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Electronic medical records - an added value at the S. Chiara Hospital, Trento

The Intensive Care Department at the S. Chiara Hospital, Trento, is a leading Italian facility that works at full strength, handling about one thousand admissions a year. Here, doctors who respond to daily emergencies make use of electronic medical records that are linked to other departments in the hospital as it is important to have all the data at hand, and crucial to have it in real time.

shared by doctors in the various departments that converges all useful data for patient management. But not just that. A constantly updated database that stores and places at the disposal of doctors and nurses an extensive range of information in electronic format, which can be accessible 24 hours a day, and only to qualified staff. An efficient, functional system that is designed to assist the doctor and considerably reduce the margin of error, while guaranteeing a very high standard of confidentiality. Is it a case of mission impossible? The system implemented at the Intensive Care Department of the S. Chiara Hospital, Trento, seems to indicate that it is quite possible. As a matter of fact, the electronic medical record is unquestionably an added value. Let's find out why.

Today, we shall discuss it with Dr. Pedrotti, Manager of the project, Dr. Geat, Director of the department, and Dr. Dellantonio, Director of the Resuscitation Unit.

Photo:

Pedrotti, Unit of Anaesthesia, Intensive Care and Operating Rooms, S. Chiara Hospital, Trento

Geat, Director of the Department of Anaesthesia, Intensive Care and Operating Rooms, S. Chiara Hospital, Trento

Dellantonio, Manager of the Resuscitation Unit, Department of Anaesthesia, Intensive Care and Operating Rooms, S. Chiara Hospital, Trento

When did you get this idea?

Pedrotti: I thought of it several years ago, when I started working. The idea issues from the fact that I observed the practical need for it and, considering my past experience—I was a computer programmer before becoming a doctor—I tried to think how computer science could effectively help medicine. That was in the 1990s, when computer science applied to the field of healthcare especially focused on automated administrative procedures, such as wages, supplies and aspects that were basically inspired by the banking system, which was the first to ever adopt this organization method. The world had already started talking about computers at the time, realizing that computer science could be of assistance to doctors but the first areas to undergo this transformation in the healthcare sector were still very far from providing a practical contribution to clinical practice. At the end of the day, the secretary entered the data in the IT system but it was

basically a matter of recording a summary of information for easy retrieval and reutilization. Instead, I tried to imagine something different, a tool that would converge all patient information, starting from data concerning admission to hospital, case history and physical examination, thus generating a complete archive. If, for instance, at the end of the year I wanted to know how many patients presenting a trauma had been admitted to my department, I could have easily obtained the information.

What has changed today, compared to the past?

Pedrotti: When I started out, IT tools were certainly not what we have today. We had to write the case history in Word, print it on a label and paste it on the hard copy medical record. This enabled us to have legible records.

That was in 1980, when I was working at the Rovereto Hospital. It was still not a single hospital complex but it featured quite a good IT standard. There was a Honeywell data processing centre where they used punched cards to manage admissions to hospital, inpatient records, discharge sheets and transfers. Then, laboratory tests, radiology investigations, services and hospitalization records were entered into the IT system in this order. The departments were the last to be linked up to the system, and the process has still not been completed, despite the remarkable progress made in recent years, especially in the last decade.

Then this project was launched

Pedrotti: This project was launched in 2010. A working group including clinicians and computer programmers was created to establish the minimum system requirements. Considering the critical nature of the data processed, the choice of system could not disregard the need to have a software that was classified as a medical device to ensure that it would be suitable to process the clinical data of patients. Another important factor that was taken into account during product assessment regarded references, namely how many copies of this software had been installed and were already active and operating in Intensive Care Departments. A public competition was organized. Since this is a public facility, it was a European competition, as established by the regulation (for purchase costs in the range of a few hundred thousand euro). Digistat was chosen, a modular software system for managing the medical records of patients, that is produced by the company UMS. Once the project was assigned, the customization phase commenced to adapt the software to meet our needs. Most of the work centered on linking up the product with the other Hospital IT systems because, as I mentioned before, our Hospital has always had a good standard of computerization, which was obviously an added value to be enhanced. If the new system could have been fully integrated into the existing one, precisely, if we found a way to enter the information collected from the laboratory, the radiology department, the consultation system and the Hospital's IT system into our Intensive Care record, we could have made the data accessible not only to our system but also to other departments in order to transfer all the information that had already been filed in electronic format from one department to another. Hence, we created an integrated system and implemented our idea of the patient's medical record, which we considered as a dataset created with reports from admissions to various departments, also considering the fact that the patient is rarely sent home straight after admission to Intensive Care. Here we treat acute cases, and then treatment is continued in another less intensive department. Hence the importance of recording and reporting all that is done in Intensive Care. This remarkable process of customisation and integration with the hospital's IT systems was

achieved as a result of the professional expertise and helpfulness of the company providing the service, and of our hospital's IT systems.

Does this also correspond to added value for other departments?

Pedrotti: Our IT system contains a so-called “history” of the reports. This is an archive onto which all the reports of all services provided to a certain patient are loaded. A complete archive would provide the doctor or healthcare professional who needs to refer to a patient's history with all the information. We could then move towards the project, which is also implemented throughout Italy, of the Citizen's Healthcare Folder, centered on the concept that if, for instance, a patient were admitted to a facility in Milan, Rome, Trento or Naples, all his data would flow into a single folder that is shared also with non-hospital frameworks. The goal is to enable the data to be used anywhere, while ensuring that it will be part of the patient's history. A ministerial project envisages this, and we have launched it here in Trentino. All the citizens of Trento who have a health card have received a smart card reader at home. They can use it to book tests and view laboratory reports over the computer.

Hence, the system is already well-oiled. Can we take stock of the situation so far?

Geat: The introduction of this system is associated with a considerable benefit, namely it will remove all errors related to handwriting or illegible text. Unfortunately, not being able to understand or read somebody else's handwriting is quite a common problem. Certain consultants have terrible handwriting, which becomes quite illegible when they are in a hurry. Hence, one has to call them to ask what they have written. Moreover, this IT system also removes spelling errors. All this creates a safe situation and offers us a huge benefit. I must say that we had a beautiful hard copy medical record that was really very extensive and we studied it for years. It was a large medical record, the size of 8 A4 sheets, that summarized everything about the patient, from laboratory tests to the clinical track and consultations. It allowed us to see all that happened that day. Obviously, each day had a different medical record. Hence, the system was all right if one focused on the current day, but when you started moving back in time, long patient stays in hospital were associated with some difficulty tracing the data, until it became quite confusing and one was unable to glean the whole story. Hence, apart from the bulk of hard copy material, it is obvious that the electronic medical record offers many options, compared to the hard copy one.

Is this also time-saving?

Geat: Regarding time, which is crucial in the Intensive Care Department, the electronic medical record takes a little longer to create, especially in the initial phase. But it is time-saving especially for nursing activities because the electronic medical record collects information about monitoring procedures and the therapy directly from the devices, namely from ventilators, data display screens, infusion pumps and even laboratory tests, etc. It is obvious that all this information has to be validated by an operator but they are automatically acquired and entered.

Pedrotti: Formerly, the Intensive Care nurse stood at the patient's bedside, measured the blood pressure or started up the blood pressure monitoring device, and then had to read the results and enter them in the medical record. Today it is all automated. Being able to automatically acquire the patient's vital parameters directly from the electromedical devices and from the laboratory is a considerable advantage in many ways.

Geat: It is an entirely different way of working. Perhaps at first we experienced some difficulty because we wanted to transfer the hard copy model to the electronic form, while the electronic medical record is, instead, an entirely different tool. We grew up in a pre-computer age; hence, we find it more difficult to adapt, and this applies to everybody. Today children grow up with IT technology; therefore, they will have no trouble adapting.

Dellantonio: I must say that some of us, the Intensive Care Department counts about twenty of us, were really quite reluctant to shift from the hard copy to the electronic system but I believe that nobody would go back now. We have naturally stored some hard copy records in case of an IT system failure because we have to go on in one way or another, and we have, at times, had to manually complete a medical record if the screen failed at that very moment. But as things stands, nobody knows how to handle a hard copy record anymore because it lacks the information it contained in the past. Furthermore, it is quite inconvenient to leaf through a medical record to find the information that was entered the previous day.

Geat: The electronic medical record certainly provides more information. It especially opens several channels to rapidly access other information. It also allows us to process data and to subsequently process all the statistics we require. For instance, we are participating in the GiViTi (Italian Group for the assessment of Intensive Care interventions) study, which is coordinated by the Mario Negri Institute. We enter the information in a database that converges data from about 450 Intensive Care Departments. This system retrieves the results of treatments administered to patients as, for instance, data regarding hospital infections, ventilator-associated pneumonia, sepsis, and other data ranging from laboratory tests to hospitalization, the number of readmissions to hospital, and the efficacy of antibiotic treatment. We can obtain all this information in real time from the electronic medical record, which would instantly help us realize whether we are working within an acceptable range or not, or whether something has to be corrected.

So, it is an improvement both for the patient and in terms of hospital efficiency?

Geat: Our hospital has been Joint Commission certified for 10 years. The Joint Commission focuses on patient safety. Certifiers have also visited the hospital for regular inspections and confirmed our keen focus on quality and efficiency, and the results we have achieved in this field.

Pedrotti: We do not print anything on a daily basis, except for a treatment prescription sheet that is also required by the Joint Commission's standards. In practice, it is a review of therapy. Said accreditation standards require a review of the therapy prescribed to be performed at least once or twice a day by a person other than the prescriber. Partly to comply with this requirement and partly because we consider it a landmark in our morning schedule, we print out this information and sign it when we meet to reassess all the patients. Only later, when the patient is discharged, do we print the entire medical record for filing purposes. Our hospital recently signed a contract with Infocert, a company that specializes in certifications, in order to preserve the electronic documents. Our medical record will shortly become an electronic document that will be signed electronically. From that moment onwards we will not even need to preserve the hard copy anymore. This

system is already being tried out in the Radiology Department, and the next department that will use it will be Intensive Care.

Geat: Before this, when we had hard copies, we had to daily transcribe the therapies, which are mostly repetitive, with the possibility of generating a triple error, precisely errors associated with forgetting, transcribing, or a third type of error, namely an exceptional one-off delivery of a medicine could have been repeated by mistake the next day, with all the related consequences. We have unfortunately witnessed some of these unforeseen events. This cannot happen anymore with the electronic medical record. For instance, if we want to administer a certain drug a certain number of times, we establish the number of administrations in advance, and if they must be repeated the next day as well. All this is done by entering the data only once, with a considerable reduction in the rate of error.

Pedrotti: Most Intensive Care patients are postoperative. This software has been installed on operating room computers to enable the anaesthetist—who knows the patient better than all others because he assesses the patient before the procedure, administers the anaesthesia, awakens him—to check that everything is all right before moving the patient to the Intensive Care Department. He writes the medical record directly, so we find it already drawn up regarding the patient's history and then, we proceed from there by entering the rest.

Is the process rather complex or is it a matter of habit?

Geat: Data is mostly entered automatically. Certainly one has to get used to it. A lot of work is required to create the right tool for us, one that is custom-made to meet our requirements. Perhaps, in this sense, it was a mistake to pressure the Administration into transferring the hard copy rationale to the electronic medical record. This has created some difficulty. It is important to keep in mind that activating a software system in a critical area requires specific Project Management skills, both on the part of the supplier and of the department's staff. Then, considering that 15 doctors work in this Intensive Care Department, besides several nurses, there is a high turn-over and training can take quite a long time. Moreover, it was also a mistake not to establish an absolute start date for using the system. Going back in time, I would do just this.

Let's talk about the issue of privacy

Pedrotti: Every employee in our hospital can access the hospital's IT system with a user name and a password, with guaranteed credentials because the password must have certain special characters, upper/lower case, that are changed every 90 days. We at Intensive Care have joined the existing protection system that already guarantees confidentiality. When we access the electronic medical record, we have to identify ourselves with the same data we use to link up to the hospital's IT system, which then envisages a hierarchy for the various access systems. The doctor who uses his credentials to access the system can perform certain operations, the nurse can do less, and the Administration is authorised to carry out yet others.

Geat: Privacy is better ensured now because previously it was objectively complicated to rule out the possibility of the medical records being seen by relations visiting the patients. This is not an issue anymore because the hard copy has been replaced by a username and password-protected screen. There is also another advantage. Since every access to

the system can be traced, all amendments can be tracked. This is a privacy guarantee, since every attempt at tampering with the system or accessing it can be traced.

Regarding laboratory tests and radiological investigations, it actually occurred that hospital employees looked into confidential records, browsing through the sensitive data of other employees perhaps. All cases have been duly checked and sanctioned.

It is impossible to ignore the issue of costs in this particular moment in history

Pedrotti: It is difficult to prove with direct linear associations that an expense of euro 100,000 to purchase an IT system will help to save euro 200 thousand. Assuredly enhanced precision in terms of both management and patient management will lead to lesser waste in terms of cost of treatment, days of hospitalisation and, especially, of improved quality of care. These are important factors that are, however, hard to quantify in terms of economic saving.

Geat: Every cost analysis must be contextualized; hence, we should start from the local framework, calculate the cost, and perform rather complex calculations. Literature reports that the system entails saving, but that is obvious. The IT system will initially cost more but the better results produced will improve the use of resources. It is, however, an unstoppable process. Laboratory tests, Radiology Department investigations, outpatient consultations and staff assessments have already been computerized.

Pedrotti: An interesting point to be considered is that the first people to use such IT systems were the managers of private healthcare facilities. Since their main goal is business, they obviously did so because they deemed that it would turn out to be convenient.

What would a future goal be?

Pedrotti: A goal to be considered would be alerts directly sent to the doctor's smartphone or tablet. This would doubtless be the system's evolution. Today we receive a memo message when we book a train. I would say that, if the patient had low blood pressure, an alert could be sent with the precious information to the doctor or the nurse's mobile. Remaining bound to paper would mean denying ourselves several valuable benefits, if we consider what computer science can do today.

Dellantonio: Another aspect that interests the private sector is, for instance, supplies management in the storerooms. If I know that I shall administer three vials of this drug to a certain patient, I could automatically tick it off on the storeroom records and trigger an automatic alert when the stocks are about to be depleted.

I would like to ask one last question about the recent decision to open the Intensive Care Department to the patient's relations.

Geat: This directive is applied here and in another Intensive Care Department in Trento. We plan on extending it to Rovereto. We have to overcome quite a lot of resistance on the part of healthcare workers because they are accustomed to adopting a paternalistic attitude towards disease management. Actually, we need to change this approach. The presence of relations is an advantage. It helps the healing process. A lot of literature reports the beneficial effect on patients produced by the presence of relations, and no study proves the reverse.