Creating an Ergonomic Solution for Avoiding Errors in Blood Transfusion

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ABSTRACT

The Centre for Patient Safety of the Tuscany Region designs solutions for preventing adverse events in the 39 hospitals and 14 local trusts of the regional healthcare system. One of the most important risks in terms of consequences is the error in blood transfusion. The Centre for Patient Safety adopted an ergonomic approach centered on human factor in order to define the best solutions for clinicians. Thus, the definition of a patient safety practice on blood transfusion has been realized starting from: the analysis of the adverse events happened in the Tuscany healthcare system in the last year about this topic; the analysis of the main phases of the process and of the related potential risks, the analysis of the interaction among the clinicians and their working context. According to this analysis we produced some tools for supporting the promotion of a safer blood transfusion process: a check list with a design that can facilitate the support to the decision making process related to the transfusion; an algorithm that visualizes the most important actions to take to avoid errors during the transfusion; a poster to remind the key controls at the bedside; a patient's identification procedure based on wristbands which layout help an active identification of the patient;. All the tools have been designed with the final users and tested.
The authors will present the tools and results about their application in one of the most complex teaching hospital of the Region.

Keywords: Safety of the blood transfusion, ergonomic check list, patient safety practice

INTRODUCTION

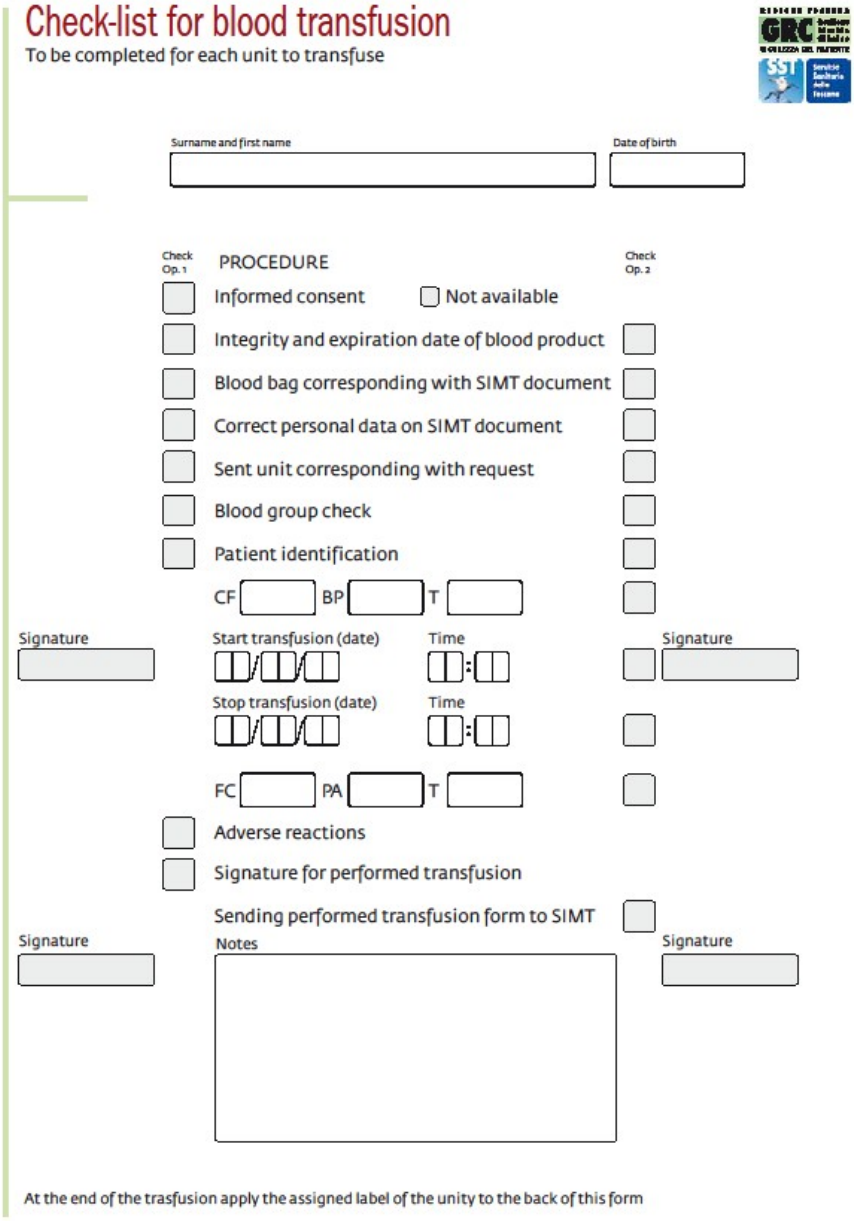
The Centre for Patient Safety The Centre for Patient Safety of the Tuscany Region designs solutions for preventing adverse events in the 39 hospitals and 14 local trusts of the regional healthcare system. One of the most important risks in terms of consequences is the error in blood transfusion. The Centre for Patient Safety adopted an ergonomic approach centered on human factor in order to define the best solutions for clinicians. Thus, the definition of a patient safety practice on blood transfusion has been realized starting from: the analysis of the adverse events happened in the Tuscany healthcare system in the last year about this topic; the analysis of the main phases of the process and of the related potential risks, the analysis of the interaction among the clinicians and their working context. The patient safety practice has been promoted by the regional government body and adopted from all the hospitals which started to work on training and a blood check list transfusion in order to face a problem that was

considered an emergency in terms of very high risk to avoid inside the system.

THE ERGONOMIC TOOLS FOR A SAFE BLOOD TRANSFUSION

The Centre, in accordance with its basic approach centred on human factor, has designed solutions for improving patient safety in blood transfusion in partnership with the professionals. Especially, all the tools have been designed by analyzing the current blood transfusion clinical care process, in some of the most complex and at high risk hospitals of the region. Starting from the process as it is now we considered all the possible pitfalls and criticalities that can induce in making an error and produce an adverse event. According to that we identify the strategic points and the related safety standard that need to be meet in order of avoiding never events. The blood transfusion check list represents these key moments and fix precise controls related to them. The regional model of check list has been designed taking into account the existing check lists already implemented in the wards. The evaluation of these tools helped the practical design of the new form. The layout of the check list is presented in Figure 1. The design emphasizes the double check process and its traceability by using a double box for the registering the check of both professionals. The space for registering not just a check but a piece of information (date, time, vital signs) meets the need of containing all the information about a transfusion in a single document (the checklist) that becomes part of the clinical record.

Figure 1 – The blood transfusion check list



Check-list for blood transfusion

To be completed for each unit to transfuse

Surname and first name

Date of birth

Check Op. 1 | PROCEDURE | Check Op. 2

- Informed consent ☐ Not available
- Integrity and expiration date of blood product
- Blood bag corresponding with SIMT document
- Correct personal data on SIMT document
- Sent unit corresponding with request
- Blood group check
- Patient identification
- CF BP T

Signature

Start transfusion (date) Time

Signature

Stop transfusion (date) Time

- FC PA T
- Adverse reactions
- Signature for performed transfusion
- Sending performed transfusion form to SIMT

Signature

Notes

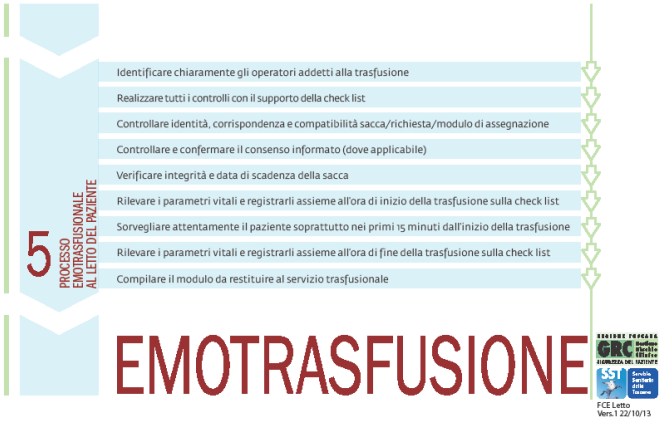
Signature

At the end of the trasfusion apply the assigned label of the unity to the back of this form

The analysis of the blood transfusion process identified also the need for reminding to the clinicians on the field all the essential controls which are needed every time that you administer a blood bag. This process was represented on an algorithm that described for each phase of the process the essential things (see Figure 2) to do and for the final step related to the final patient's identification before administering the blood a specific poster was conceived (see figure 3). Both alerts were designed to be visible to operators during the process, thus while the one representing the entire blood transfusion has to be displayed in the physicians and nurses dedicated area, the one related to the final check has to be displayed at the bedside.

Figure 2 – Poster with the algorithm to control safety in strategic phases of the blood transfusion

Figure 3 – Poster with the algorithm to control the final check before blood administration



The patient's identification at the bedside is realized with the support of a wristband whose layout has been conceived to guarantee an easy reading of the information even from far away. The essential information are described together with two specifications about allergies and use of oral anticoagulants, and a barcode (see figure 4).

Figure 4 - Wristband patient's identification procedure

THE PATIENT SAFETY PRACTICE

These tools became part of the essential requirements of the patient safety practices on blood transfusion that have to be adopted from all the hospitals and centers where blood transfusion takes place in the Tuscany Region. The patient safety practice includes also a training program where newcomers in clinical units at high density of transfusions are involved in a structured simulation session supported by the transfusion services and a periodic retraining on how to realize controls before administering blood.

The patient safety practice has composed of some essential parts: rational – state of the art of the problem; patient safety requirements; standards to be met and related performance indicators. The practice has been formally approved by the regional government so that its application becomes a priority for each hospital and part of the accreditation program with the related plans of evaluation.

THE APPLICATION IN A TEACHING HOSPITAL: RESULTS

The teaching hospital starts its training activities from the clinicians belonging to the top ten wards which have the higher number of transfusions a year inside the hospital.

The course had 5 editions with the participation of 95 clinicians (35 medical doctors, 58 nurses, 2 obstetricians). The evaluation of the course from the participants was very good: in a scale from 1 (very bad) to 5 (very good), the course was considered very useful (5), giving good practical solutions (5) and designed with and effective training methodology (5).

During the period between January and February 2014, 200 check lists were verified (see table 1) and the results are described in the following table. In general the check list was adequately used, even if there are some criticalities regarding the compilation of the final part, especially the data related to the traceability of the check list (date of compilation) and of the vital signs after the transfusion.

Concerning the performance data just few indicators have been monitored: the number of assigned blood units for each ward was of 5278; units which were sent back to the blood centre were 1610 (31% of the total), the blood units are sent back after an average period of time of 2,5 days (max time allowed for the blood unit to be out of the centre blood is 72 hours).

Furthermore, the blood transfusion check list has been included into the electronic clinical record and designed according to the ergonomic evaluation realized for its initial definition. The implementation of the electronic check list is still going on but we can show a screen shot of the interface in the following images (figures 5-6).

Once you start the process of blood administration, the blood bag barcode is requested, once the barcode number is inserted the system controls the existence of the corresponding checklist and if it not found or not completed a new one appears (see image 4).

Table 1 – compliance to the blood check list in a big teaching hospital of the Tuscany Region (sample)

Compliance to the blood check list		
	Yes	**No**

Total number of analyzed check lists: 200					
1	Is the check list inside the clinical record?	198		2	
2	Is the blood bag labeled?	198			
3	Is there one check list for each transfonded blood unit?	198		2	
		MDs		**Nurses**	
		SI	**NO**	**SI**	**NO**
4	Is the informed consent checked out?	188			
5	Is the integrity and the expiration date checked out?			180	
6	Is the correnspondence of the blood bag with the request from blood centre checked out?	188		188	
7	Is the correctness of the personal data on the request from the blood centre checked out?	188		176	
8	Is the correspondence of the sent units with the request checked out?	188			
9	Is the correspondence of the blood group checked out?	188			
10	Is the patient's identification checked out?	188		188	
11	Are the vital signs written down at the beggining of the blood transfusion?			185	
12	Are date and time of the starting transfusion writtend down?			188	
13	Are all the signatures there?			185	
14	Are date and time of the end of the transfusion writtend down?			170	
15	Are the vital signs written down at the end of the blood transfusion?			166	
16	Are adverse events checked out?		175		
17	Is the signature for the blood centre document checked out? E' barrata la firma del documento SIMT?	188			
18	Is the sending receipt for the blood centre checked out?			170	
19	Are the connected signatures there?	180			

Figure 5 - Request of barcode for the blood bag associated to the new check list

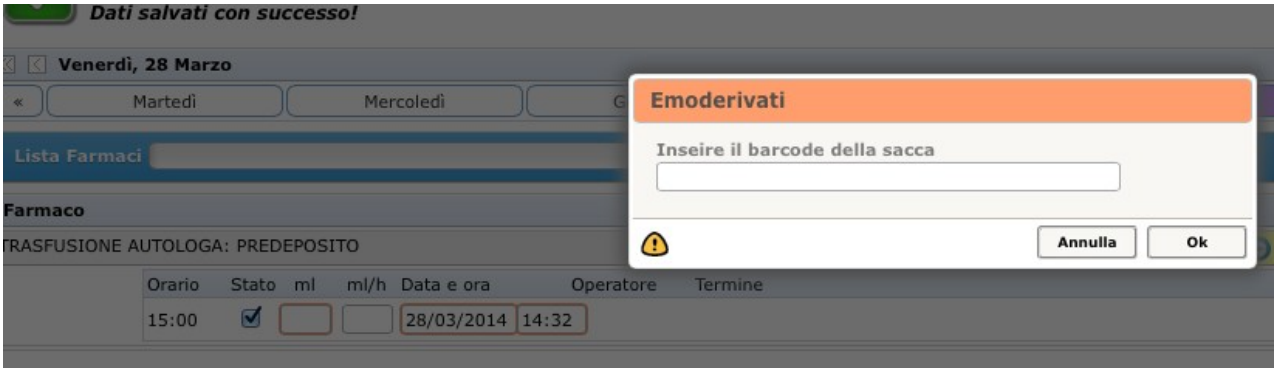
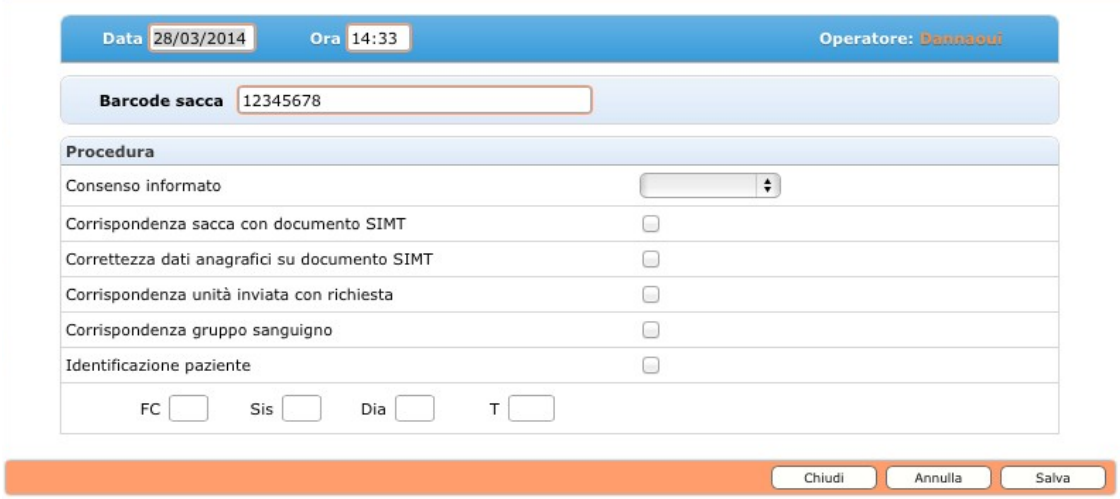


Figure 6 - Electronic check list



This check list is personalized according to the profile of the clinician that is logged on (medical doctor or nurse); and only after both professional have checked out the checklist, the administration process can go on.

CONCLUSIONS

Safety in blood transfusion has become a priority in the Tuscany healthcare Region, and ergonomic solutions have been designed in order to support clinicians in ensuring a safe blood administration. The effective application of these tools depend on many factors related to the complexity of the hospitals: an adequate training of all the involved professionals, a strong commitment of the management to indicate the use of these tools as a priority and to build an evaluation system that monitor on the real application of the solution in daily sharp end life.

For the next future some actions have been already planned: a strict monitoring of the real application of the patient safety practice, the realization of a FAD program for training newcomers about safety in blood transfusion and an annual regional seminar to share experiences and results of the monitoring of the patient safety application in the healthcare local trusts.

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