E-Health in the Enrolment and Monitoring of Patients with Cleft Lip and Palate in Mali: Case of Rotaplast 2012 Mission

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Original Research Article

Abstract: This study has addressed the use of e-health in the enrolment/recruitment and monitoring of patient with cleft lip and palate in Mali during humanitarian mission of Rotaplast 2012. It was a prospective and descriptive study which has covered an eight-month period from January to August 2012. Structures involved in the study were National Agency of Tele Health and Medical Informatics (NATHMI), NGO Horizon Vert, Mother and Child Hospital Center "Le Luxembourg" (MCHC). The population studied has amounted to 142 patients during enrolment/recruitment phase with 87 patients who have been taken care and followed during six months after surgical act. In view of this study's results, we can conclude that the use of information and communication technologies in health field allows for better coordination and management of patients. Then, EHealth initiatives contribute to gathering information and transferring competence among health workers. EHealth has neither finished revealing its merits nor even its limits.
Keywords: E-Health, enrolment, monitoring cleft lip and palate.

INTRODUCTION

World Health Organization (WHO) has said that E-Health serves as management and support of health at national and international level through interactive audiovisual communications and data [1].

Spurred on by information and communication technologies (ICT), medical setting has been undergoing profound change.

In these days, ICT evolution has made remote medicine possible: telemedicine. Contrary to what has often been said, ICT has been welcomed by medical practitioners [2].

Since the early 2000s, the importance of ICT was emphasized by WHO in a report of United Nations for Africa [3]. Several research work has been conducted in the field of telemedicine in Mali. In 2008, the State's clear willingness has been expressed by the creation of NATHMI. NATHMI creation has then translated into concrete action the institutionalization of E-health. This process has also demonstrated the state's early understanding of potential that presents ITC to accelerate the achievement of the millennium development goals.

Clefts lip and palate are facial deformities occurring in the second month of intrauterine life. In our country, several studies have been conducted on this pathology. Cleft lip and palate are esthetically striking and highly disabling on the function, deglutition, and phonation. It was in this context that the Rotary Club « Bamako Djoliba » has initiated a humanitarian mission in collaboration with the « Rotaplast International » for the treatment of patient with cleft lip and palate. The initiators of this mission were facing an issue of enrolment of patients. In this context, ITC revolution with the deployment of mobile telephony have allowed to consider a new scheme of enrolment and monitoring of these patients leading by NATHMI. It was within this framework that this study focused on the enrolment of patients with cleft lip and palate by ITC has been carried out.

The aim of this study was to analyze the contribution and benefit of E-health in the enrolment and monitoring of these patients. What can ITC bring

about an improvement of quality care of these patients in Mali?

OBJECTIVE
The objectives of this study were:
- Describing the activities of E-health
- Identifying difficulties in the process of implementing E-health activities
- Evaluating patients' assessment of the use of ITC
- And formulating recommendations for promoting E-health

MATERIALS AND METHODS
The study has taken place at NATHMI in collaboration with NGO « Horizon Vert ». Surgical interventions have been carried out at Mother and Child Hospital Center « le Luxembourg » in Bamako.

It was a prospective and descriptive study of E-health activities in ensuring treatment of cleft lip and palate which has been started in January 2012 and continued until August 2012. E-health activities have essentially involved:
- TV spots for patient enrolment
- The use of mobile telephony for the enrolment and monitoring of patients
- The use of teleconsultation platform REEVASAN (Electronic Network of Medical Evacuation) for final selection and monitoring of patients

The study has involved 142 patients during the enrolment phase in which 87 patients with cleft lip or palate have been taking care and followed up during six months. The majority of patients were from all regions of Mali except Kidal. Two patients came from surrounding countries (Guinea and Mauritania).

The study has been conducted in several phases:
- The pre-selection phase (broadcasting of TV Spots and enrolment of patients by phone);
- The selection phase (patients' consultation, preoperative medical exam, compiling medical record, registering of medical records on the REEVASAN platform)
- The phase of surgical interventions (clinical day, clinical and biological aspects, programming of interventions, hospitalization, interventions, treatment)
- The phase of postoperative care

Patients with cleft lip and palate confirmed by a health professional that have agreed to take part in the study after informed consent and verbal assent were included in this study.

Word processing has been done by the software Office Word 2007 under Windows Operating System 7 Starter. Image processing has been done by the software Fast Stone Capture 5.3 French version. Data has been entered into and analyzed by Epi Info 3.5.1 French version.

THE E-HEALTH PLATFORM: REEVASAN
REEVASAN is based on the telemedicine software iPath developed at Pathology Institute of University Hospital of Basel (Swiss). It is a server of telepathology based on open source platform which is composed of database server 'postgresql', web server 'apache' associated with web programming language 'PHP', CGI programs and java applets. The system is accessible from any computer connected to internet and web browser supporting Java.

The first step to be able to use the system is being registered in order to get a user account. Since one has a user account, he can use all resources of the system as an applicant or even as an expert according to entitlement allocated by the system administrator. The web interface allows to add easily new images, descriptions and comments. Experts have been called in responding to different cases submitted, their comments and discussions have been posted on the discussion space.

Fig-1: Homepage of REEVASAN

A teleconsultation on the REEVASAN server of NATHMI occurs in four steps. First of all, a request is formulated by the non-expert to one or several experts. Second, the preparation of image or document is performed by the non-expert. Next, the image or the document is presented to one or several experts. At last, the reply of one or several experts is delivered to the non-expert. Questions and clinical information provided by the non-expert are documented on the description field, and experts approve the diagnosis; questions for clarifications and their opinions are documented on the comment field. All of these data are saved in the database.

Fig-2: Examples of cases registered on REEVASAN

The REEVASAN Platform also fits in with the teleradiology, the tele dermatology and telepathology. It could be also used in telecardiology and teleobstetric for electrocardiogram strips and echography.

RESULTS

Table-1: Distribution of E-Health activities during the Pre-selection phase.

ACTIVITIES	NUMBER
TV Spots	**60**
Phone calls for initial contact	**142**
Phone calls for confirmation of the diagnosis	**142**

Table-2: Distribution of E-Health activities during the selection phase.

| ACTIVITIES	NUMBER
Phone calls for consultation phase	142
Phone calls for preoperative medical exam	142
Records registered on REEVASAN	142
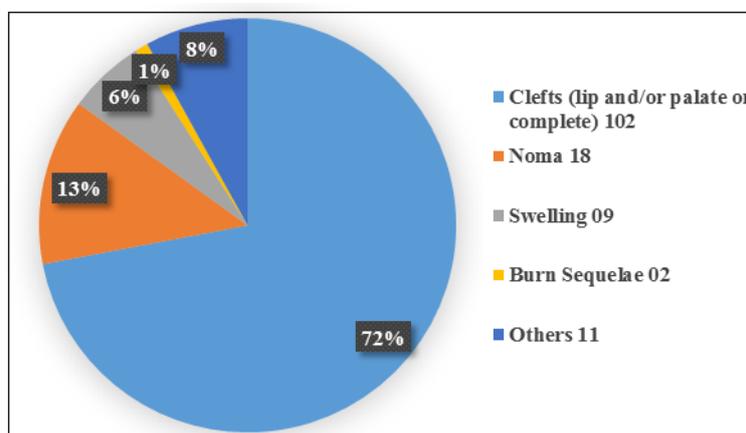
**Fig-3: Distribution of recruited patients by phone based on diagnostic during selection phase.**
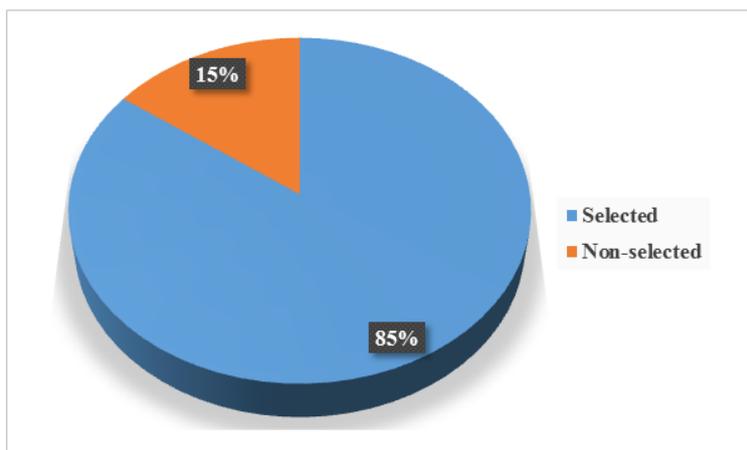
Fig-4: Distribution of patients selected during selection phase.

Table-3: Distribution of E-health activities during surgical intervention phase

ACTIVITIES	NUMBER
Phone calls for clinical day	**142**
Phone calls for hospitalization	**87**
Records registered on REEVASAN	**87**
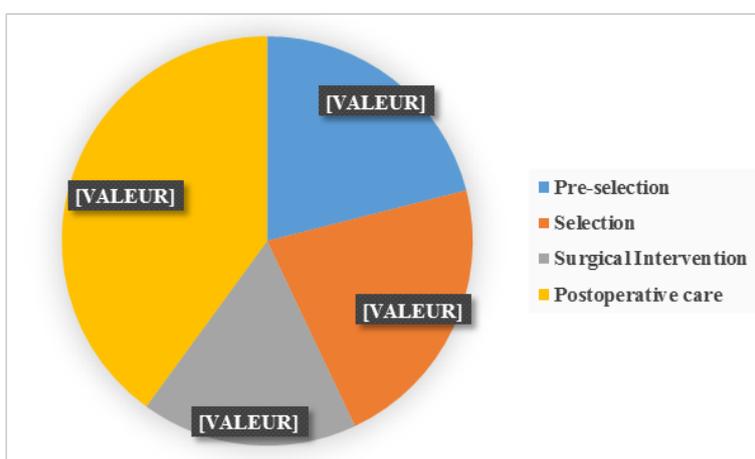
Fig-5: Distribution of phone calls during the different phase of the mission.

Table-4: Distribution of activities undertaken on REEVASAN platform during the different phase of the mission.

ACTIVITIES	PHASE	NUMBER
Records registered on REEVASAN	**Selection**	**142**
Records registered on REEVASAN	**Surgical intervention**	**87**
Records updated on REEVASAN	**Monitoring**	**261**

Tableau-5: Distribution of patient based on type of communication which has allowed them to be informed about the mission.

| TYPE OF COMMUNICATION	NUMBER	PERCENTAGE
Group communication	**13**	**14,90%**
Mass communication	**56**	**64,40%**
Interpersonal communication	**18**	**20,70%**
Total	**87**	**100,00%**
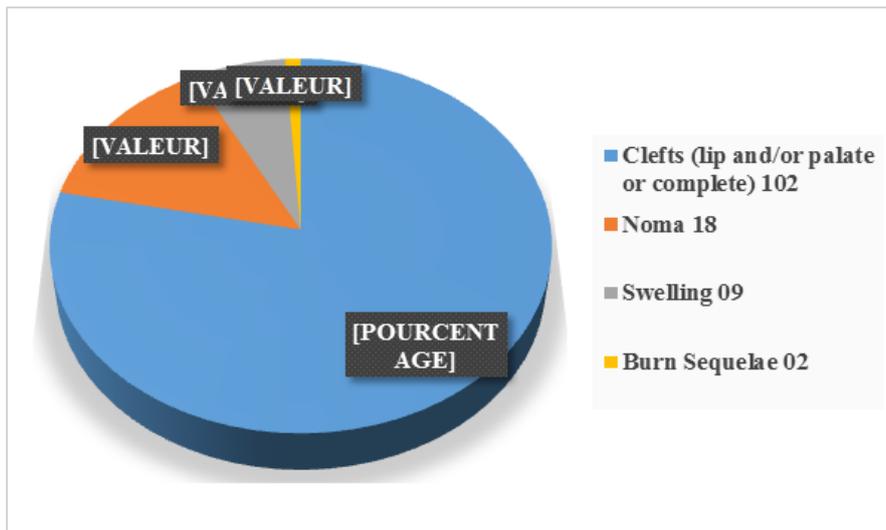
Fig-6: Distribution of patients who have been taking care based on diagnostic.

Table-6: Distribution of patients based on surgical technics.

SURGICAL TECHNICS	NUMBER	PERCENTAGE
Millard	**74**	**85,10%**
Tennisson	12	13,80%
Veauwardill	1	1,10%
Total	87	100,00%

Table-7: Distribution of patients' number during postoperative care phase based on 6 months monitoring.

OUTCOMES OF PATIENTS	EFFECTIF	PERCENTAGE
Disunity	1	1,10%
Recovery with sequelae	3	3,40%
Recovery without sequelae	**83**	**95,40%**
Total	87	100,00%

DISCUSSION

The study was conducted during a period of great expansion of information and communication technologies which take part in great importance in our life. In recent years, the use of device by medical professional has steadily increased in our country.

Pre-selection phase

During this phase, 60 TV spots have been broadcasting on national TV for a month. Those TV spots have permitted to 64,40% of our patients (56 cases) to learn about the mission through the mass communication.

In total, 284 phone calls have been carried out during this phase, of which 142 during the procedure of getting in touch with patients and 142 during the procedure of confirming the diagnosis by the health agent (21, 53% of all phone calls). Those procedures have allowed to pre-select 142 patients [5].

According to DU GOUJON, mass communication allows to draw attention of patient or his relatives.

Selection phase

In this phase, 142 phone calls have been carried out during consultation procedure which have allowed to confirm 102 cases of clefts lip and palate (71,83% of pre-selected patients). During the procedure of preoperative medical exam, 142 phone calls have been carried out which have allowed 100% of our patients to carry out their preoperative medical exam. OUANE has found that 45,8% of his patients have been carried out their preoperative medical exam [4].

By means of 142 registered medical records on the REEVASAN platform, the missionaries have retained 85% of patients (87 cases) who have had a confirmed cleft before their arrival in the mission center. The use of this platform has allowed transparency in the selection of 80% of patients.

According to silvestre *et al*., the use of Information and Communication Technologies can greatly improve the quality of relationship with the patient [6].

Phase of surgical interventions

During this phase, 229 phone calls have been carried out (17,36% of all phone calls) with 142 phone calls during clinical day and 87 phone calls during hospitalization.

Phase of postoperative care

During the phase of postoperative care, 522 phone calls have been carried out (39,58%) at the rate of 87 phone calls per month for a period of six months.

The missionaries have taken part in the procedures to be followed in case of any complications through 261 updated on the REEVASAN platform.

After six months of monitoring, contact was maintained with 100% of patients being cared for; OUANE has lost 36% of patients in his series [4].

Surgical technics

In our series, Millard technics has represented 85,5% ; Ouane has found 3,6% [4], Diakite 5,4% [7] and Anastassov→ 100% [8].

CONCLUSION

EHealth using in health field allows to better coordinate care activities of patients. Ehealth therefore contributes to transferring competence among health workers. In Sub-Saharan Africa, the expansion of telemedicine applications remains an urgent necessity because it allows to compensate for geographic isolation of people and lack of quality and quantity of continuing training of health workers. EHealth has neither finished revealing its merits nor even its limits. It provides access to the most basic right of life: the right to health.

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