig
Equipment: Speed, Quality and Quantity	Yes	5	64.60	323.00	107.000	.070
	No	83	43.29	3593.00		
Architecture, Language, Decision Support (Nursing Process) and Graphics	Yes	5	51.30	256.50	173.500	.539
	No	83	44.09	3659.50		
Benefits and Security	Yes	5	50.30	251.50	178.500	.601
	No	83	44.15	3664.50		
Information Sharing	Yes	5	41.70	208.50	193.500	.801
	No	83	44.67	3707.50		
Technical Support and Training	Yes	5	45.80	229.00	201.000	.907
	No	83	44.42	3687.00		
Total Score	Yes	5	48.10	240.50	189.500	.746
	No	83	44.28	3675.50		

To analyze whether there are differences in the variable *"levels of satisfaction"* according on the respondent "*being a trainer*", the Mann-Whitney U test was applied, which presented a U test statistic of U=189,500, *p*=,746, indicating a not significant statistically difference according on the respondent "*being or having been a trainer"*.

3.6.4. Differences depending on the *"Professional category"* of the respondent

An analysis was performed to test whether there are statistically significant differences in the level of total satisfaction and in the dimensions according to the *"Professional category"* of the respondent (table 25).

Table 25: Differences in "levels of satisfaction" with the NIS, depending on the "Professional category" of the respondent

	Professional Category	N	Middle Rank	H of Kruskal-Wallis	Sig
Equipment: Speed, Quality and Quantity	**Nurse**	56	47.22	2.554	.466
	Graduate Nurse	11	57.14		
	Specialist Nurse	30	49.83		
	Other	1	83.00		
Architecture, Language, Decision Support (Nursing Process) and Graphics	**Nurse**	56	50.77	3.643	.303
	Graduate Nurse	11	41.86		
	Specialist Nurse	30	48.38		
	Other	1	96.00		
Benefits and Security	**Nurse**	56	53.38	5.829	.120
	Graduate Nurse	11	43.45		
	Specialist Nurse	30	42.92		
	Other	1	96.00		
Information Sharing	**Nurse**	56	50.32	2.681	.443
	Graduate Nurse	11	48.91		
	Specialist Nurse	30	46.73		
	Other	1	93.00		
Technical Support and Training	**Nurse**	56	50.70	3.136	.371
	Graduate Nurse	11	42.05		
	Specialist Nurse	30	48.58		
	Other	1	92.00		
Total Score	**Nurse**	56	51.00	3.500	.321
	Graduate Nurse	11	45.00		
	Specialist Nurse	30	46.77		
	Other	1	97.00		

To assess the level of satisfaction according to the professional category, we proceeded to analyze the H of Kruskal Wallis (since the grouping variable has 4 categories).
To analyze whether there are differences in the *"levels of satisfaction"* between Nurses, Graduate Nurses, Specialist Nurses and others, the Kruskal-Wallis test was applied, revealing an H-test statistic of H-value: 3,500, *p*=,321, indicating a non-significant difference between the groups.

3.7. Association between *"levels of satisfaction"* with the NIS and characteristics of the respondent

It was performed a spearman's correlation analysis to evaluate whether overall and factor satisfaction were associated with "age", "time of professional exercise in the department", "hours of training prior to the use of the NIS" and "usage time".

3.7.1. Association between *"levels of satisfaction"* with the NIS and *"Age"*

It was performed a spearman's correlation analysis to evaluate whether overall and factor satisfaction were associated with age (table 26).

Table 26: Association between "levels of satisfaction" with the NIS and "age"

Equipment: Speed, Quality and Quantity	**Spearman Rho**	-,090
	Sig.	.377
Architecture, Language, Decision Support (Nursing Process) and Graphics	**Spearman Rho**	-.046
	Sig.	.653
Benefits and Security	**Spearman Rho**	-.057
	Sig.	.574
Information Sharing	**Spearman Rho**	.137
	Sig.	.177
Technical Support and Training	**Spearman Rho**	-.129
	Sig.	.206
Total Score	**Spearman Rho**	-.037
	Sig.	.721

It was found that the levels of satisfaction (overall and by dimensions) are not significantly correlated with age.

3.7.2 Association between *"levels of satisfaction"* with the NIS and *"time of professional exercise in the department"*

It was performed a spearman's correlation analysis to evaluate whether overall and factor satisfaction were associated with *"time of professional exercise in the department" (table 27).*

Table 27: Association between "levels of satisfaction" with the NIS and "time of professional exercise in the department"

Equipment: Speed, Quality and Quantity	**Spearman Rho**	-.130
	Sig.	.203
Architecture, Language, Decision Support (Nursing Process) and Graphics	**Spearman Rho**	-.070
	Sig.	.493
Benefits and Security	**Spearman Rho**	-.078
	Sig.	.446
Information Sharing	**Spearman Rho**	.119
	Sig.	.243
Technical Support and Training	**Spearman Rho**	-.147
	Sig.	.149
Total Score	**Spearman Rho**	-.069
	Sig.	.501

It was also found that the levels of satisfaction (overall and by dimensions) are not significantly correlated with department time.

3.7.3. Association between *"levels of satisfaction"* with the NIS and "*Hours of training prior to the use of the NIS"*

It was performed a spearman's correlation analysis to evaluate whether overall and factor satisfaction were associated with the hours of training prior to the use of the NIS (table 28).

Table 28: Association between "levels of satisfaction" with the NIS and "hours of training prior to the use of the NIS"

Equipment: Speed, Quality and Quantity	**Spearman Rho**	.439
	Sig.	.032
Architecture, Language, Decision Support (Nursing Process) and Graphics	**Spearman Rho**	.265
	Sig.	.210
Benefits and Security	**Spearman Rho**	.243
	Sig.	.252
Information Sharing	**Spearman Rho**	-.448
	Sig.	.028
Technical Support and Training	**Spearman Rho**	.287
	Sig.	.173
Total Score	**Spearman Rho**	.174
	Sig.	.415

As stated above, only 27 nurses received previous training, and only 24 answered the question *"How many hours of training have you attended?"*.

Here, it was found that only satisfaction with *"Equipment: Speed, Quality and Quantity"* and *"Information Sharing"* is significantly correlated with the *"hours of training prior to the use of the NIS"*.

There is a moderate positive correlation between the level of satisfaction with the *"Equipment: Speed, Quality and Quantity"* and the hours of previous training (r=.439; *p*=.032). This means that the higher the level of prior training, the higher the level of satisfaction with *"Equipment: Speed, Quality and Quantity"*.

In turn, the level of satisfaction with *"Information Sharing"* presented a statistically significant negative relationship with the number of hours of previous training. This means that the higher the level of prior training, the lower the level of satisfaction with *"Information Sharing"* (r=-.448; *p*=.028)

3.7.4 Association between *"levels of satisfaction"* with the NIS and *"Usage time"*

It was performed a spearman's correlation analysis to evaluate whether overall and factor satisfaction were associated with the NIS usage time (table 29).

Table 29: Association between *"levels of satisfaction"* with the NIS and *"usage time"*

Equipment: Speed, Quality and Quantity	**Spearman Rho**	-.078
	Sig.	.503
Architecture, Language, Decision Support (Nursing Process) and Graphics	**Spearman Rho**	.033
	Sig.	.775
Benefits and Security	**Spearman Rho**	-.091
	Sig.	.430
Information Sharing	**Spearman Rho**	.159
	Sig.	.169
Technical Support and Training	**Spearman Rho**	-.002
	Sig.	.987
Total Score	**Spearman Rho**	-.010
	Sig.	.932

It was also found that the levels of satisfaction (overall and by dimensions) are not significantly correlated with the NIS usage time.

3.8. Unnecessary features integrated in the NIS / Users' intention to abandon the NIS in use

In the questionnaire used, in addition to a set of questions answered on an ordinal scale, there were two questions whose answer was nominal: question 45 – *"Regarding the NIS in use, do you consider that it includes unnecessary functionalities?"*; and question 46 – *"If it were up to you, would you stop using this information system?"*.

By analyzing the data from these two questions**,** we found that the majority of SClínico® users (52,8%) considered that it included unnecessary functionalities (table 30).

Table 30: Unnecessary features integrated in the NIS

		N	%
Q45. *"Regarding the NIS in use, do you consider that it includes unnecessary functionalities?"*	**No**	42	47.2
	Yes	47	52.8
	Total	89	100

The results displayed in the table 30 allow establishing that future research should be carried out to effectively understand which NIS's unnecessary functionalities to which users refer, in order to improve the NIS itself.

Regarding the intention if they could decide to abandon the NIS in use, the response trend was the same, that is, the majority of SClínico® users (54,2%) would abandon the NIS (table 31).

Table 311: Users' intention to abandon NIS in use

		N	%
Q46. *"If it were up to you, would you stop using this information system?"*	**No**	44	45.8
	Yes	52	54.2
	Total	96	100

The data revealed by table 31 are worrisome because most users would be willing to stop using the NIS in use which, in this case, refers to SClínico®. Since SClínico® is one of the most used NIS in Portugal (if not the most used), being utilized by more than 13000 professionals [40], this data cannot be neglectful.

CONCLUSION

Adoption of HIS is changing how healthcare is provided [2] and regarding "Nursing Information" specifically, the consensus-based opinion is that is crucial for health governance today [4]. Despite this acknowledgment, it seems that nursing care is only just beginning to become visible in health statistics/indicators [4].

Nurses represent the largest professional group in the health area [106], playing a crucial role in teams and making a decisive contribution to the health gains of the population. Furthermore, they collect and document a very large amount of data. Thus, it is crucial to gain knowledge about nurses' satisfaction with their IS and identify the domains in which such levels of satisfaction are lower [7].

The present work (developed within the quantitative paradigm, with a descriptive, exploratory, and cross-sectional approach) had the objective of describe the level of satisfaction of Nurses as users of NIS in Electronic Support in the ACeS Tâmega II – Vale do Sousa Sul, where the most used NIS is SClínico®. SClínico® is considered an EHRs, and the use of which has substantially increased during the last years, allowing the growth in quality of the healthcare services and the control of the costs [11].

To evaluate the success of IS, DeLone and McLean propose a model that is widely recognized and accepted by the scientific community ("The DeLone & McLean Information Systems Success Model") [12], and was applied as the theoretical framework in this dissertation. It's a multidimensional model being "User Satisfaction" one of its dimensions [12].

Taking into account the wide range of instruments available to assess the satisfaction of IS users, it was decided to use the instrument developed by Campos (2012) [5]. This questionnaire focuses specifically on nurses' satisfaction as users of NIS and it was one of the first experiences, on a large scale, of measuring the satisfaction of NIS users within a Portuguese health institution [5]. This option, in addition to methodological security, allowed a data analysis compared with previous studies [7].

Using descriptive and inferential statistical analysis the results were presented in two parts: characterization of the sample and the results related to user satisfaction with the NIS (grouped into five dimensions emerging from the EFA).

Of the 159 questionnaires distributed, 98 were filled – represented 61,64% of the target population of the study, which was quite significant for the analysis of the results. The sample was mainly characterized by female individuals, mostly general nurses, with none or little previous formal training in the use of the NIS, and where only a few were a trainer/parameterizer/facilitator. Participants had on average 41.44 years old; had been working

in the department, on average, for about 12.62 years; and have been using the NIS for an average of 9.05 years.

The results were then organized around the five dimensions resulting from the EFA: "Equipment: Speed, Quality and Quantity"; "Architecture, Language, Decision Support (Nursing Process) and Graphics"; "Benefits and Security"; "Information Sharing"; "Technical Support and Training"

First of all, mention that the global score of nurses' satisfaction with the NIS in use, on the ACeS scale, was 2.41. On a scale of 1 to 5, considering that score 1 corresponds to "little satisfied" and score 5 to "very satisfied", nurses at ACeS Tâmega II – Vale do Sousa Sul are moderately satisfied with the NIS they use – the SClínico®.

In comparative terms, considering previous studies conducted in this field using the same data collection instrument, the global score of nurses' satisfaction with the NIS in use in the present study is lower than that found by Campos [5], Moreira [17] and Silva [74], but higher than that found by Moura [7]. Regarding the specific dimensions, the comparative power with previous studies is lower since, as a result of the EFA, the dimensions (and the respective questions assigned to each one) are slightly different from study to study. It should be noted that some of these studies also included the results of user satisfaction with other IS, in addition to SClínico®. However, the comparison was made only with the results obtained for this IS.

The two dimensions in which nurses were less satisfied were "Technical Support and Training" and "Equipment: Speed, Quality and Quantity". As referred by Moura (2015) [7], the two dimensions in which nurses are less satisfied do not concern to the "intrinsic quality" of the IS; rather to the nature of the support they receive (received) for using the system, as well as the equipment and the performance of the network/servers.

On the other hand, nurses were more satisfied with the "Architecture, Language, Decision Support (Nursing Process) and Graphics" and "Information Sharing".

Considering the "*levels of satisfaction" with the NIS*, no statistically significant differences were found between male and female respondents; in respondents who had and who did not have previous training, and in respondents who are or have been a trainer; and in groups with different professional categories (Nurses, Graduate Nurses, Specialist Nurses and Others).

Also, the *"levels of satisfaction"* with the NIS (global score and by dimensions) do not present differences statically significant considering age, department time, and with NIS usage time.

However, some correlations were found, namely, the higher the level of prior training, the higher the level of satisfaction with *"Equipment: Speed, Quality and Quantity"; and* the higher the level of prior training, the lower the level of satisfaction with *"Information Sharing"*.

Other interesting aspect that emerges from the present study derive from the fact that users are not satisfied with aspects (as "Graphics" and the "Benefits" of the NIS) that could be directly associated with the system's ability to make visible the health gains sensitive to nursing care.

Additionally, it appears that the studies carried out in primary healthcare environment (as the present study) obtained lower global satisfaction levels than those implemented at the hospital level. Several hypotheses could be considered here and, as such, it would be important, with additional studies, to study these factors.

Two other very relevant findings relate to the fact that the majority of the nurses at ACeS Tâmega II - Vale do Sousa Sul, considered that the NIS in use included unnecessary functionalities; and the majority of SClínico® users would abandon the NIS in use.

It is important to mention, as a limitation of this study, the fact that it is limited to only one specific ACeS, which makes it difficult to generalize the results. Thus, it would be desirable to replicate this study in a more comprehensive and representative way.

All these results deserve reflection not only at the ACeS scale but also at the ARS, to improve the areas where the levels of satisfaction with the NIS were lower, allowing the improvement of Electronic Health Records, which will have an impact on the level of care provided.

It is also important to involve the users themselves (in this case, the Nurses) in the policies and strategies (macro and micro) that concern to the NIS, since the success of these systems depend, to a large extent, on this involvement of users with their NIS (from its conception, maintenance, and management).

Thus, in the face of the results obtained, it would be beneficial for the users themselves but, above all and ultimately for the patients, as well as for the ARS/ACeS/Hospitals, that further studies on user satisfaction with "their" information systems were implemented, whether in the context of primary healthcare or in a hospital context (since the specificities of each context are diverse). This will make it possible to introduce changes that derived from the results of these same studies in a perspective of continuous quality improvement.

These conclusions also lead to reflection on the quality of the systems in use and the need for updating/adapting them considering the current requirements. Since the beginning of this century, almost every nurse in Portugal uses a NIS (SAPE® – former SClínico®), with the ICNP™ as a taxonomy for the building of Nursing Diagnosis and Interventions [107].

With the analysis of the national nursing documentation system [6], performed by CIDESI-ESEP upon request by the Portuguese Ministry of Health, it was highlighted that the use of a taxonomy or classification is not enough to comply with the current requirements of representation of the nursing discipline and of semantic and technical interoperability.

That is why CIDESI-ESEP evolved to the building of a Nursing Ontology (*NursingOntos*), a multilingual and customizable terminology system that can run on the backend of any nursing information system to be developed, representing the core concepts of the profession (assessment data, diagnosis, objectives and interventions) and the relationships between them [108], regardless of the formats that are presented to users in the "front end" and allowing a high level of interoperability [109].

With the approval by Portuguese OE since 2019 [110], this ontology is set to be incorporated in the new EHR to be developed by SPMS and by private health providers groups and software companies.

Regarding future work, there are several stages and future projects associated with this Investigation. Thus, and in accordance with the "Authorization for the study from the Ethics Committee of ARS North", the results will be communicated, as soon as the study is concluded, to this entity.

The study will also be shared, expectedly, until the end of 2023, at a multidisciplinary meeting at the researcher's functional unit and at a Plenary Meeting of the Technical Councils of ACeS Tâmega II - Vale do Sousa Sul.

It is also intended to prepare and publish a scientific article in a magazine (to be designated) and to present an Oral Communication in a Nursing Congress (to be designated).

In conjunction with one of the authors of the questionnaire used (and Professor Co-advisor of the present dissertation), it seems important to try to develop a new instrument/questionnaire, graphically more appealing and in a smaller format. Thus, the questions with greater weight in each dimension resulting from the EFA of the various studies carried out to date, may be considered.

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APPENDICES

Appendix 1: ***"Nursing Information Systems User Satisfaction Questionnaire"***

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Questionário Sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem (SIE)

Este questionário faz parte do projeto de investigação intitulado "Satisfação dos Utilizadores de Sistemas de Informação e Documentação de Enfermagem em Suporte Eletrónico: um Estudo no ACeS Tâmega II – Vale do Sousa Sul", da autoria de Carla Lourenço, no âmbito do 2º Ciclo de Estudos em Informática Médica da Faculdade de Medicina e da Faculdade de Ciências da Universidade do Porto, e tem como objetivo geral descrever o nível de satisfação dos Enfermeiros deste ACeS, enquanto utilizadores de sistemas de informação de enfermagem em suporte eletrónico.

Este questionário foi construído por Filipe Pereira e Ernesto Jorge Morais, docentes e investigadores da Escola Superior de Enfermagem do Porto, dado não existir nesta área nenhum questionário de Avaliação de Satisfação do Utilizador do Sistema de Informação em Enfermagem suficientemente abrangente.

Dada a pertinência desta temática, solicita-se que dê a máxima atenção às questões colocadas, traduzindo nas respostas a sua opinião refletida e sincera.

Os dados recolhidos serão tratados confidencialmente e, por conseguinte, os resultados da pesquisa não irão identificar os inquiridos, garantindo-se assim o anonimato.

Por favor, preencha completamente os círculos com esferográfica azul ou preta e certifique-se que respondeu a todas as questões.

A sua colaboração é fundamental para a realização deste projeto!

Para qualquer questão relacionada com este questionário, poderá contactar a investigadora através do **mail:** [redacted]

Caracterização do respondente

a) Idade: ☐☐ anos **b) Género Sexual:** ○ Feminino ○ Masculino

c:) Categoria Profissional:

○ Enfermeiro

○ Enf.º Graduado

○ Enf.º Especialista

○ Enf.º Chefe

○ Outro ☐☐☐☐☐☐☐☐☐☐

d) Há quanto tempo exerce funções neste serviço? ☐☐ anos completos.

e) Teve formação antes da implementação do(s) SIE em uso no serviço? ○ Sim ○ Não

e.1.) Se sim, quantas horas de formação frequentou? ☐☐☐☐

f) A formação foi ministrada por quem? ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

g) Já foi ou é formador/parametrizador/facilitador? ○ Sim ○ Não

h) Para responder a este questionário vai basear-se em que SIE (nome e versão, se possível) que utiliza actualmente?

☐☐

i) Há quanto tempo utiliza o SIE que referiu? ☐☐ anos completos.

j) Que SIE(s) já utilizou (nomes e versões, se possível)?

☐☐

Caracterização do serviço

Qual/quais o(s) SIE que está/estão em uso no serviço (nome, versão e tempo de implementação, se possível)?

☐☐

Enquanto utilizador(a) de Sistemas de Informação em Enfermagem (SIE), responda às questões considerando o "**1**" como "**pouco satisfeito**" e o "**5**" como "**muito satisfeito**".

	Pouco satisfeito				Muito satisfeito
1. Relativamente à **linguagem utilizada** no SIE em uso para a construção dos enunciados...					
1.1. ...dos **diagnósticos de Enfermagem**, considera-se:	○	○	○	○	○
1.2. ...das **intervenções de Enfermagem**, considera-se:	○	○	○	○	○
1.3. ...dos **resultados de Enfermagem**, considera-se:	○	○	○	○	○
2. Relativamente **à importância atribuída à "Avaliação inicial de enfermagem"**, na estrutura arquitectónica do SIE em uso, considera-se:	○	○	○	○	○
3. Relativamente **à importância atribuída aos "Diagnósticos de enfermagem"**, na estrutura arquitectónica do SIE em uso, considera-se:	○	○	○	○	○
4. Relativamente **à importância atribuída às "Intervenções de Enfermagem"**, na estrutura arquitectónica do SIE em uso, considera-se:	○	○	○	○	○
5. Relativamente **à importância atribuída aos "Resultados de Enfermagem"**, na estrutura arquitectónica do SIE em uso, considera-se:	○	○	○	○	○
6. Relativamente **à associação entre um diagnóstico específico, as respectivas intervenções e resultados de enfermagem**, considera-se:	○	○	○	○	○
7. Relativamente ao **nível de apoio à tomada de decisão clínica**, proporcionado pelo SIE em uso, na identificação:					
7.1. ...dos **diagnósticos de Enfermagem**, considera-se:	○	○	○	○	○
7.2. ...das **intervenções de Enfermagem**, considera-se:	○	○	○	○	○
7.3. ...dos **resultados (alteração status diagnóstico / termo dos diagnósticos) de Enfermagem**, considera-se:	○	○	○	○	○
8. Relativamente aos **dispositivos/mecanismos de alerta** disponíveis no SIE em uso (ex. alergias, interacções medicamentosas, ...), considera-se:	○	○	○	○	○
9. Relativamente à capacidade do SIE em uso de **representar os cuidados** efectivamente prestados ao cliente, considera-se:	○	○	○	○	○
10. Relativamente à capacidade do SIE em uso em **realizar actualizações dos conteúdos / parametrização**, em função das necessidades específicas do serviço, considera-se:	○	○	○	○	○
11. Relativamente à capacidade do SIE em uso em **realizar actualizações baseadas na evidência científica**, considera-se:	○	○	○	○	○
12. Relativamente aos **mecanismos de acesso individual ao processo clínico do cliente** (password, restrições do utilizador) do SIE em uso, considera-se:	○	○	○	○	○
13. Relativamente aos **mecanismos/dispositivos de gestão de acesso de outros profissionais à documentação** disponível no SIE em uso, considera-se:	○	○	○	○	○
14. Relativamente à **manutenção dos dados do cliente ("arquivo") ao longo do tempo** no SIE em uso, considera-se:	○	○	○	○	○
15. Relativamente ao **nível global de segurança/protecção dos dados dos clientes** do SIE em uso face a utilizações indevidas "por estranhos" (hackers), considera-se:	○	○	○	○	○
16. Relativamente ao **nível global de segurança/protecção dos dados dos clientes** do SIE em uso, face a utilizações indevidas "por utilizadores autenticados" (dados já documentados passíveis de ser alterados por outro profissional), considera-se:	○	○	○	○	○

	Pouco satisfeito				Muito satisfeito
17. Relativamente aos **mecanismos de segurança que impedem a documentação de dados aberrantes** no SIE em uso (ex: "Temperatura corporal =60ºC"), considera-se:	○	○	○	○	○
18. Relativamente à **possibilidade de documentação da informação que reporta como relevante para o exercício da actividade profissional**, considera-se	○	○	○	○	○
19. Relativamente ao **acesso à informação necessária para o exercício da actividade profissional**, considera-se:	○	○	○	○	○
20. Relativamente à **partilha de informação documentada** no SIE em uso, **na mesma instituição entre serviços diferentes, por Enfermeiros**:					
20.1. No que se refere ao **conteúdo da informação partilhada**, considera-se:	○	○	○	○	○
20.2. No que se refere à **quantidade da informação partilhada**, considera-se:	○	○	○	○	○
20.3. No que se refere à **compreensibilidade da informação**, considera-se:	○	○	○	○	○
21. Relativamente à **partilha de informação documentada** no SIE em uso, **na mesma instituição entre serviços diferentes, entre Enfermeiros e outros profissionais de saúde** (ex: médicos):					
21.1. No que se refere ao **conteúdo da informação partilhada**, considera-se:	○	○	○	○	○
21.2. No que se refere à **quantidade da informação partilhada**, considera-se:	○	○	○	○	○
21.3. No que se refere à **compreensibilidade da informação**, considera-se:	○	○	○	○	○
22. Relativamente à **partilha de informação documentada por outros profissionais de saúde (Ex. Médicos)** no seu sistema de informação em uso:					
22.1. No que se refere ao **conteúdo da informação partilhada**, considera-se:	○	○	○	○	○
22.2. No que se refere à **quantidade da informação partilhada**, considera-se:	○	○	○	○	○
22.3. No que se refere à **compreensibilidade da informação**, considera-se:	○	○	○	○	○
23. Relativamente à **partilha de informação documentada** no SIE em uso, **entre instituições diferentes, entre Enfermeiros**					
23.1. No que se refere ao **conteúdo da informação partilhada**, considera-se:	○	○	○	○	○
23.2. No que se refere à **quantidade da informação partilhada**, considera-se:	○	○	○	○	○
23.3. No que se refere à **compreensibilidade da informação**, considera-se:	○	○	○	○	○

	Pouco satisfeito				Muito satisfeito
24. Relativamente à **partilha de informação documentada** no SIE em uso, **entre instituições diferentes**, **entre Enfermeiros e outros profissionais de saúde**:					
24.1. No que se refere ao **conteúdo da informação partilhada**, considera-se:	○	○	○	○	○
24.2. No que se refere à **quantidade da informação partilhada**, considera-se:	○	○	○	○	○
24.3. No que se refere à **compreensibilidade da informação**, considera-se:	○	○	○	○	○
25. Relativamente aos **mecanismos de apoio técnico do "serviço de informática"** da sua instituição ao SIE em uso:					
25.1. Nas **horas de expediente**, considera-se:	○	○	○	○	○
25.2. **Fora das horas de expediente**, considera-se:	○	○	○	○	○
Se considerar pertinente, indique por favor algumas **sugestões de melhoria do apoio dos serviços de Informática**					
26. Relativamente aos **mecanismos de apoio técnico** ao SIE em uso:					
26.1. No que respeita ao apoio **técnico presencial**, considera-se:	○	○	○	○	○
26.2. No que respeita ao apoio **técnico por telefone**, considera-se:	○	○	○	○	○
26.3. No que respeita ao apoio **técnico por e-mail**, considera-se:	○	○	○	○	○
26.4. No que respeita aos **mecanismos de ajuda do próprio sistema** (ex. helpdesk), considera-se:	○	○	○	○	○
27. Relativamente ao **apoio quotidiano dos enfermeiros formadores/facilitadores/parametrizadores** do SIE em uso, considera-se:	○	○	○	○	○
Se considerar pertinente indique algumas **sugestões de melhoria no apoio técnico** ao quotidiano dos Enfermeiros					
28. Relativamente à frequência de **actualizações dos conteúdos / parametrização** do SIE em uso, em função das necessidades específicas do serviço, considera-se:	○	○	○	○	○
29. Relativamente à **apresentação gráfica dos interfaces** ("Páginas apresentadas") no SIE em uso:					
29.1. Da "**avaliação inicial do cliente**", considera-se:	○	○	○	○	○
29.2. Do "**plano de cuidados do cliente**", considera-se:	○	○	○	○	○
29.3. Da "**documentação da execução das intervenções autónomas de Enfermagem**" do cliente, considera-se:	○	○	○	○	○
29.4. Da "**documentação da execução das intervenções interdependentes de Enfermagem**" do cliente, considera-se:	○	○	○	○	○
29.5. Da "**documentação da evolução/resultados de Enfermagem**" considera-se:	○	○	○	○	○

	Pouco satisfeito				Muito satisfeito
30. Considerando a **prontidão de resposta** (velocidade de processamento) do SIE em uso: 30.1. Relativamente ao **tempo que despende/gasta na execução da documentação dos cuidados**, considera-se:	○	○	○	○	○
30.2. Relativamente a **velocidade de registo, gravação e reserva dos dados**, considera-se:	○	○	○	○	○
30.3. Relativamente à **velocidade de acesso à informação já documentada por enfermeiros**, considera-se:	○	○	○	○	○
30.4. Relativamente à **velocidade de acesso à informação já documentada por outros profissionais de saúde**, considera-se:	○	○	○	○	○
Se entender adequado, indique por favor algumas **sugestões de melhoria de velocidade/prontidão de resposta** do SIE em uso					
31. Relativamente à **quantidade de terminais (computadores) disponíveis para proceder à documentação** no SIE em uso, considera-se:	○	○	○	○	○
32. Relativamente à **qualidade dos terminais (computadores) disponíveis para proceder à documentação** no SIE em uso, considera-se:	○	○	○	○	○
33. Relativamente à **formação prévia** que teve oportunidade de frequentar sobre a utilização do SIE em uso, considera-se:	○	○	○	○	○
34. Sobre a **formação contínua** (caso exista) relativa à utilização do SIE em uso, considera-se:	○	○	○	○	○
35. Relativamente ao **contributo** do SIE em **uso na promoção da eficiência dos cuidados de enfermagem** que presta ao cliente, considera-se:	○	○	○	○	○
36. Relativamente ao **contributo** do SIE em uso na **promoção da capacidade de tomada decisão e autonomia no exercício da sua actividade profissional**, considera-se:	○	○	○	○	○
37. Relativamente aos **contributos**, da utilização do SIE em uso, na **produtividade do exercício da sua actividade profissional**, considera-se:	○	○	○	○	○
38. Relativamente aos **contributos** prestados pelo SIE em uso na **promoção da formação e investigação em enfermagem**, considera-se:	○	○	○	○	○
39. Relativamente aos **contributos** do SIE em uso para a **promoção dos ganhos em saúde dos clientes**, considera-se:	○	○	○	○	○
40. Relativamente à **quantidade dos indicadores relativos aos cuidados de enfermagem que são gerados** a partir do SIE em uso, considera-se:	○	○	○	○	○
41. Relativamente à **qualidade dos indicadores relativos aos cuidados de enfermagem que são gerados** a partir do SIE em uso, considera-se:	○	○	○	○	○
42. Relativamente aos **contributos** do SIE em uso na **promoção da comunicação entre os diferentes níveis de gestão da instituição** (ex. Enf. Chefe, Director), considera-se:	○	○	○	○	○

	Pouco satisfeito				Muito satisfeito
43. Tendo em consideração **os eventuais indicadores relativos aos cuidados de enfermagem** que são gerados pelo SIE em uso:					
43.1. Relativamente à utilização da informação documentada **na estratégia de gestão de recursos humanos**, considera-se:	○	○	○	○	○
43.2. Relativamente à utilização da informação documentada **na estratégia de gestão de recursos materiais no serviço**, considera-se:	○	○	○	○	○
44. Relativamente à **facilidade de utilização** do SIE em uso, considera-se:	○	○	○	○	○

45. Relativamente ao SIE em uso, considera que este integra funcionalidades desnecessárias? ○ Sim ○ Não

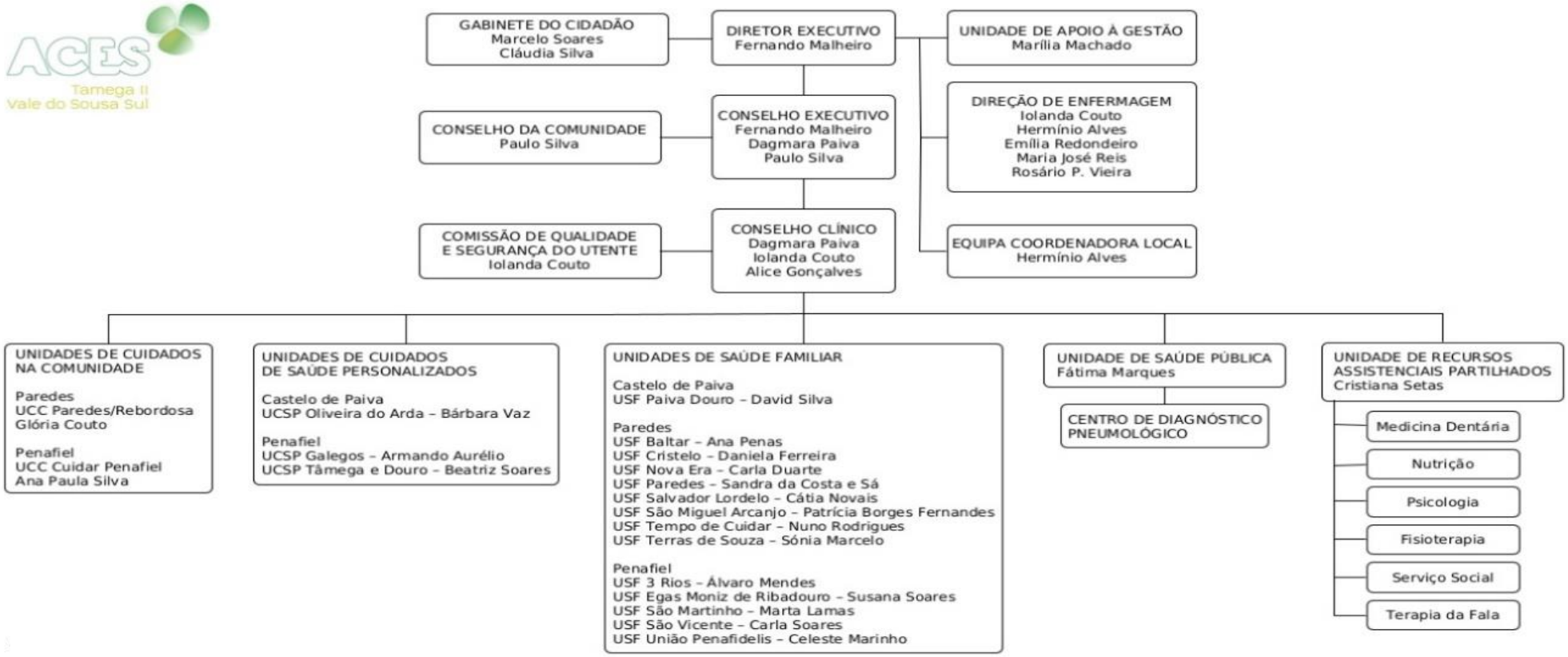
45.1 Se considerar pertinente indique, por favor, as funcionalidades que considera desnecessárias:

46. Se dependesse de si deixaria de utilizar este sistema de informação? ○ Sim ○ Não

Muito obrigado pela sua colaboração!

Appendix 2: Organogram of the Functional Units of ACeS Tâmega II - Vale do Sousa Sul

Organogram of the Functional Units of ACeS Tâmega II - Vale do Sousa Sul [111]



Source: I. ACSS - Administração Central do Sistema de Saúde, "Organogram of the Functional Units of ACeS Tâmega II - Vale do Sousa Sul," 2023. [Online]. Available: https://bicsp.min-saude.pt/pt/biufs/1/10003/QUEM SOMOS/Organograma ACES VSS 10022023.jpg. [Accessed: 14-May-2023].

Appendix 3: Authorization for the use of the data collection tool

Autorização para a utilização do "Questionário Sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem (SIE)"

Filipe Pereira e Ernesto Jorge Morais, docentes e investigadores da Escola Superior de Enfermagem do Porto e autores do *"Questionário Sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem (SIE)"*, concedem a Carla Manuela Pinto Lourenço a autorização para a aplicação deste instrumento no âmbito do seu projeto de investigação intitulado *"Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: a Study at the Health Centers Group Tâmega II – Vale do Sousa Sul"*, em curso no âmbito do 2º Ciclo de Estudos em Informática Médica da Faculdade de Medicina e da Faculdade de Ciências da Universidade do Porto.

Porto, 16 de maio de 2022

[redacted]

[redacted]

Appendix 4: Authorization for the study from ACeS Tâmega II - Vale do Sousa Sul

GOVERNO DE PORTUGAL | MINISTÉRIO DA SAÚDE

ARS NORTE
Administração Regional de Saúde do Norte, I.P.

ACES TÂMEGA II – VALE DO SOUSA SUL
Unidade de Apoio à Gestão
Recebido em 26/5/2022
Por 99- [redacted]

Projeto / Estudo n.º_____/_____

Data de Receção: ____/____/____

PROJECTO DE INVESTIGAÇÃO

Identificação do(s) investigador(es) do estudo

Nome Completo: Carla Manuela Pinto Lourenço

Contacto telefónico: [redacted]

E-Mail: [redacted] (profissional) [redacted] (pessoal)

Qualificação Académica: Licenciatura em Enfermagem; Pós-Graduação Enfermagem Gerontogeriátrica; Pós-Graduação Enfermagem Avançada; Especialista Enfermagem Médico-Cirúrgica; Mestrado (não conferente de grau) em Informática Médica

Funções que desempenha: Enfermeira Especialista
Instituição: [redacted] (ACES Tâmega II – Vale do Sousa Sul)

Designação do Estudo: *"Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: a Study at the Health Centers Group Tâmega II – Vale do Sousa Sul"*

Área científica em que se enquadra o estudo: Informática Médica – Sistemas de Informação

Vigência do Estudo (Data de princípio e de fim): Outubro de 2021-Setembro 2022

Tipo de análise (quantitativa, qualitativa): paradigma quantitativo, com abordagem descritiva, exploratória e de caráter transversal.

Palavras – chave: Sistemas de Informação de Enfermagem; Avaliação da Satisfação do Utilizador; Registos de Saúde Eletrónicos

Co-Investigador(es) (quando aplicável): Não aplicável
Nome(s) Completo(s): Não aplicável

OUTROS PROFISSIONAIS ENVOLVIDOS (Exemplo: Orientador)

Nome(s) Completo(s) / Instituição:
- Orientador: Prof. Dr. José Alberto da Silva Freitas / Faculdade de Medicina da Universidade do Porto
- Coorientador: Prof. Ernesto Jorge de Almeida Morais / Escola Superior de Enfermagem do Porto

OUTRAS INFORMAÇÕES SOBRE ESTUDO

Objetivo Geral: Descrever o nível de satisfação dos Enfermeiros enquanto utilizadores de Sistemas de Informação e Documentação de Enfermagem em Suporte Eletrónico no ACeS Tâmega II – Vale do Sousa Sul.

[redacted]

GOVERNO DE PORTUGAL | MINISTÉRIO DA SAÚDE

ARS NORTE
Administração Regional de Saúde do Norte, I.P.

Metodologia: este estudo insere-se no paradigma quantitativo, com abordagem descritiva, exploratória e de caráter transversal. Será aplicado o *"Questionário sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem"*, sendo a amostragem não probabilística e a amostra constituída por enfermeiros em exercício de funções há mais de três meses nas Unidades Funcionais do ACeS Tâmega II – Vale do Sousa Sul, que aceitem participar de forma esclarecida, livre e informada. Todos os participantes serão esclarecidos quanto aos objetivos e à metodologia do estudo, tendo por base a garantia de todas as normas de confidencialidade e de anonimato. Os dados serão processados e analisados na plataforma SPSS, sendo que posteriormente serão eliminados.

População alvo: totalidade dos enfermeiros do ACeS Tâmega II- Vale do Sousa Sul que usem sistemas de informação e documentação de enfermagem em suporte eletrónico.

Critérios de inclusão: totalidade dos enfermeiros do ACeS Tâmega II-Vale do Sousa Sul que usem sistemas de informação e documentação de enfermagem em suporte eletrónico, e que exerçam funções há mais de três meses nas Unidades Funcionais.

Método de recolha dados (anexar instrumento recolha): *"Questionário sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem"* (ver anexo)

Descrição do que consiste a colaboração do ACeS: autorização para a aplicação dos questionários nas Unidades Funcionais do ACeS.

Termo de Responsabilidade

Declaro assumir a liderança científica do projeto / estudo e as responsabilidades decorrentes da sua boa execução, bem como a dar feedback do estudo em causa e suas conclusões ao ACeS Tâmega II – Vale Sousa Sul.

Data: 23/05/2022

Assinatura: [redacted]

[redacted]

GOVERNO DE PORTUGAL | MINISTÉRIO DA SAÚDE

ARS NORTE
Administração Regional de Saúde do Norte, I.P.

Projeto / Estudo n.º____/____
Data de Receção: ____/____/____

PARECER CONSELHO CLÍNICO E DE SAÚDE

Favorável ☒ **Não Favorável** ☐

Favorável, mas condicional a parecer favorável pela Comissão de Ética para a Saúde da ARS Norte.

Data: 25 de maio de 2022

Assinaturas: [redacted]

Nada a opor.
Responsável Acesso Informação [redacted]

DIRETOR EXECUTIVO

ACeS VSS

Nada a opor á sua realização, depois do parecer da Comissão de Ética
Agrupamento de Centros de Saúde
[redacted]

[redacted]

Appendix 5: Authorization for the study from the Ethics Committee of ARS North

REPÚBLICA PORTUGUESA
SAÚDE

SNS
SERVIÇO NACIONAL DE SAÚDE

ARS NORTE
Administração Regional de Saúde do Norte, I.P.

Por E-mail

Exmo./a Senhor/a
Diretor Executivo
Dr. Fernando Malheiro
ACES Tâmega II - Vale do Sousa Sul
Travessa Rua Marquês do Pombal
4560-682 Penafiel

Sua referência	Data	Nossa referência	Data
		CE/2022/166	2022-10-18

Assunto: **Parecer sobre o Estudo 20220083 - "Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: A Study at the Health Centers Group Tâmega II - Vale do Sousa Sul"**

para conhecimento, junto se envia o Parecer desta Comissão de ética para a Saúde sobre o Estudo 20220083 - "Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: A Study at the Health Centers Group Tâmega II - Vale do Sousa Sul".

Com os melhores cumprimentos de,

COMISSÃO DE ÉTICA

[redacted]

Maria José Ferreira Santos
Presidente da Comissão de Ética

Anexo(s): 1 Parecer

☐ COMUNICAÇÃO ☐ INFORMAÇÃO ☒ PARECER DATA: **2022-09-14**
REFERÊNCIA: **CE/2022/105**

PARA .....: CONSELHO DIRETIVO

DE .....: COMISSÃO DE ÉTICA

ASSUNTO ..: **PI 20220083 - Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: A Study at the Health Centers Group Tâmega II - Vale do Sousa Sul**

EXARADO NA ATA Nº 2022_35
REUNIÃO DE 2022-10-13

DELIBERADO AUTORIZAR
2022-10-13

[redacted]
Carlos Nunes
Presidente do CD

[redacted]
Maria Clara Castro
Vice Presidente do CD

[redacted]
Paula Duarte
Vogal do CD

Relatório

A- Apresentação do pedido em apreciação

A Comissão de Ética para a Saúde da Administração Regional de Saúde do Norte, I.P. recebeu o pedido de parecer sobre o projeto intitulado "Users Satisfaction Regarding Nursing Information and Documentation in Electronic Health Records: A Study at the Health Centers Group Tâmega II - Vale do Sousa Sul", formulado por CARLA MANUELA PINTO LOURENÇO, enfermeira especialista a exercer funções no ACES Tâmega II - Vale do Sousa Sul, no âmbito do Mestrado em Informática Médica da Faculdade de Medicina da UP.

O pedido de parecer foi instruído com os documentos obrigatórios para a sua submissão.

B - Identificação de questões com eventuais implicações éticas ou metodológicas

Este estudo insere-se no plano curricular do Mestrado em Informática Médica com a orientação do Professor Doutor José Alberto da Silva Freitas (Faculdade de Medicina da Universidade do Porto) e coorientação do Professor Ernesto Jorge de Almeida Morais (Escola Superior de Enfermagem do Porto), com intuito de obter o grau de Mestre em Informática Médica. O Estudo presente será aplicado em contexto de cuidados de saúde comunitários e tem como objetivo principal descrever o nível de satisfação dos Enfermeiros enquanto utilizadores de Sistemas de Informação e Documentação de Enfermagem em Suporte Eletrónico no ACeS Tâmega II - Vale do Sousa Sul. Neste estudo será implementado como instrumento de recolha de dados o "Questionário sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem" (Campos, 2012), sendo os dados posteriormente processados e analisados em base de dados na plataforma SPSS. Os dados serão desde o início do processo anonimizados, sendo que não existe forma de haver identificação do participante nos resultados. O estudo insere-se no paradigma quantitativo, com abordagem descritiva, exploratória e de caráter transversal, sendo a amostragem não probabilística e a amostra constituída por enfermeiros em exercício de funções há mais de três meses nas Unidades Funcionais do ACeS Tâmega II - Vale do Sousa Sul, que aceitem participar de forma esclarecida, livre e informada. Todos os participantes serão previamente esclarecidos quanto aos objetivos e à metodologia do estudo assinando o consentimento informado de forma livre, tendo por base a garantia de todas as normas de confidencialidade e de anonimato. A amostra deverá, idealmente, corresponder a um mínimo de 30 participantes de forma a corresponder a um paradigma quantitativo. No entanto, é previsível um número significativamente superior de participantes. O recrutamento será efetuado previamente à recolha dos dados, via correio eletrónico, através do envio de e-mail para o endereço eletrónico profissional dos enfermeiros do ACeS Tâmega II - Vale do Sousa Sul, com a apresentação do estudo. Posteriormente, os participantes que tenham interesse em participar e que tenham assinado o consentimento informado e livre, responderão às questões inerentes ao questionário de recolha de dados.

O questionário apresenta questões maioritariamente fechadas e é constituído por três secções: caracterização dos respondentes; caracterização do SIE em uso no serviço; e um grupo de 46 questões centrados na satisfação dos utilizadores (enfermeiros) com o sistema de informação.
Não existem custos associados à participação no estudo, sendo esta voluntária e apresentando-se como possibilidade a desistência em qualquer momento do processo de consentimento informado e livre, sem qualquer prejuízo do participante.
Os dados recolhidos para o estudo serão meramente processados e analisados para efeitos da investigação. Os dados manter-se-ão confidenciais e anonimizados de acordo com os regulamentos e leis aplicáveis, não sendo possível, consequentemente, a identificação dos participantes no estudo.
A informação será gerida tendo em conta os pressupostos bioéticos da investigação, considerando que será criada uma base de dados na qual irá ser gerada a informação que posteriormente será usada na dissertação. Toda a informação gerada do estudo, não será relacionada aos seus participantes e será só usada com este propósito. Análise estatística dos dados será com recurso ao software IBM SPSS (Statistical Package for the Social Scienoe).

Em resumo:
· Os participantes têm de assinar o consentimento informado para participarem no estudo depois de serem esclarecidos do que consta o estudo e são livres de a qualquer momento se retirarem do estudo sem qualquer necessidade de justificação, e sem que tal traga qualquer consequência para o próprio;
· O estudo tem o aval da instituição onde se realiza (ACeS Tâmega II - Vale do Sousa Sul);
· Os dados recolhidos serão processados e analisados sem que haja possibilidade de relação dos dados com os participantes;
· Todos os dados serão utilizados para este estudo e não para outros fins;
· Os questionários em suporte de papel serão guardados em local seguro cujo acesso será só do conhecimento do investigador;
· Os questionários em papel serão só conservados pelo tempo previsto na lei para trabalhos de investigação e posteriormente destruídos;
· Os dados serão processados em base de dados protegida por palavra-passe e trabalhados em SPSS ® versão 27.
· Os dados a recolher são adequados aos objetivos do estudo e correspondem ao estritamente necessário para alcançar esses mesmos objetivos.
· Estão acauteladas medidas técnicas e organizacionais para processar os dados de forma segura.

C - Conclusão
Reconhecendo a relevância do estudo e após análise em reunião ordinária do mês de setembro, a Comissão de Ética para a Saúde da ARSN considera que estão assegurados os procedimentos que garantem o respeito das normas éticas relativas à proteção dos dados pessoais, dos direitos e dos interesses dos participantes, pelo que delibera por unanimidade, dar parecer favorável à realização do estudo.

A equipa de investigação deve comunicar os resultados, assim que o estudo esteja concluído.

Porto, 13 de setembro de 2022

[redacted]

Maria José Ferreira Santos
Presidente da Comissão de Ética

Rua Santa Catarina, 1288 4000-447 Porto
Telefone: 220411000 E-mail: arsn@arsnorte.min-saude.pt Website: www.arsnorte.min-saude.pt

Appendix 6: Informed Consent

CONSENTIMENTO INFORMADO, LIVRE E ESCLARECIDO PARA PARTICIPAÇÃO EM INVESTIGAÇÃO

de acordo com a Declaração de Helsínquia[1] e a Convenção de Oviedo[2]

Por favor, leia com atenção a seguinte informação. Se achar que algo está incorreto ou que não está claro, não hesite em solicitar mais informações. Se concorda com a proposta que lhe foi feita, queira assinar este documento.

Título do estudo: *"Users Satisfaction Regarding Nursing Information and Documentation In Electronic Health Records: A Study At The Health Centers Group Tâmega II – Vale do Sousa Sul" ("Satisfação dos Utilizadores de Sistemas de Informação e Documentação de Enfermagem em Suporte Eletrónico: um Estudo no ACeS Tâmega II – Vale do Sousa Sul")*

Enquadramento: Este estudo insere-se no plano curricular do Mestrado em Informática Médica com a orientação do Professor Doutor José Alberto da Silva Freitas (Faculdade de Medicina da Universidade do Porto) e coorientação do Professor Ernesto Jorge de Almeida Morais (Escola Superior de Enfermagem do Porto), com intuito de obter o grau de Mestre em Informática Médica. O Estudo presente será aplicado em contexto de cuidados de saúde comunitários e tem como objetivo principal descrever o nível de satisfação dos Enfermeiros enquanto utilizadores de Sistemas de Informação e Documentação de Enfermagem em Suporte Eletrónico no ACeS Tâmega II – Vale do Sousa Sul.

Explicação do estudo: Neste estudo será implementado como instrumento de recolha de dados o *"Questionário sobre Satisfação do Utilizador de Sistemas de Informação em Enfermagem"* (Campos, 2012), sendo os dados posteriormente processados e analisados em base de dados na plataforma *SPSS*. Os dados serão desde o início do processo anonimizados, sendo que não existe forma de haver identificação do participante nos resultados. O estudo insere-se no paradigma quantitativo, com abordagem descritiva, exploratória e de caráter transversal, sendo a amostragem não probabilística e a amostra constituída por enfermeiros em exercício de funções há mais de três meses nas Unidades Funcionais do ACeS Tâmega II – Vale do Sousa Sul, que aceitem participar de forma esclarecida, livre e informada. Todos os participantes serão previamente esclarecidos quanto aos objetivos e à metodologia do estudo assinando o consentimento informado de forma livre, tendo por base a garantia de todas as normas de confidencialidade e de anonimato.

Condições e financiamento: Não existem custos associados à participação no estudo, sendo esta voluntária e apresentando-se como possibilidade a desistência em qualquer momento do processo de consentimento informado e livre, sem qualquer prejuízo do participante. O estudo obteve parecer favorável por parte da Comissão de Ética da ARS Norte.

Confidencialidade e anonimato: Os dados recolhidos para o estudo serão meramente processados e analisados para efeitos da investigação. Os dados manter-se-ão confidenciais e anonimizados de acordo com os regulamentos e leis aplicáveis, não sendo possível, consequentemente, a identificação dos participantes no estudo.

Para esclarecimento adicional acerca de alguma dúvida durante o processo, poderá contactar:
Investigadora Principal: Carla Manuela Pinto Lourenço; Enfermeira Especialista em Enfermagem Médico-Cirúrgica na US[redacted] Mestranda em Informática Médica; Te[redacted] E-mai[redacted]

[1] http://portal.arsnorte.min-saude.pt/portal/page/portal/ARSNorte/Comiss%C3%A3o%20de%20%C3%89tica/Ficheiros/Declaracao_Helsinquia_2008.pdf

[2] http://dre.pt/pdf1sdip/2001/01/002A00/00140036.pdf

Nome do Investigador: Carla Manuela Pinto Lourenço

Assinatura do Investigador: ... ... **Data:** ..../......./...........

-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Declaro ter lido e compreendido este documento, bem como as informações verbais que me foram fornecidas pela/s pessoa/s que acima assina/m. Foi-me garantida a possibilidade de, em qualquer altura, recusar participar neste estudo sem qualquer tipo de consequências. Desta forma, aceito participar neste estudo e permito a utilização dos dados que de forma voluntária forneço, confiando em que apenas serão utilizados para esta investigação e nas garantias de confidencialidade e anonimato que me são dadas pelo/a investigador/a.

Nome do participante: ... ...
Assinatura: ... ... Data: ..../......./...........

ESTE DOCUMENTO É COMPOSTO DE 2 PÁGINAS E FEITO EM DUPLICADO:

UMA VIA PARA O/A INVESTIGADOR/A, OUTRA PARA A PESSOA QUE CONSENTE

Appendix 7: Content of the E-mail sent to Nurses with information about the study

"Subject: Important collaboration in Research Project

Good morning.

My name is Carla Lourenço and I am a Nurse at [redacted]

I am currently developing a research project entitled "Users Satisfaction Regarding Nursing Information and Documentation In Electronic Health Records: A Study At The Health Centers Group Tâmega II – Vale do Sousa Sul", within the scope of the 2nd Cycle of Studies in Medical Informatics of the Faculty of Medicine and Faculty of Sciences of the University of Porto, which has the general objective of describing the level of satisfaction of the Nurses of this ACeS, as users of nursing information systems in electronic support.

I therefore come to invite Nursing Colleagues who have been working at ACeS for over 3 months to fill in the "Nursing Information Systems User Satisfaction Questionnaire" that you will receive at your functional unit, in the next few days, via internal mail, with a maximum estimated completion time of 15 minutes.

The "Informed Consent, Free and Clarified for Participation in Research" will also be sent to be completed, and each nurse must keep a copy of it, forwarding the original informed consent, duly signed, to me.

After the Nurses of each functional unit finish filling out the Informed Consents and Questionnaires, they must be placed in the envelope and forwarded to my functional unit [redacted] *via internal mail.*

The completed documentation must be sent to my unit within a maximum period of 15 days after receipt of the same.

With regard to the questionnaire, given the pertinence of this topic, fellow nurses are asked to pay maximum attention to the questions asked, translating a reflected and sincere opinion into the responses. The collected data will be treated confidentially and, therefore, the research results will not identify the respondents, thus guaranteeing anonymity. It will also be important to completely fill in the circles with a blue or black ballpoint pen, making sure that all questions have been answered.

The participation of Nursing Colleagues is essential for the realization of this project, thanking you in advance for your collaboration.

For any question related to this questionnaire, the researcher can be contacted through the e-mail address: [redacted]

Sincerely,

Carla Lourenço

Nurse Specialist in Medical-Surgical Nursing

[redacted]

Note: email translated into English from the original in Portuguese

Appendix 8: Exploratory factor analysis: total variance explained

F1 Equipment: Speed, Quality and Quantity	2 Architecture, Language, Decision Support (Nursing Process) and Graphics	3 Benefits and Security	4 Information Sharing	5 Technical Support and Training

	Component					h2
	F1	F2	F3	F4	F5	
Q30.2 Considering the response readiness (processing speed) of the NIS in use: Regarding the speed of registration, recording and data reservation	,809					,721
Q30.1 Considering the response readiness (processing speed) of the NIS in use: Regarding the time you spend/spent in carrying out the documentation of care	,804					,762
Q30.4 Considering the response readiness (processing speed) of the NIS in use: Regarding the speed of access to information already documented by other health professionals	,801					,772
Q30.3 Considering the response readiness (processing speed) of the NIS in use: Regarding	,779					,710
Q32. Regarding the quality of the terminals (computers) available to carry out documentation on the NIS in use	,541					,449
Q44. Regarding the ease of use of the NIS in use	,500					,565
Q31. Regarding the number of terminals (computers) available to carry out documentation on the NIS in use	,433					
Q7.1 Regarding the level of support for clinical decision-making, provided by the NIS in use, in the identification... of Nursing diagnoses		,809				,713
Q7.2 Regarding the level of support for clinical decision-making, provided by the SIE in use, in the identification... of Nursing interventions		,795				,717
Q29.2 Regarding the graphic presentation of the interfaces ("Displayed Pages") in the NIS in use: From the "client's care plan"		,687				,655
Q1.2 Regarding the language used in the NIS in use for the construction of statements... of nursing interventions		,676				,540
Q29.4 Regarding the graphical presentation of the interfaces ("Displayed pages") in the NIS in use: From the client's "documentation of the execution of interdependent Nursing interventions"		,663				,719
Q29.3 Regarding the graphic presentation of the interfaces ("Displayed pages") in the NIS in use: From the client's "documentation of the execution of autonomous Nursing interventions"		,646				,701
Q6. Regarding the association between a specific diagnosis, the respective interventions and nursing outcomes		,636				,648
Q3. Regarding the importance attributed to "Nursing Diagnoses", in the architectural structure of the NIS in use		,625				,563

Q7.3 Regarding the level of support for clinical decision-making, provided by the NIS in use, in the identification... of Nursing results (change in diagnostic status / term of diagnoses)		,617				,599
Q4. Regarding the importance attributed to "Nursing Interventions", in the architectural structure of the NIS in use		,611				,591
Q13. Regarding the mechanisms/devices for managing access by other professionals to the documentation available in the NIS in use		,608				,491
Q1.1 Regarding the language used in the NIS in use for the construction of statements... of Nursing diagnoses		,605				,434
Q29.5 Regarding the graphic presentation of the interfaces ("Displayed pages") in the NIS in use: From the "Documentation of the evolution / results of Nursing"		,477				,645
Q29.1 Regarding the graphical presentation of the interfaces ("Displayed Pages") in the NIS in use: From the "initial customer assessment"		,325				,455
Q18. Regarding the possibility of documenting the information reported as relevant to the exercise of the professional activity			,696			,721
Q8. Regarding the alert devices/mechanisms available in the NIS in use (e.g. allergies, drug interactions, …)			,633			,546
Q17. Regarding the security mechanisms that prevent the documentation of aberrant data in the NIS in use (e.g.: "Body temperature =60°C")			,633			,499
Q19. Regarding access to information necessary for the exercise of professional activity			,625			,627
Q14. Regarding the maintenance of customer data ("file") over time in the NIS in use			,589			,533
Q15. Regarding the overall level of security/protection of NIS customer data in use against misuse "by outsiders" (hackers)			,584			,528
Q2. Regarding the importance attributed to the "Initial Nursing Assessment", in the architectural structure of the NIS in use			,583			,591
Q42. Regarding the contributions of the NIS in use in promoting communication between the institution's different management levels (e.g. Head Nurse, Director)			,578			,660
Q43.1 Considering any indicators related to nursing care that are generated by the NIS in use: Regarding the use of the information documented in the human resources management strategy			,578			,594
Q9. Regarding the ability of the NIS in use to represent the care effectively provided to the client			,560			,575
Q5. Regarding the importance attributed to "Nursing Outcomes", in the architectural structure of the NIS in use			,532			,568
Q8. Regarding the alert devices/mechanisms available in the NIS in use (e.g. allergies, drug interactions, …)			,529			,550
Q41. Regarding the quality of indicators related to nursing care that are generated from the NIS in use			,511			,619
Q11. Regarding the ability of the NIS in use to carry out updates based on scientific evidence			,511			,467

Q1.3 Regarding the language used in the NIS in use for the construction of statements... of nursing results			,438			,424
Q39. Regarding the contributions of the SIE in use to promote health gains for clients			,424			,583
Q16. With regard to the overall level of security/protection of NIS customers' data in use, against misuse "by authenticated users" (already documented data that can be changed by another professional)			,406			,471
Q43.2 Considering any indicators related to nursing care that are generated by the NIS in use: Regarding the use of the information documented in the strategy for managing material resources in the department			,405			,607
Q28. Regarding the frequency of content updates / parameterization of the NIS in use, depending on the specific needs of the department			,385			,482
Q40. Regarding the number of indicators related to nursing care that are generated from the NIS in use			,346			,629
Q35. Regarding the contribution of the NIS in use in promoting the efficiency of the nursing care provided to the client			,238			,584
Q37. Regarding the contributions, of the use of the NIS in use, in the productivity of the exercise of their professional activity			,259			,715
Q38. Regarding the contributions provided by the NIS in use in promoting training and research in nursing			,144			,594
Q36. Regarding the contribution of the NIS in use in promoting decision-making capacity and autonomy in the exercise of their professional activity			,178			,673
Q21.1 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, between Nurses and other health professionals (e.g.: doctors): With regard to the content of the shared information				,862		,806
Q21.3 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, between Nurses and other health professionals (e.g.: doctors): With regard to the comprehensibility of the information				,850		,753
Q21.2 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, between Nurses and other health professionals (e.g.: doctors): With regard to the amount of information shared				,833		,726
Q24.3 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses and other health professionals: With regard to the comprehensibility of the information				,784		,756
Q24.2 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses and other health professionals: With regard to the amount of information shared				,759		,727
Q20.3 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, by Nurses... With regard to the comprehensibility of the information				,683		,669

Q22.2 Regarding the sharing of information documented by other health professionals (e.g. doctors) in your information system in use: With regard to the amount of information shared				,674		,613
Q20.2 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, by Nurses... Regarding the amount of information shared				,673		,757
Q23.3 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses… With regard to the comprehensibility of the information				,592		,699
Q20.1 Regarding the sharing of information documented in the NIS in use, in the same institution between different departments, by Nurses... Regarding the content of the shared information				,590		,762
Q24.1 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses and other health professionals: With regard to the content of the shared information				,576		,581
Q23.2 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses… With regard to the amount of information shared				,562		,709
Q23.1 Regarding the sharing of information documented in the NIS in use, between different institutions, between Nurses… With regard to the content of the shared information				,557		,704
Q12. Regarding the individual access mechanisms to the client's clinical file (password, user restrictions) of the NIS in use				,459		,277
Q22.1 Regarding the sharing of information documented by other health professionals (e.g. Doctors) in your information system in use: With regard to the content of the shared information				,406		,590
Q22.3 Regarding the sharing of information documented by other health professionals (e.g. Doctors) in your information system in use: With regard to the comprehensibility of the information				,525		,654
Q26.3 With regard to technical support mechanisms for the NIS in use: With regard to technical support by e-mail					,797	,737
Q26.2 With regard to technical support mechanisms for the NIS in use: With regard to technical support by telephone					,795	,740
Q26.4 Regarding the NIS technical support mechanisms in use: With regard to the system's own help mechanisms (e.g. helpdesk)					,741	,689
Q26.1 Regarding the technical support mechanisms for the NIS in use: With regard to face-to-face technical support					,709	,682
Q27 Regarding the daily support of nurses who train/facilitate/parameterize the NIS in use					,614	,600
Q25.1 Regarding the technical support mechanisms of your institution's "informatics department" to the NIS in use... During office hours					,526	,605
Q25.2 Regarding the technical support mechanisms of your institution's "informatics department" to the NIS in use... Outside office hours					,506	,477
Q33 Regarding the previous training that you had the opportunity to attend on the use of the NIS in use					,319	,546
Q34 On ongoing training (if any) regarding the use of the NIS in use					,270	,529
Eigenvalue	**27.798**	**5.815**	**4.037**	**2.842**	**2.598**	
Explained Variance (Total 61.557%)	**39.712%**	**8.307%**	**5.767%**	**4.060%**	**3.711%**	

Appendix 9: Aggregation of questions by Domains – Comparative table with the previous studies

		Questions																												
		1.1.	1.2.	1.3.	2.	3.	4.	5.	6.	7.1.	7.2.	7.3.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.1.	20.2.	20.3.	21.1.	21.2.	21.3.
Domains identified by Campos (2012)	Nursing Process	•	•	•	•	•	•	•	•	•	•	•		•									•	•						
	Information security and maintenance												•				•	•	•	•	•	•								
	IS support mechanisms														•	•														
	Technical Aspects																													
	Benefits																								•	•	•	•	•	•
Domains identified by Moreira (2014)	Nursing process and Benefits	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•	•	•						
	Information Sharing																								•	•	•	•	•	•
	Support and Training																													
	Graphics and Security																•	•	•	•	•									
	Equipment: speed, quality and quantity																													
Domains identified by Moura (2015)	Nursing process and Benefits	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•	•	•						
	Information Sharing																								•	•	•	•	•	•
	Support and Training																													
	Graphics and Security																•	•	•	•	•									
	Equipment: speed, quality and quantity																													
Domains identified by Silva (2016)	Information Sharing																	•	•					•	•	•	•	•	•	•
	Structure and content of information necessary for decision making	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•							
	NIS support structures and contributions																													
	Security, data protection, and technical and training support																			•	•	•								
	Graphical presentation of data																													
Domains identified in the current study	Equipment: speed, quality and quantity																													
	Architecture, Language, Decision Support (Nursing Process) and Graphics	•	•			•	•		•	•	•	•						•												
	Benefits and Security			•	•			•					•	•	•	•			•	•	•	•	•	•						
	Information Sharing																•								•	•	•	•	•	•
	Technical Support and Training																													

		Questions																												
		22.1.	22.2.	22.3.	23.1.	23.2.	23.3.	24.1.	24.2.	24.3.	25.1.	25.2.	26.1.	26.2.	26.3.	26.4.	27	28.	29.1.	29.2.	29.3.	29.4.	29.5.	30.1.	30.2.	30.3.	30.4.	31	32	33
Domains identified by Campos (2012)	Nursing Process																													
	Information security and maintenance																													
	IS support mechanisms										•	•	•	•	•	•	•	•												•
	Technical Aspects																		•	•	•	•	•	•	•	•	•	•	•	
	Benefits	•	•	•	•	•	•	•	•	•																				
Domains identified by Moreira (2014)	Nursing process and Benefits																	•												
	Information Sharing	•	•	•	•	•	•	•	•	•																				
	Support and Training										•	•	•	•	•	•	•													•
	Graphics and Security																		•	•	•	•	•							
	Equipment: speed, quality and quantity																							•	•	•	•	•	•	
Domains identified by Moura (2015)	Nursing process and Benefits																	•												
	Information Sharing	•	•	•	•	•	•	•	•	•																				
	Support and Training										•	•	•	•	•	•	•													
	Graphics and Security																		•	•	•	•	•							
	Equipment: speed, quality and quantity																							•	•	•	•	•	•	
Domains identified by Silva (2016)	Information Sharing	•	•	•	•	•	•	•	•	•																				
	Structure and content of information necessary for decision making																	•												
	NIS support structures and contributions																							•	•	•	•	•	•	•
	Security, data protection, and technical and training support										•	•	•	•	•	•	•		•	•	•	•	•							

	Graphical presentation of data																													
Domains identified in the current study	**Equipment: speed, quality and quantity**																							•	•	•	•	•	•	
	Architecture, Language, Decision Support (Nursing Process) and Graphics																		•	•	•	•	•							
	Benefits and Security																	•												
	Information Sharing	•	•	•	•	•	•	•	•	•																				
	Technical Support and Training										•	•	•	•	•	•	•													•

		Questions											
		34.	35.	36.	37.	38.	39.	40.	41.	42.	43.1.	43.2.	44.
Domains identified by Campos (2012)	Nursing Process												
	Information security and maintenance												
	IS support mechanisms	•											
	Technical Aspects												•
	Benefits		•	•	•	•	•	•	•	•	•	•	
Domains identified by Moreira (2014)	Nursing process and Benefits		•	•	•	•	•	•	•	•	•	•	
	Information Sharing												
	Support and Training	•											
	Graphics and Security												
	Equipment: speed, quality and quantity												•
Domains identified by Moura (2015)	Nursing process and Benefits		•	•	•	•	•	•	•	•	•	•	
	Information Sharing												
	Support and Training												
	Graphics and Security												
	Equipment: speed, quality and quantity												•
Domains identified by Silva (2016)	Information Sharing												
	Structure and content of information necessary for decision making												
	NIS support structures and contributions	•	•	•	•	•	•	•	•	•	•	•	•
	Security, data protection, and technical and training support												
	Graphical presentation of data												
Domains identified in the current study	Equipment: speed, quality and quantity												•
	Architecture, Language, Decision Support (Nursing Process) and Graphics												
	Benefits and Security		•	•	•	•	•	•	•	•	•	•	
	Information Sharing												
	Technical Support and Training	•											

Users Satisfaction Regarding Nursing Information and Documentation In Electronic Health Records: A Study At The Health Centers Group Tâmega II – Vale Do Sousa Sul

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