

# **The communication breakdown in the generation of the adverse event in an obstetrics and gynecology ward: a System Dynamics perspective.**

## **1. Introduction**

The clinical risk refers to the probability that a patient suffers damage during the delivery of health care services. The issue has taken on an increasing emphasis in recent years due to an increased awareness by the patient about their rights, and the importance attributed by the health care organizations to the quality of their services. In order to allow a clear understanding of the phenomenon, following the indication provided by the Joint Commission<sup>1</sup>, it is useful to distinguish the terms adverse event, sentinel event, near miss and no harm event as follows:

- sentinel event is any unanticipated event in a healthcare setting resulting in death or serious physical or psychological injury to a patient or patients, not related to the natural course of the patient's illness. Such events are called “sentinel” because they signal the need for immediate investigation and response. The terms “sentinel event” and “error” are not synonymous; not all sentinel events occur because of an error, and not all errors result in sentinel events.
- adverse event is any untoward medical occurrence in a patient or clinical investigation subject administered a pharmaceutical product and which does not necessarily have to have a causal relationship with this treatment. An adverse event (AE) can therefore be any unfavorable and unintended sign (including an abnormal laboratory finding, for example), symptom, or disease temporally associated with the use of a medicinal product, whether or not considered related to the medicinal product.
- near miss is a situation which could cause an adverse event for the patient (for example, a fall avoided by the intervention of a nurse).
- no harm event is an event that had the potential to result in a harm to the patient (such as falling without patient outcomes).

In Italy, as happened in the rest of the world, the attention to the problem of error in medicine shown a renewed interest after the publication of the report “To Err Is Human” by the Institute of Medicine (Kohn et al. 1999). After this important document, the scientific research in the field started to expand and new frontiers in the study of clinical errors have been opened. The change of vision generated by this research has “humanized” the professionals working in the health care system, and has changed the concept of medical errors being no longer considered as a reason for punishing the guilty yet as a reason for learning from the errors at the level of the whole organization.

Deaths caused, directly or indirectly, by the erroneous practices within the national care systems in Italy, amount to 30 to 35 thousand per year, constituting about 90 per day. This represents a higher

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<sup>1</sup> The Joint Commission is a United States-based nonprofit organization that accredits and certifies more than 20,000 health care organizations and programs in the United States). The declared mission of the organization is "To continuously improve health care for the public, in collaboration with other stakeholders, by evaluating health care organizations and inspiring them to excel in providing safe and effective care of the highest quality and value." ([www.jointcommission.org](http://www.jointcommission.org))

number of victims, then the one caused by, traffic accidents, stroke, and most of the types of cancers, with annual costs estimated at 10 billion euro. A half of those errors might have been avoided by improving the organization of health facilities offering medical instruments and ad hoc "anti-slip". The departments with the highest risk is, according to the source "Toscana Medica", the operating room (32%), followed by inpatient departments (28%), emergency departments (22%) and outpatient departments (18%). Moreover, the department most often undergoing court trials as a result of medical errors is orthopedics (16.5%), followed by oncology (currently rates fell from 13% to 10%), obstetrics and gynecology (10.8%) and general surgery (10.6%). The described phenomenon has led to a rapid growth of insurance premiums offered by insurance companies to healthcare organizations with an evident negative impact on the financial side.

The issue of clinical risk has been studied by several authors in different fields. Two of the most popular reference models for the study of clinical risk are: the "swiss cheese" model (Reason, 2000) and the human factors model (Vincent, 1998).

## 2. The Reason model for medical errors

Following the theoretical framework of Reason (2000), the human error problem can be viewed in two ways: the person approach and the system approach. Each model of error refers to different views of error's etiology and management. The person approach focuses on the unsafe acts (errors and procedural violations) of people at the sharp end, arising from deviant mental processes (forgetfulness, inattention, poor motivation etc.). Their management is aimed at reducing undesired variability in human behavior. According to Reason, "followers of this approach tend to treat errors as moral issues, assuming that bad things happen to bad people" (Reason, 2000). The system approach refers to the concept that errors can occur even in the best organizations because of the fallibility of people. The errors management is based on the assumption that although "we cannot change the human condition, we can change the conditions under which humans work" (Reason, 2000).

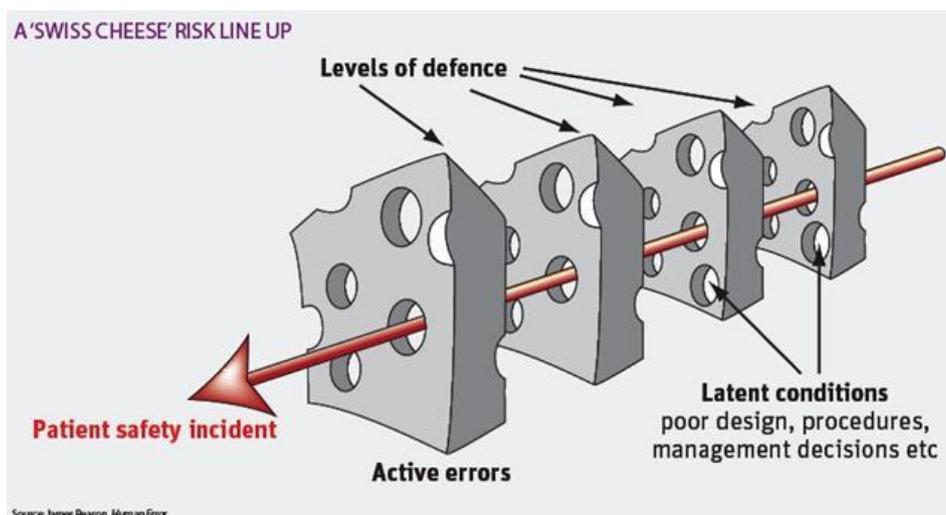


Figure 1. The "swiss cheese" model, Reason The human error, 2000.

A central role, in the system approach, is occupied by defenses and barriers of the organization. In an ideal and desired condition, each defensive barrier would be intact, however, in real life, they were more likely to be slices of “*Swiss cheese*” (figure 1) with many holes constantly moving, opening and shutting. As Reason said: “the presence of holes in any one “slice” does not normally cause a bad outcome. Usually, this can happen only when the holes in many layers momentarily line up to permit a trajectory of accident opportunity bringing hazards into damaging contact with victims” (Reason, 2000). In the light of these studies, a healthcare organization can be considered as a complex system, inside which it is possible to trace the various interconnected sub-systems.

### 3. Vincent’s model and the role of human factors

Through the work of Reason, the evolution of error has gone from an individual perspective to a system view. In the individual perspective, the efforts to reduce the errors are centered on people and are based on the encouragement to “do better” (upgrading or adding new rules or procedures). The prevailing culture is the “blame culture”. In the systemic perspective, errors and human behavior cannot be understood in isolation, but only in relation to the context in which people work. According to Vincent: “the medical staff is influenced by the nature of the task it performs, by the working group, the working environment and the wider organizational context, the so-called systemic factors” (Vincent et al., 1998).

Vincent (1998), by using the system approach provided by Reason (2000), has studied the role of human factors in the generation of an adverse event in healthcare. The term human factors can be defined in several ways but, a widely accepted definition is that of the Health and Safety Executive (HSE: UK industrial safety regulator): “Human factors refer to environmental, organizational and job factors, and human and individual characteristics which influence behavior at work in a way which can affect health and safety. A simple way to view human factors is to think about three aspects: the job, the individual and the organization and how they impact on people’s health and safety-related behavior.” (HSE, 1999). In reference to the human factors that can influence clinical practice and can contribute to the generation of the adverse event, Vincent (1998) identifies 7 main framework and their relative contributory factors (table 1).

<b>Framework</b>	<b>Contributory Factors</b>	<b>Examples of Problems That Contribute to Errors</b>
<b>Institutional</b>	Regulatory context Medico-legal environment National Health Service Executive	Insufficient priority given by regulators to safety issues; Legal pressures against open discussion, preventing the opportunity to learn from adverse events
<b>Organization and management</b>	Financial resources and constraints Policy standards and goals Safety culture and priorities	Lack of awareness of safety issues on the part of senior management; Policies leading to inadequate staffing levels

<b>Work environment</b>	Staffing levels and mix of skills Patterns in workload and shift Design, availability, and maintenance of equipment Administrative and managerial support	Heavy workloads, leading to fatigue; Limited access to essential equipment; Inadequate administrative support, leading to reduced time with patients
<b>Team</b>	Verbal communication Written communication Supervision and willingness to seek help Team leadership	Poor supervision of junior staff; Poor communication among different professions; Unwillingness of junior staff to seek assistance
<b>Individual staff member</b>	Knowledge and skills Motivation and attitude Physical and mental health	Lack of knowledge or experience; Long-term fatigue and stress
<b>Task</b>	Availability and use of protocols Availability and accuracy of test results	Unavailability of test results or delay in obtaining them; Lack of clear protocols and guidelines
<b>Patient</b>	Complexity and seriousness of condition Language and communication Personality and social factors	Distress; Language barriers between patients and caregivers

Table1. Framework of Factors Influencing Clinical Practice and Contributing to Adverse Events (Vincent et al., 1998)

### *Patient framework*

Patients have a key role to play in helping to reach an accurate diagnosis, in deciding about appropriate treatment, in choosing an experienced and safe provider, in ensuring that treatment is appropriately administered, monitored and adhered to, and in identifying adverse events and taking appropriate action. Other patient factors that may influence the communication with the staff and hence the clinical practice are patient's language and personality.

### *Task framework*

This framework refers to the procedures to implement in order to ensure the correct dispensing of health care. We have to take into account the availability and use of protocols and their lack of clarity as key factors in the generation of adverse events.

### *Individual staff member framework*

Several individual factors may influence the clinical practice such as personality, experience, and training. Other factors related to staff concern the physical and mental health. These last factors may be damaged by work stress and burn out, two problems strongly associated with healthcare contexts.

### *Team framework*

Each member of the staff is part of a team, and his performance may be influenced by other members, and how they are organized, and how they support, supervise, monitor, and communicate with each other. An important role in this framework is played by communication. Verbal (communication between junior and senior staff, communication between professions, communication between specialties and departments, adequate handover) and written communication (legibility and signatures of records, adequate management plan, availability of records, quality of referral and discharge) among the members represent one of the most important issue to take into account in order to avoid the probability to occur a medical error.

### *Work environment framework*

Factors related to the work environment may include staffing levels and mix of skills, patterns in workload and shift, design, availability, and maintenance of equipment. There is a growing evidence base from health care architecture, interior design, and environmental and human factors engineering that supports the assertion that safety and quality of care can be designed into the physical construction of facilities.

### *Organizational and management framework*

Organizational factors are omnipresent, but difficult to quantify (organizational climate, group norms, morale, authority gradients, local practices) that often go unrecognized by individuals because they are so deeply immersed in them. However, over time these factors are sure to have their impact and the system performance. Management factors refer to the way in which the organization is handled such as financial resources and constraints and policy standards and goals.

### *Institutional framework*

The institutional framework influences patient safety and quality of care by shaping the context in which care is provided. It refers to the economic and regulatory context, and to the National Health Service Executive.

## **4. Pitfalls of the traditional methods in managing the clinical risk**

In order to reduce the incidence of the clinical risk and to improve the quality of the careers, in the healthcare sector have been imported risk management methods successfully applied in other sectors. These methods (Root Causes Analysis, Failure Mode and Criticality Analysis Effectiveness, Incident Reporting, etc.), although useful in the identification of risk probability and assessing the potential effects of the occurrence of adverse events, do not support the management of healthcare organizations in the identification and evaluation of risk management policies because they are based on an linear analysis of the system and the relationships between business processes. In particular, the shortcomings of those methods are:

- They don't take into account the feedback structure of the net of causality that links each other the variables of the healthcare system;
- They are static and don't take into account the delays between causes and effects;

- They don't consider the interactions between the different risks on each other; they don't take into consideration the costs and their effect on the organizations management.

For these reasons, all these methods are inadequate in helping healthcare companies in setting safety targets and evaluating safety performance improvements. Therefore, it is possible that a hospital does not invest in clinical risk reduction because of the costs and of “heaviness” of the operational procedures in such investment. This happens because of the lack of understanding and/or of inability to assess the benefits that investments in clinical risk reduction fee. In fact, where these methods have been considered often have not had a real application, because healthcare organizations have been limited to a formal implementation of the procedures, but this has resulted in a substantial improvement in the approach of clinical risk management. It is therefore necessary that these companies perceive an improvement in the risk profile often resulting in a considerable saving on insurance policies, the cost for claims and the costs of “non-quality” and “safety”. In addition, by reducing the clinical risk, the Health care companies get a better image and, therefore, an increase in the competitiveness of healthcare organizations.

Regarding Italy, health care organizations limited their work to a formal implementation of clinical risk management procedures without any substantial improvement in the culture of patient safety. Many initiatives are driven by journalistic campaigns following a serious adverse event, but are short-lived and their action runs out after the initial emphasis. National and regional institutions oblige health care companies to collect data about adverse events in order to create a central error monitoring system and to create internal committees for the audit and the management of clinical risk. However, the central error monitoring system (SIMES, sistema informativo di monitoraggio degli errori in sanità) does not allow to collect info about the so called “near miss” and “no harm events”, and in most of the internal clinical risk committee the action is limited to producing meeting and suggesting procedures without a real implementation.

## **5. The system dynamics as a new powerful methodology in managing clinical risk**

Health care organizations are complex and dynamic systems, often characterized by delay between cause and effect and many goals, interests and actors, who can in some way be in conflict one each other. The methodology of system dynamics is suitable for dealing with the dynamic complexity that characterizes the health care system, since it provides the development of computer simulation models that replicate the processes of accumulation and feedback. Those processes, can be tested systematically, to identify effective policies to overcome the policy resistance. The application of the system dynamics methodology to clinical risk management facilitates a deep analysis of business processes in order to identify the areas of criticality and the potential interventions to reduce the probability of adverse events. According to Homer and Hirsch “a central tenet of system dynamics is that the complex behaviors of organizational and social systems are the result of ongoing accumulations (of people, material or financial assets, information, or even biological or psychological states) and both balancing and reinforcing feedback mechanisms” (Homer and Hirsch, 2006). System dynamics uniquely offers the practical application of these concepts in the form of computerized models in which alternative policies and scenarios can be tested in a systematic way that answer both “what if” and “why”, doing so, the health care management is able

to properly evaluate the effects of clinical risk management policies on organization performance, both in short and medium-long term.

## 6. The role of communication in the generation of the medical adverse events

A central element for error prevention in medicine is good (in terms of efficacy and efficiency) communication, in particular the communication between doctor and patient and/or medical informal cares (family members, caregivers, volunteers) and communication between doctors or other medical professionals. Communication plays a significant role in the etiology, aggravation and containment of effects of medical errors and in all aspects of the promotion of patient safety. It is a process that determines effectiveness, efficiency and productivity of the organization, contributing (if not appropriate, complete, or transmitted in time and in the manner most appropriate) to 'onset of risk factors. Communication between professionals is crucial within the healthcare facility. It is the leading cause of failure on the basis of root cause analysis carried out by the Joint Commission on Accreditation of Healthcare Organizations on sentinel events reported in medicine, in 2012 (figure2).

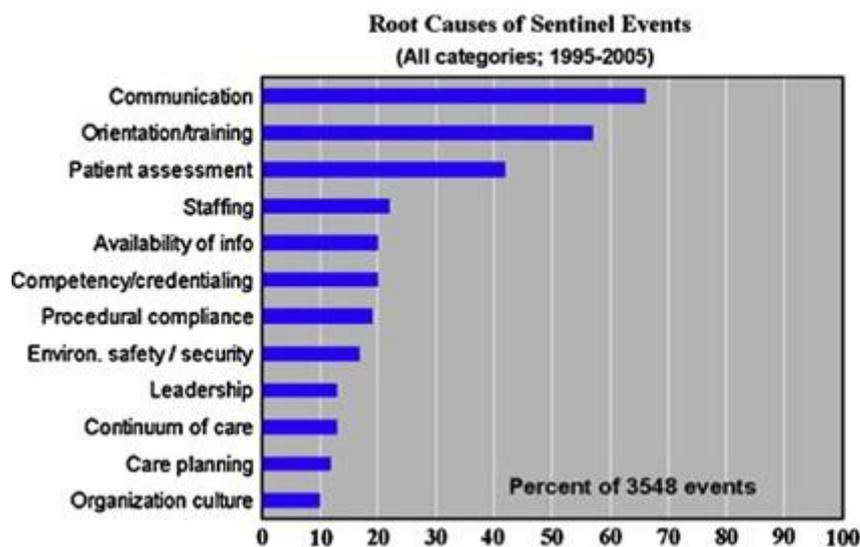


Figure2. Sentinel Event Data Root Causes by Event Type 2004- 2Q 2012. The Joint Commission.

The lack of a capillary and fluid internal communication, compromises the knowledge necessary to improve the delivery of care, and, thus, harm patient safety. The patients, doctors and professionals, both of public and private health, are therefore interested and involved in the continuous improvement of the quality and safety of care, this is, for ethical, political and economic reasons, the main priority of all health systems. As a result of the growing importance of the problem, the literature about communication in the management of clinical risk has greatly increased during recent years at the international level. Institutional documents of particular significance have been adopted in some countries, such as: Australia and England. The document "Open Disclosure Standard" Australia 2003, emphasized, among other things, the need for communication between health professionals and with all other staff of the company health, and between staff and patients and relatives. In England, the National Patient Safety campaign in 2005 launched "Being Open".

The document underlines the following ten principles: 1. the principle of the admission of an adverse event, 2. the principle of truth, timeliness and clarity of communication 3. the principle of apology; 4. the principle of recognition of the expectations of the patient and/or his relatives 5. the principle of professional support; 6. the principle of the system of risk management and the improvement of the system 7. the principle of responsibility multidisciplinary 8. the principle of clinical governance 9. the principle of confidentiality; 10. the principle of continuity of care.

Through the use of system dynamics, this study aims at carrying out the analysis of one of the main psychosocial factors at the basis of an adverse event in an organizational setting, as theorized by Vincent et al. (1998) which identified seven major "framework" as the basis of the factors potentially triggering adverse event. The following work suggests that, among these, the subsystem communication occupies a special place: communication is what allows the interconnection between the different elements of the system. Hence there is the possibility to work on the communication subsystem to affect the entire organizational system. The choice is motivated by the fact that communication refers, in a transversal way, to two frameworks: patient and team. At patient level, the communication barriers between patients and health professionals, and between them and the patient's family, are often the basis for the generation of an adverse event. At team level, a good verbal and written communication is the basis of a good quality of care. In 70% of sentinel events occurred in 2005, the Joint Commission has detected aspects concerning communication. Greenberg et al. (American College of Surgeons, 2007), have carried out a documentations review of 444 surgical errors analyzed in 61 U.S. hospitals: 60 cases related to communication breakdown. From these data we understand how the breakdown of communication is one of the factors most highly associated with the possibility of generation of an adverse event in health care. From this evidence, there follows the choice to direct the research to the analysis and evaluation of the quality of communication between doctor and patient (or between the doctor and the patient's family), and between healthcare professionals. Since "one cannot not communicate" (1 axiom of communication), care should be taken, to the way in which it is manifested and managed, especially in organizations characterized by dynamic complexity, such as the hospital, in order to avoid the possibility of the occurrence of adverse events.

## **7. Objectives of the study**

The objective of the research is to investigate the relationship between the communication and the adverse event. The hypothesis is that a good communication, in terms of efficacy and efficiency, allows the healthcare organization to achieve levels of efficiency and effectiveness. In addition, a good internal communication increases the sense of belonging to the company, with a positive effect on the climate and organizational well-being. As regards the doctor-patient communication, good communication is a key factor to increase the quality of care, in order to respond adequately to the expectations of patients and their families, and to ensure a successful outcome of the treatments. The benefits of good communication do not relate only to the patient, but also to the doctor in terms of personal satisfaction, self-efficacy and reduction of burnout. All the factors mentioned above refer to the human factors, identified by Vincent et al. (1998) influencing clinical practice and contributing to adverse events.

## 8. The Methodology

The research was carried out in a public hospital called “Presidio Ospedaliero Civico”, placed in Partinico, a little town near to Palermo (the capital of Sicily Region), which serves a population of 40.000 people (some macro-variables of the hospital and the operational unit involved in the research are shown in the table2). The hospital is part of the ASP6 Palermo that represents the Provincial body for Health Services, an entity as provided by law that is responsible to manage and coordinate the services and public health activities for the whole province. In particular it was decided to focus the preliminary analysis of the research in a specific operational unit: the ward of obstetrics and gynecology. The choice is motivated by the high risk level of the operational unit at issue, and by the high emotional involvement that the ward of obstetrics and gynecology involves, activating social, ethical and emotional values, extremely important as they concern women, motherhood and the newborn.

MACROVARIABLES	PARTINICO HOSPITAL	OBSTETRICS AND GYNECOLOGY WARD
BEDS	87 ORDINARY 18 DAY HOSPITAL	12 ORDINARY 2 DAY HOSPITAL
EMPLOYEES	291 (85 DOCTORS, 154 NURSES, 21 OSS, 2 OTA, 8 AUXILIARY, 21 TECNICS)	32 (10 DOCTORS, 10 OBSTETRICIANS, 12 NURSES, 1 OSS)
AVERAGE PATIENTS PER YEAR	4778 IN 2011 4938 IN 2012	845 IN 2011 1113 IN 2012
RISK MANAGER	YES	YES
SYSTEM OF COMPLAINS MANAGEMENT	YES	YES
NEAR MISSES	32 (2011) 29 (2012)	16 (2011) 10 (2012)
CLAIMS	11 (2011) 35 (2012)	2 (2011) 4 (2012)
SENTINELL EVENTS	1 (2011) 1 (2012)	0 (2011) 0 (2012)

Table2. Hospital and obstetrics and gynecology ward macro-variables

### a. Subjects and tools

In order to make a preliminary analysis on the role of communication among the health workers in the generation of adverse event, a semi-structured interview was administered to the main health care organizational actors of clinical risk management: the ASP risk manager, the operational unit referent for clinical risk, the chief of the operational unit and the responsible of midwife’s nursing care. Responses were voluntary and no personal information was collected to avoid fear of respondents’ identification. This semi-structured interview with these employees is aimed to investigate the quality of the communication among the medical and non medical staff and between medical staff and patients, and its impact on the generation of adverse events. Moreover, a questionnaire was administer to the whole personnel of the ward in order to explore the perception about the clinical risk and the perception of the communication role in the generation of adverse events. As for the interview, responses were voluntary and no personal

information was collected to avoid fear of respondents' identification. The chosen questionnaire is the "*Hospital Survey on Patient Safety Culture*" (Nieva, Sorra, 2003). The choice is motivated by the dimensions investigated by the instrument, in particular "Communication Openness and Feedback" and "Communication About Error".

#### **b. Procedures**

The collected data are used to design the causal loop diagram (CLD) through group model building (GMB) sessions. From this point of view, the main output of the GMB sessions is the CLD, a document that describes the causal relationship between the key-variables of the healthcare company involved in this study, in order to understand their role in the etiology of the adverse event. The GMB represents the first step in the system dynamics modeling process, allowing to create a shared view of the problem among the key stakeholders. Following Vennix et al. (1992), three main tasks were performed by modelers to generate the CLD: elicitation of information, exploring courses of action or convergent tasks, and evaluation.

### **9. The results**

#### **c. Commentaries from interviews**

Two kind of interviews were administered: an individual interview to the ASP risk manager and a group interview with the operational unit referent for clinical risk, the chief of the operational unit and the responsible of midwife's nursing care, according to the GMB procedure. A preliminary evidence resulting from the interviews is a common misunderstanding of the clinical risk's concepts (sentinel event, adverse event, near miss, no harm event). Despite all the personnel of the hospital have attended a training course on the topic of clinical risk, there is still some difficulty to identify an event as a near miss or adverse event. This causes a problem in the hospital collecting data relating to near misses. During the interview with the ASP risk manager, data were collected about the voluntary reporting of near misses in the obstetrics and gynecology ward. However, those data, do not correspond to those indicated in the group interview by the actors operating within the ward of obstetrics and gynecology. Moreover, the subjects underline how, both the voluntary reporting of near misses and the mandatory reporting of sentinel events, are sometimes avoided by personnel due to the considerable bureaucratic burden of the procedure. The mandatory reporting of sentinel events (SIMES), for instance, activates a series of procedures which involve the workers even outside of working hours. The interviews have focused on the role of the communication in the generation of the adverse event. Subjects were asked to identify the main bottlenecks that could affect the quality of the care and generate an adverse event. The first question asked about the communication between doctors and patients. At this level the main bottleneck refers to the anamnesis data collection. The high

number of patients, the low number of personnel and, last but not the least, structural weaknesses (poor number of rooms and equipment that cause long waiting times), cause errors and shallowness in the anamnesis data collection and consequently in the probability of generating an adverse event. Moreover, the growing number of foreign patients, provide a language barrier, that affect in a negative way the quality of medical records. Subjects underline how, sometimes is happened that during an adverse event, through a attention by the health workers to the patient and a good communication among these, it is avoided to incur in complaints. The second question asked about the communication among doctors. At this level the main bottleneck is in the handover of the patient. The lack of computerized medical records and the limited time available affect the quality of the handover among doctors and create the condition for the occurrence of an adverse event. The third question asked about the communication between doctors and nurses or among nurses. For example, the modification by doctors, of therapy in progress and delay in the medical records updating could create, for the nurses, fertile ground for the occurrence of an adverse event, such as in drug delivery.

#### **d. Commentaries from questionnaire.**

The data collected in the questionnaire allowed to identify the perception of the personnel about the issue of clinical risk management. Among the several dimensions investigated by the questionnaire, the most important for the purpose of the research are: “Communication Openness” and “Feedback and Communication About Error”. The data analysis was performed by SPSS 16.0, and it was analyzed the correlation (r di Pearson) between the different dimensions (Table3 correlations).

“Communication Openness” correlates positively with:

- “Supervisor/manager expectations & actions promoting safety” (.588)
- “Feedback and Communication About Error” (.422)
- “Hospital Handoffs & Transition” (.403)
- “Teamwork Across Hospital Units” (.589)
- “Hospital Management Support for Patient Safety” (.389)

“Feedback and Communication About Error” correlates positively with:

- “Organizational Learning—Continuous improvement” (.568)
- “Overall Perceptions of Safety” (.549)
- “Supervisor/manager expectations & actions promoting safety” (.576)
- “Patient Safety Grade” (.524)
- “Hospital Handoffs & Transition” (.386)
- “Hospital Management Support for Patient Safety” (.642)
- “Frequency of Event Reporting” (.669).

Table3 correlations.

Table3 correlations	Team Work	Staffing	Organizational Learning—Continuous improvement	Nonpunitive Response To Error	Overall Perceptions of Safety	Supervisor/manager expectations & actions promoting safety	Feedback and Communication About Error	Communication Openness	Frequency of Event Reporting	Hospital Management Support for Patient Safety	Teamwork Across Hospital Units	Hospital Handoffs & Transitions	Patient Safety Grade
Team Work	1	-.489**	0,222	0,015	0,055	0,078	-0,014	0,276	0,337	0,239	0,241	0,014	0,295
	27	0,01	0,265	0,941	0,784	0,701	0,946	0,164	0,086	0,23	0,227	0,944	0,135
		27	27	27	27	27	27	27	27	27	27	27	27
Staffing		1	-0,085	-0,178	0,279	0,135	-0,106	-0,091	-0,156	-0,145	0,022	0,024	0,108
			0,675	0,375	0,159	0,502	0,6	0,651	0,436	0,471	0,912	0,907	0,592
			27	27	27	27	27	27	27	27	27	27	27
Organizational Learning—Continuous improvement			1	0,147	0,338	0,094	,568**	-0,083	,584**	,507**	0,272	0,141	,597**
				0,464	0,085	0,641	0,002	0,68	0,001	0,007	0,17	0,483	0,001
				27	27	27	27	27	27	27	27	27	27
Nonpunitive Response To Error				1	0,366	0,115	0,345	0,146	0,306	,414*	0,362	0,104	0,249
					0,061	0,567	0,078	0,467	0,121	0,032	0,064	0,605	0,21
					27	27	27	27	27	27	27	27	27
Overall Perceptions of Safety					1	,508**	,549**	0,262	,473*	,551**	0,323	0,347	,444*
						0,007	0,003	0,187	0,013	0,003	0,101	0,076	0,02
						27	27	27	27	27	27	27	27
Supervisor/manager expectations & actions promoting safety						1	,576**	,588**	0,229	,445*	,558**	,482*	0,351
							0,002	0,001	0,251	0,02	0,002	0,011	0,072
							27	27	27	27	27	27	27
Feedback and Communication About Error							1	,422*	,669**	,642**	0,368	,386*	,524**
								0,028	0	0	0,059	0,047	0,005
								27	27	27	27	27	27
Communication Openness								1	0,219	,389*	,589**	,403*	0,147
									0,274	0,045	0,001	0,037	0,463
									27	27	27	27	27
Frequency of Event Reporting									1	,701**	0,338	0,321	,658**
										0	0,084	0,103	0
										27	27	27	27
Hospital Management Support for Patient Safety											1	,689**	,621**
												0,001	0
												27	27
Teamwork Across Hospital Units											1	,668**	0,268
												0	0,176
												27	27
Hospital Handoffs & Transitions												1	0,169
													0,399
												27	27
Patient Safety Grade													1
													27

**e. Causal loop diagram CLD.**

The data collected in the interviews allowed to identify some of the main cause-effect relationships characterizing the organizations system. As showed in the causal loop diagram (figure 3), the high number of *patients* is related to a high number of *treatments*. The law of large numbers tells us that an higher number of *treatments* determines a rise in the number of *adverse events* due to clinical errors. The high number of *adverse events* cause an increase in *claims* that are related to a loss of *image*. The loss of *image* have a return in term of loss of *patients* (loopB1).

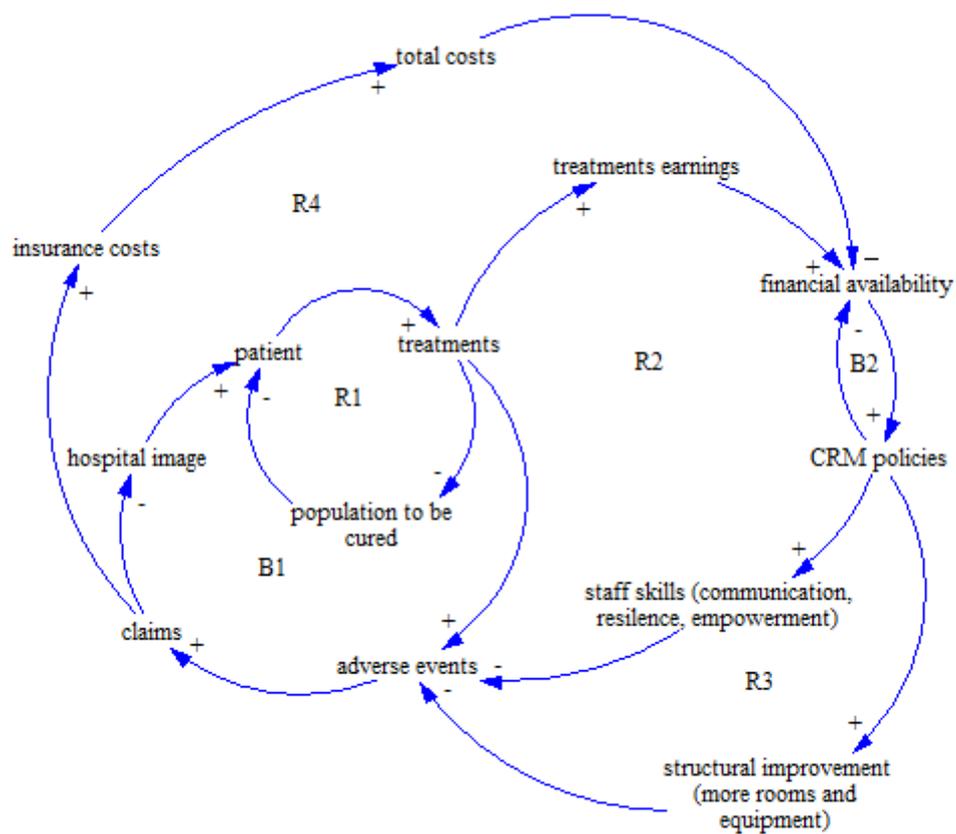


Figure3. The causal loop diagram

Nevertheless, when the number of *treatments* increase, there is an increase in *treatments earnings* and consequently in the *financial availability*. In this way the health care company has more money to invest in *CRM policies*. It is logical that the *CRM policies* reduce the *financial availability* (loopB2). However *CRM policies* should improve some *staff skills* (such as communication), or they should activate some *structural improvement* (more rooms and equipments, computerized medical records), in order to reduce the number of *adverse events* and the number of *claims*, with a positive effect on the *hospital image* and consequently in the number of *patients* and *treatments*

(loopR2 and loopR3). A reduction in the number of *adverse events* cause a reduction of *claims*. In this way the *costs* related to insurance and compensations claims and hence the *total costs* are reduced. This reduction has a positive effect on the *financial availability* and so in the possibility to invest more in *CRM policies* with a further reduction of *adverse events* (loopR4).

## 10. Discussion

A central tenet, arising from the collected data, is a common misunderstanding of the clinical risk's concepts. This represents the base of the communication breakdown because of just a sharing meaning of the element of the system allows the organization to create the conditions to improve a good communication and consequently a reduction of the adverse events. The starting point, in order to act on the level of the communication, is therefore to create a sharing meaning of the CRM' concepts troughs the provision of training sessions with the personnel. As opposed to courses attended previously by employees, this training session will be built based on the actual training needs. It means that the personnel will be involved in the building of the best training able to fill the gap that they themselves have identified.

At level of the doctor-patient communication the main bottleneck is in the anamnesis data collection. The main problem is given by the increase number of foreign patients (during last 5 years it was found an increase of 20% of patients coming from China, North Africa and East Europe) the hospital is not prepared to deal with this patients so the probability to occur in an adverse event increase. In order to deal whit this issue would be useful to establish a program of cultural mediation in the hospital in order to promote the communication and the elimination of linguistic, social and cultural barriers between operators and foreign patients, and thereby facilitate the provision of care and improving the access and use of health service by immigrants.

At level of communication among the personnel the main bottleneck is in the handover of the patient. The lack of a computerized medical records system represents an obstacle for a good provision of care and increases the chance of potential communication breakdown. Several studies show that the benefits in the use of computerized medical records are: improving the accessibility and availability of information contained in the medical records; the decrease in the time spent in data typing; the decrease in the incidence of human errors; the decrease in the time spent in making copies of folders. Although the introduction of a computerized medical records in a small hospital is a very expensive project, this investment has certainly paid off by improving the quality of care provided, the reduction of waste and the reduction of patient risk.

On the basis of this findings the introduction of these types of systems is to be considered as an improvement in the hospital practice and at the same time a way to reduce the clinical risk.

## 11. Conclusion and further researches

This research is part of a broader research started by an agreement between the University of Palermo and the ASP6 Palermo. The aim of this agreement is to activate three technical round tables, one of these refers to the Clinical risk management area. Our scope is to analyze the clinical

risk management in the hospitals of the ASP6. In particular we want to start our analysis in a specific ward of a single hospital as a preliminary analysis in order to find the basic concepts in the risk management, and, in a second step, extend the analysis to the total amount of the ASP6 hospitals in order to find the common tolls and procedures about this issue. The preliminary analysis represents also the first step in the building of a System dynamics model. To this qualitative analysis will be flanked a quantitative analysis in order to collect data needed to build the SD model. Will be necessary a deep analysis of organizational processes in order to identify the critical areas in which an adverse event can occur, and his causes. Through the scenario analysis it will possible to test different CRM policies in order to evaluate their potential effects on the company's performance both in short and medium long time.

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