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# Impact of Software Change on Workflow and Satisfaction of Intensive Care Staff

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## ABSTRACT

**Background:** The use of electronic patient record software at the bedside can have a significant impact on critical care practice and therefore potentially on workflow. Data recording is essential for good patient follow-up. We looked at the impact of a change in computer software in the critical care administrative workload and in the time spent at the bedside for patient care.

**Methods:** Qualitative prospective research in 2 ICU (58/18 beds) in 2 hospitals who worked with the same software. Hospital 1 changed the software in ICU to an EMR software and Hospital 2 did not modify his software. 10 months after the change of software, we evaluated the satisfaction of the ICU staff in the 2 institutions.

**Results:** Over 6-week period, 154 participants responded to a satisfaction questionnaire on the computerization of their respective ICU. In Hospital 1, the impact on general satisfaction and daily work of the medical nursing staff was 40.6% compared with 80.9% in Hospital 2 (p<0,0001).The time spent at the patient's bedside was 50% in Hospital 1 compare with 77% in Hospital 2 (p<0,0001). In Hospital 1, an additional time of 76.87 minutes over per shift of 8 hours compared Hospital 2 which did not change software. The software was adapted to ICU practice at 95.5% in Hospital 2. Only 17% of responders felt that saved administrative work with the new software in Hospital 1.

**Conclusion:** The change in software not specifically adapted to ICU practice results in more laborious coding 10 months after it implementation. It reduces the time spent for patient care and increases the administrative workload. Further studies with longer timeframes after implementation of a new system in other countries are needed to confirm our study on the impact of additional administrative workload for the nursing staff.

**Keywords:** Electronic health record; Digital strategy; Workload; Intensive care unit; Nursing

## INTRODUCTION

Over the last decade, the healthcare system has been severely challenged and hospital teams have faced exhausting conditions, as highlighted by the recent Covid-19 pandemic. Studies have demonstrated that a low nurse-to-patient ratio is associated with high mortality, lack of care, and prolonged ICU stays due to surgical complications [1-8]. Therefore, every effort should be made to improve working conditions for nursing staff.

As of today, few, if any, studies exploring the benefits of hospital computerization, in particular when switching from paper to computers, have evaluated software that was satisfactory compared with new software considered to be better.

Nekoei-Moghadam et al., for instance, pointed out that the first step to reduce medical errors was to improve patient safety in healthcare organizations. Developing health information systems, encouraging employees to report errors, and planning to reduce nurses' workload can be effective in achieving the desired health outcome [9].

It has also been proven that Electronic Nursing Handover

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Systems are more efficient than paper-based ones, and that they ensure better care continuity [10,11]. However, systematic and prospective studies identifying Electronic Health Record (HER)-related errors across the entire medication management process are scarce [12].

In 2016, the World Health Organization set the record straight by stating several advantages of EHRs in the report of the third global survey on eHealth, which was conducted by the Global Observatory for eHealth [13]. EHRs improve the quality [13,14], the accuracy, and the timeliness of patient information at the place of care, and provide insights on healthcare costs, use, and outcomes. EHRs also promote quality of care, reduce costs, support patient mobility, increase information reliability, and give access to patient information to multiple healthcare providers [15]. Moreover, EHR data analyses can highlight areas of concern and health service delivery [16].

Administrative procedures in medicine are obviously increasing, which is extremely time-consuming for physicians and nurses, increasing their respective workloads [17-19]. Thus, Mohammadnejad et al. underlined that technological solutions should be considered on a contextual basis and that attention should be paid when selecting technologies to support nursing workload [20]. The nursing staff is well aware that time devoted to patient care is essential in the therapeutic process, hence their preference for the use of information technology (IT) tools that can help them save time spent on administrative processes and focus more on patient care, the core activity of their profession [21].

The digitalization of intensive care units (ICUs) in our institutions began in 1994 and has since been able to adapt to the reality of the field, thus providing valuable medical decision-making support (Artificial Intelligence [AI]) based on the needs of the various players in the sector [22]. Therefore, we have gradually witnessed a transition from paper patient files to a Patient Data Management System (PDMS). The data recorded in a structured manner enabled the ICUs to enter the world of big data and to evolve towards advanced technologies that will be extended to the rest of acute medicine (anesthesia, pediatric, neonatology, and emergencies). The specifications for the latter were written by Belgian intensive care physicians and nurses, who were brought together in a working group on clinical informatics and applied research in intensive care. By 1987, informatics had enabled the development of comprehensive data storage and processing programs, prognostic scores, improved clinical research, and treatment adequacy. In 2019, the evolution of the software used has been accredited by Accreditation Canada International (ACI) [23,24].

The implementation of an EMR mobilizes enormously both hospital management and political decision-makers. This requires a lot of energy and requires considerable financial budgets in a sometimes-complicated context in terms of health policies. Reason why the subject can be considered sensitive. The satisfaction survey presented in this article was meant to be constructive, to strive for excellence in healthcare, and to improve the quality of critical care in Europe and abroad. The nursing staff is well aware of the complexity of hospital IT and its necessity. Having a fully centralized electronic file format accessible in one place is beneficial, provided that "IT is a tool to help humans to care for humans. IT is malleable and must be adapted as much as possible to the way of working and to the needs of the user" [25].

Indeed, IT is there to support healthcare workers and facilitate care evaluation [26]. In other parts of the world, Electronic Medical Record (EMR)-type systems were shown to reduce medical cost and improve healthcare quality and health outcomes in general [10]. The largest potential savings from health information technologies (HITs) come from a reduction of hospitalization durations, nurses' administrative time, and drug consumption in hospitals, as well as a reduction of drug consumption and radiology equipment use in outpatient care [17].

However, the complexity and variety of this often unstructured information have contributed to the mistrust and gradual rejection of IT tools and its formalized requirements, thus underlining the need for a new organization regarding the writing, coding, and hierarchy of medical information, as pointed by A. De Wever [27]. The users will not like it and in case it does not satisfy the needs, the users would ignore it, and they even might consider the system an intruder and irritating factor as pointed by S. Rostami [15]. Tool appropriation by healthcare professionals is essential to ensure proper management of the validity of each user's information.

## Factors Associated with Nursing Time

The factors associated with working time are, according to two Nursing Activities Score (NAS) studies in Belgium, body mass index, length of stay outliers, Acute Physiology And Chronic Health Evaluation (APACHE) II score, patients who died, as well as patients undergoing mechanical ventilation and continuous dialysis, as mentioned by Bruyneel et al in their article on nursing workload measurement in intensive care with the NAS [28,29].

## Description of all Processes

The ICUs of both institutions have been equipped with the same ICU-specific PDMS created by intensive care doctors and nurses (GTICRASI), and running since 1994 with regular adjustments (upgrading and updating). The ICU software used in both institutions was known as Qcare PDMS (Group Evolucare-GPI). One of the two institutions changed its software in November 2020 to an institutional EMR known as EPIC (also deployed in the ICU). The objective of the study was to assess and compare staff satisfaction in these two institutions regarding the software used in intensive care. For the first institution associated with the software change, we waited for 10 months after the implementation of a new EMR to allow medical and nursing staff to adapt for the new system before sending the questionnaire to the two hospital staff members.

What are the expected benefits of an EMR like EPIC software and the advantages of critical care software like Qcare PDMS? The EMR software allows physicians, nurses, and healthcare professionals to track healthcare information of their patients [30]. It allows for greater accessibility (centralized information updated immediately), efficiency, and security for both the provider and the patient. It offers a better communication between the different providers, a quick access to medical

information (patient medical history, allergies), coordination of care, a digital record of a patient's health information, and decision-making support. EMR software helps reduce medical errors (drug interactions, prescription errors, etc.) [16].

At the critical care level, the Qcare PDMS software, which is specific to critical care such as intensive care, anesthesia, emergency room, and neonatology, will provide, in addition to the aforementioned elements, granularity in the precision of the digital recording of structured information, rapid information visualization, precision and quality of the hydroelectrolytic balance, simplicity of use, adaptability and scalability of the software according to the pharmacological, practical, or ministerial modifications. Moreover, it is user-friendly unique multilingual software. Since the structured digital information reported at the patient's bedside is of high quality, the data can easily be extracted for scientific studies involving artificial intelligence.

### Aim of the Study

We assessed the satisfaction of heterogenous ICU staff group in two hospitals 25 years after the beginning of this adventure [31]. We sought to answer the following research question: Does changing software in an ICU impact nursing clinical workload, time devoted to patient care, and satisfaction?

## METHODS

### Design and Setting of the Study

This is qualitative study was conducted in two hospitals including 7 intensive care units, with a total of 76 mixed intensive care beds (surgical and medical). The two institutions employed 255 intensive care professionals and received all types of pathologies. Regarding the sample size calculation, the total number of healthcare professionals in the nursing staff of the two teams was lower than the theoretical number needed to meet the optimal statistical sample size.

The study was performed between two COVID-19 waves and outside the workload registration period requested by the Belgian Ministry of Health, which requires a specific coding of nursing procedures that is used as a tool to fund hospitals and critical care [32].

### Survey

A questionnaire was developed to assess the satisfaction of ICU staff and the impact of IT tools on their daily work. The items of the questionnaire were based on an analysis of a similar survey, on other questionnaires included in the complementary training courses, and on the institution's own "homemade" format. A pre-test was carried out to validate the questionnaire.

This satisfaction survey on the computerization of intensive care included a four-page questionnaire with 20 questions in paper format (to ensure anonymity) (**Annexure**).

The main themes of the questionnaire were classified into several dimensions:

- User profile and experience duration
- Numerical evaluation of the satisfaction regarding the IT tool and its quality
- IT tool impact on daily work
- IT tool functions needing improvement or working well.

One or more answers were allowed depending on the type of question and participants could also add free hand-written comments. The most relevant questions are presented in the results section and the answers to the other questions can be found in the **Table 1**.

### Statistical Analysis

The encoding was carried out electronically using the Survey Manager V7 software from Soft Concept. For satisfaction scoring and all questions, a Chi-square test was used. A p-value value <0.05 was considered statistically significant. To calculate the minimum sample size, we used the Cochran's equation with a precision level of 5%, a confidence level of 95%, an estimated proportion of 0.5 and a population size of 255. The appropriate sample size given the population size and specified combination of precision, confidence and variability was 154.

### Ethical Considerations

A unique and anonymous number was randomly assigned to each questionnaire completed by the healthcare teams in each institution. We have respected the law on privacy and the subjects' anonymity was assured. The agreement of the department heads was sought and granted. No non-anonymized data were included in the study. The study was submitted to the Ethical Commission of the Hospital for approval. As no data collected in our study had an impact on privacy, no consent was required.

## RESULTS

Data were collected between September 20, 2021 and October 31, 2021. Out of the 255 critical care professionals, 154 questionnaires were fully answered and analyzed. The participation rate in the study was 56% for Hospital #1 (a tertiary care hospital with a larger staff) equipped with the new EMR EPIC and 75% for Hospital #2 (a general hospital) equipped with Qcare PDMS, a specific ICU software.

### Characteristics of the Participants

The study included 154 participants, 109 from Hospital #1 (computerized with EMR EPIC) and 45 from Hospital #2 (computerized with Qcare PDMS). The mean age of the responders was 39.3 years (interquartile range: 22-64) with a higher proportion of women than men. The education degree was higher in Hospital #1, with a higher proportion of respondents with a university level than in Hospital #2. The confirmed professional field experience was over 10 years in both institutions (**Table 1**).

The satisfaction results were analyzed according to age groups: 20 years-35 years old, 36 years-50 years old, and >50 years old. The satisfaction level did not differ according to age, with an average score per group of 5.2/10, 5.6/10, and 5.3/10, respectively.

**Table 1:** Characteristics of the heterogenous participants. EMR, electronic medical record; ICU, Intensive Care Unit

| Total n=154 | Total n=154 | Hospital #1 EMR software (n=109) | Hospital #2 ICU software (n=45) |
|---|---|---|---|
| Gender: Male/Female | 29%/72% | 33 males/73 females/3 unknown | 10 males/35 females |
| Age: Average | 39.3 years | 38 years | 42.5 years |
| Youngest/Oldest | 22 years/64 years | 22 years/64 years | 23 years/59 years |
| **Maximum educational level** | | | |
| Primary school | - | - | - |
| Lower secondary school | - | - | - |
| Higher secondary school | 8 (5%) | 5 | 3 |
| Non-university higher studies | 96 (63%) | 63 | 33 |
| Academic studies | 48 (32%) | 40 | 8 |
| **What is your profession in the intensive care unit?** | | | |
| Healthcare assistant | | 4 | 4 |
| Nurse | | 83 | 32 |
| Physiotherapist | | 3 | 2 |
| Doctor | | 16 | 4 |
| Technical staff | | 1 | 1 |
| Secretary | | - | 2 |
| Dietician | | - | - |
| Other | | - | - |
| **How many years have you been working in intensive care?** | | | |
| <1 year | 17 | 14 | 3 |
| 1-3 years | 15 | 11 | 4 |
| 3-5 years | 18 | 15 | 3 |
| 5-10 years | 20 | 15 | 5 |
| 10-15 years | 17 | 13 | 4 |
| 15-20 years | 16 | 9 | 7 |
| 20 years | 50 | 31 | 19 |
| No response | 1 | 1 | - |
| Participation rate in the study | | 56% | 75% |

## Satisfaction Score

**Figure 1** shows the extent to which the IT tools ease the administrative tasks, according to participants. The mean satisfaction score was 3.89 in Hospital #1 compared with 8.02 in Hospital #2 ($p<0.0001$). The score obtained in Hospital #2 would have probably been equivalent to that of Hospital #1 before the software change (or even higher), as some additional functionalities existed and others had been programmed. This could explain some of the dissatisfaction expressed by the staff.

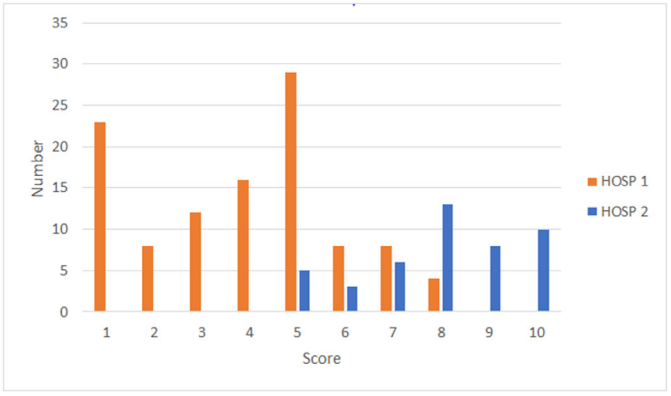


**Figure 1:** Assessment of the extent to which the information technology tools ease the administrative tasks, as rated on a scale from 0 to 10 by participants. Hospital #1 was equipped with the EMR software and Hospital #2 was equipped with the QCare PDMS software, specific to ICUs

## Evaluation of IT Tool Quality

Assessment of the IT tool quality was 30.5% for Hospital #1 vs. 54.5% for Hospital #2 ($p<0.0001$). Regarding the item "insufficiently advanced for my position," we obtained 20.5% for Hospital #1 vs. 2.25% for Hospital #2 ($p<0.0001$). For the item "just right for position," we obtained 16.5% for Hospital #1 vs. 41% for Hospital #2 ($p<0.0001$). For the item "not very advanced for my position," we obtained 12.5% for Hospital #1 vs. 2.25% for Hospital #2 ($p<0.0001$) (**Table 2**).

**Table 2:** Evaluation of IT tool quality. EMR, electronic medical record; ICU, Intensive Care Unit

| Functionalities | Hospital #1 EMR software | Hospital #2 ICU software |
|---|---|---|
| No change at all for my position | 12 (11.5%) | - |
| Quite advanced for my position | 31 (30.5%) | 24 (54.5%) |
| Insufficiently advanced for my position | 21 (20.5%) | 1 (2.25%) |
| Just right for my position | 17 (16.5%) | 18 (41%) |
| Not very advanced for my position | 13 (12.5%) | 1 (2.25%) |
| Too advanced for my position | 9 (8.5%) | - |
| No answer | 6 | 1 |

## IT Description

For the description of the IT tools, in Hospital #1 using the EMR Epic, 41% of the respondents estimated that there was a work overload and 24% that the tool was less advanced than in the past, compared with 0% in Hospital #2 using Qcare PDMS. In Hospital #2, 79% expressed that it was a precious help in everyday life compared with 26% in Hospital #1. 6% of the participants considered that it was impossible to work without an IT tool in Hospital #1 (Table 3).

**Table 3:** Description of the IT tool

| Several choices are possible | Total n=154 | Hospital #1 EMR software (n=109) | Hospital #2 ICU software (n=45) |
|---|---|---|---|
| It is an overload of work | 52 | 52 (41%) | - |
| The tool is less advanced than in the past | 30 | 30 (24%) | No software change |
| This does not change anything | 6 | 5 (4%) | 1 (2%) |
| It is a precious help in everyday life | 70 | 33 (26%) | 37 (79%) |
| I could not work without it | 16 | 7 (6%) | 9 (10%) |

## Ratio of Time Spent for Patient Care to Computer Tasks

Table 4 shows the proportion of time devoted to patient care vs. time spent working on the computer. In Hospital #1, 56% of the nursing staff expressed that the time spent on the computer was equivalent to the time devoted to patient care. By contrast, in Hospital #2, 76% considered that the time devoted to patient care represented three quarter of their time shift.

## Time Saved for Patient Care

In Hospital #1, an average of 93.75 minutes was saved daily for patient care as opposed to 237.12 minutes in Hospital #2 (Table 5).

## Satisfaction Regarding IT Tools

Concerning the satisfaction regarding the IT tools on a scale from 1 to 10, the mean score was 4.06 in Hospital #1, equipped with the EMR software, and 8.09 in Hospital #2, equipped with the ICU software (p<0.0001) (Table 6).

**Table 4:** Ratio of time spent for patient care to computer tasks. EMR, electronic medical record; ICU, intensive care unit

| Ratio | Total n=154 | Hospital #1 EMR software (n=109) | Hospital #2 ICU software (n=45) |
|---|---|---|---|
| 50% patients/50% computer | 66 | 61 (56%) | 5 (11%) |
| if >50 % computer | 16 | 15 (14%) | 0 |
| 40% patients/60% computer | | 5 | |
| 25% patients/75% computer | - | 7 | - |
| 20% patients/80% computer | | 3 | |
| 60% patients/40% computer | | 1 (1%) | 0 |
| 75% patients/25% computer | 33 | 21 (19%) | 12 (27%) |
| 80% patients/20% computer | 13 | 2 (2%) | 11 (25%) |
| 90% patients/10% computer | 11 | 4 (3.5%) | 7 (15%) |
| 95% patients/5% computer | 4 | 0 | 4 (9%) |
| No answer | 11 | 5 (4.5%) | 6 (13%) |

**Table 5:** Time saved for patient care. EMR, electronic medical record; ICU, Intensive Care Unit

| | Total n=154 | Hospital #1 EMR software (n=109) | Hospital #2 ICU software (n=45) |
|---|---|---|---|
| **Time saved for patient care per shift (8h)** | **60** | **19 (17%)** | **41 (91%) (p<0.0001)** |
| Time saved during 8-hour shifts (minutes) | | 31.25 minutes (12 answers/19) (From 10 to 60 minutes) | 79.04 minutes (21 answers/41) (From 15 to 120 minutes) |
| Time saved daily | | 93.75 minutes | 237.12 minutes |
| Time lost for administrative work per shift (8h) | 90 | 88/109 | 2/45 (p<0.0001) |
| Time lost during 8-hour shifts (minutes) | | 76.87 minutes (47 answers/88) (From 15 to 400 min) | No answer |
| Time lost daily | | 230.61 minutes | Not applicable |
| Lost time for administrative work-Saved time for patient care | | 230.61-93.75=136.86 minutes per day | Not applicable |
| No answer | 4 | 2 (2%) | 2 (4.5%) |

**Table 6:** Satisfaction assessment regarding the IT tools used in both hospitals

| Score | Hospital #1 EMR software (n=109) | Hospital #2 ICU software (n=45) |
|---|---|---|
| 1 | 1 | 0 |
| 2 | 9 | 0 |
| 3 | 17 | 1 |
| 4 | 23 | 0 |
| 5 | 13 | 3 |
| 6 | 15 | 1 |
| 7 | 9 | 9 |
| 8 | 11 | 12 |
| 9 | 6 | 9 |
| 10 | 1 | 10 |
| Mean | 4.066 | 8.089 |

# DISCUSSION

This study shows that the software change in one of the institutions had a significant impact on the administrative workload of nursing staff and reduced the time devoted to patient care. Other studies [33,34] have shown that implementing an IT system as opposed to handwritten documentation has reduced the time devoted to administrative work and increased the time spent at the patient bedside, as nursing work documentation was handwritten. However, we can see that administrative procedures in medicine are increasing. They are highly time-consuming for physicians and nurses, with a major impact on patient care. As mentioned by the British Medical Association, doctors in England spend more than 13.5 million hours each year due to inadequacies and malfunctions in IT systems and equipment, equivalent to nearly 8,000 full-time medical jobs or just under £ 1 billion [2]. As previously mentioned, other studies explored in detail the quality of data collection and error reduction, but few reported data on nursing satisfaction and time spent working on computers. By contrast, they presented a lot of data on satisfaction regarding the switch from paper to IT tools, but did not explore the impact of a new IT system on the nursing satisfaction and time spent on the computer compared with the time devoted to patient care.

IT tools can improve or reduce the administrative workload if they are adapted to the specific condition of the ICU. The most important aspect is to have a computer system adapted to the field, especially in the ICU, emergency department, or anesthesia department. The requirements include a user-friendly computer system fully connected to record clinical data and prescription data. Some programs are more adapted for outpatient services, consultation, and general services, as the information list is more restricted.

Evaluating the implementation of software is not an easy task due to the complexity of the criteria. However, we believe that a period of 10 months after the launch of new software was sufficient to use it optimally. Of note, hospital staffs are very mobile during their clinical training and hospitals are increasingly working with temporary staff, which leaves little time for training and the acquisition of IT subtleties.

When analyzing the socio-demographic characteristics of the participants, we observed that the education level in intensive care was very high. The proportion of participants with a university level was higher in Hospital #1 than in Hospital #2, which is expected as Hospital 1 was academic.

The staff of Hospital #1 was very well trained, and a quarter of the intensive care nurses had a university degree in addition to their specialization in intensive care. In terms of field practice, more than 50% of the ICU staff had at least 10 years of clinical experience. It can be concluded that medical informatics requirements were very high. For both hospitals, the analysis of the average satisfaction level according to age led to the conclusion that younger staff, more used to computer systems, did not show a different satisfaction level with the new system. The participation rate was high, which highlights an interest from healthcare professionals in the issues affecting their daily work. The key observation was the major satisfaction difference between the two hospitals.

A third of the responders in Hospital #1 found the tool fairly advanced for their position and less than a fifth found it fully adapted to the needs of the field. These figures almost doubled in Hospital #2.

Since Hospital #2 has not undergone any change in the computerized patient file system, this former question was not applicable. It can also be observed that the respondents who rated the software as an overload of work are all in Hospital #1.

This additional workload can be explained by a data encoding process that is more laborious 10 months after the launch than with the previous software, which was adapted to care practice and could effortless be used at the patient's bedside thanks to its easily accessible configuration. Similar remarks were found in the literature in England in 2014, in Denmark in 2019, and in Switzerland in 2020 [35-37].

Various elements could explain the loss of time devoted to patient care, but they were not explored in our study. The administrative workload may induce some under-coding of information and data, and may have an impact on hospital financing if it is based on the objective critical care workload [29]. This dimension was not explored by our questionnaire, but further studies should address this point. Knowing that the staffing standard for an ICU is 2.5 full-time equivalents per bed (FTEB), the daily nursing time spent on administrative tasks would correspond to 0.28 FTEB [28].

## Limitations of the Study

This study was performed in only two institutions and 7 ICUs. The number of participants was limited. The questionnaire was based on the institution's own "homemade" format and was not a scientifically validated standard questionnaire. The qualitative approach of the questionnaire could be combined with more objectives and defined criteria to obtain greater significance of the results through a mixed method approach. Moreover, the study should be repeated after a more prolonged adaptation period (for example 6 months and 12 months) to reevaluate the satisfaction of nursing and medical staff regarding the software and have a comparison with the target groups. The strength of this study is that we looked at

the impact of a software change in the ICU and not a switch from paper to electronic format. Strength is that we were able to compare the ratings of the same employees who worked at the patient bedside with both software (**Table 7**).

**Table 7:** Summary table

| Summary table | Hospital #1 | Hospital #2 |
|---|---|---|
| IT satisfaction in intensive care | Software EMR | Software ICU |
| Number of participants N=154 | 109 | 45 |
| Software adapted to the care practice | 47% | 95.5% |
| Proportion of paper/ computer work (PC) | 13%pap/87% PC | 25%pap/75% PC |
| IT is overworked and less advanced than in the past | 65% | 0% |
| Valuable help/difficult to do without | 32% | 89% |
| Time spent with the patient | 50% | 77% |
| Estimated loss of time | 82% | 2,5% |
| Average: Min/shift/ person | 76,87 min | -min |
| Estimated time saving | 17,43% | 95% |
| average: Min/shift/ person | -min | 79,04 min |
| General level of satisfaction | 40.66% | 80.89% |
| Summary | Summary | Summary |
| Summary | Summary | Summary |
| Summary | Summary | Summary |

## CONCLUSION

The volume of information produced in hospitals is quite considerable, hence the importance of having correct and precise data recording corresponding to the reality on the ground. The change from one software to another had a major impact on the time devoted to patient care by the nursing and medical staff, as part of patient care time may turn into administrative work time.

In intensive care, the software used must be specific to the discipline and easily adapted according to the needs and the evolution of the ICU field practice.

Before any change from software to another, the ICU specificities must be considered by the decision-making teams. This way, the medical and nursing staff will be able to continue to correctly enter as much data as possible in a structured way and in a minimum of time. It will be essential to assess staff satisfaction on several occasions. This will enable all levels of management to improve the quality of care and the financing of healthcare institutions. The main objective of healthcare computerization must remain "to help people to care for people" in a simple, fast, and efficient way…

## AVAILABILITY OF DATA AND MATERIALS

The data are available from the corresponding author on simple request.

## ACKNOWLEDGEMENT

The authors would like to highlight the contributions of the GTICRASI and emphasize the vital importance of including users in the design and development of an effective IT tool. However, users must be able and willing to spend time with IT specialists to define their needs.

## COMPETING INTERESTS STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that might appear to influence the work reported in this article. Ph. DELREZ declares to have a complementary independent activity to give trainings and consultations.

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## DECLARATION OF GENERATIVE AI IN SCIENTIFIC WRITING

During the preparation of this work the authors not used generative AI in scientific writing. The authors reviewed and edited the content and takes full responsibility for the content of the publication.

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