Stockholm Evaluation Unit

MEDECINS SANS FRONTIERES
LÄKARE UTAN GRÄNSER

EVALUATION OF THE EMR DEPLOYMENT IN KABINDA VIH HOSPITAL

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ACRONYMS

Acronym	Meaning
MSF	Médecins Sans Frontières
OCB	Operational Unit in Brussels
EMR	Electronic Medical Record
CHK	Kabinda VIH Hospital
OPD	Out-Patient Department
IPD	In-Patient Department
PSE	Psycho-Social Education
VL	Viral Load
TB	Tuberculosis

EXECUTIVE SUMMARY

As of December 2017, MSF OCB deployed an Electronic Medical Record in Centre Hospitalier Kabinda, in Kinshasa, Democratic Republic of Congo, as a pilot response to the hospital organisational issues having consequences on its capacity to provide quality care.
This digital record collects patient data prior and during consultations and hospitalization and aims at easing their timely access and sharing among medical or paramedical members of staff and, in the end, at improving patient care quality.
The context is that of a HIV hospital, CHK, with an increasing number of patients in very critical conditions, and few human and technical resources. Therefore, the key goal of the project is to work on the workflow efficiency to deliver better care.

The present evaluation is meant to assess if the EMR is indeed a right and sufficient answer to CHK main organisational issue, and if it can be replicated elsewhere. MSF OCB envisions a second pilot in Egypt and a larger roll out in MSF hospitals in 2019 and looks for replicability conditions.
For this purpose, the assessment is based on OECD / DAC references: relevance, appropriateness, effectiveness, efficiency, impact and replicability. The evaluation is based on a desk review and semi-structured interviews which were performed between September and early November 2018. Both the field and the headquarters were solicitated by the evaluator at each level of involvement (end user, project management, support and maintenance, governance, strategy, validation levels…), either remotely or face-to-face.
If the project documents review and interviews allow cross analyses and a better insight on some topics, other themes are only tackled by means of interviews which cannot aim to capture a complete reality, only getting close to it.

Some of the main findings of the evaluation can be highlighted here.
It appears that the CHK pilot was successful on several levels. In particular, the way end-users were trained, supported and now followed-up by the Kinshasa EMR team shows a good involvement of the project team on site. This is a critical element which clearly supports end users' adherence to the tool. Although the CHK staff is already used to new processes as being part of an operational research site, the digital tool could be very disruptive but thanks to the accompaniment, they never feel lost.
Besides, the principle underlying the EMR tool, that is to say the unicity of the information source for medical and paramedical staff, is most appreciated because it saves time, now especially in the lab part of the tool, but end users already envision potential time gains in other parts of their daily tasks, after some enhancements of the tool. The data management as a whole, which was one of the main problems at CHK, has clearly improved: now the EMR ensures a secure storage of the records, an easy access to information anytime and allows a better traceability of data encoding.

The CHK implementation also has to progress in several areas, and at a larger scale the EMR project itself if new roll out are envisioned.
Among other things, the EMR project needs more coherence in its development. This can come from a difficult governance due to some missing or insufficiently involved stakeholders onsite and at headquarters level, but also due to a lack of financial framing at both EMR project level and CHK pilot level. This translates into unclear messages transmitted to the field, and especially to the end users who are the worker ants of this EMR implementation, but do not see its goal on the long term.
The top-to-down dynamic used for the CHK pilot presents some problematic aspects, even though it is linked to the fact that other EMR implementations are considered since the beginning. The tool was chosen before the pilot site could express its specific needs and one can observe discrepancies as the tool does not meet all field expectations. The tool remains incomplete in terms of functionalities to be a real organizational lever and workflows were not deeply analysed to avoid repetition or duplication of process. In this respect, end users are feeling confused about the EMR tool although they are perfectly aware of its potential benefits.

With the project replicability as a perspective, the EMR project also needs to deal with the tool lack of flexibility. The CHK pilot showed that the tool could not be as adapted to the needs as it should to meet expectations. It questions the tool capacity to be fully efficient in other contexts. Customizing the tool often requires the action of external consultants which generates an important level of dependency and could be difficult to manage by the EMR project team when the tool will be rolled out in several sites corresponding to different needs.
This lack of flexibility also seems to bring a flaw in data reliability as it remains difficult to define coherence controls to check the clinical data collected in the digital record. Currently, these data are being checked only visually by end users and this cannot be considered as sufficient when patients care is at stake.

In order to improve operations to come, the first recommendation of this evaluation is focused on the EMR project governance established by the steering committee. All the project stakeholders have to find their place in the project strategy definition, none should be left behind. This way, everyone could express their view and a consensus could be found. The project could be fully successful because understood by everyone while remaining coherent. From that, nearly all other recommendations follow.

The coherence brought by the steering committee will translate into adequate and thorough analyses of the onsite situation and needs, as well as appropriate technical and equipment choices by the project management and the supporting department. The EMR project will therefore be a solution that will best address the issues identified whether they are organizational, technical, covering a maximum of needs and, at least, the most crucial points of them. If end users feel their needs are understood and concretely taken into consideration, the adherence to the overall project will increase.

Stemming from the first recommendation, the improvement of the communication around the project strategic information, such as the main objectives and expected results, is also essential to enhance users' adherence, and thus to ensure the project success. This is one of the main roles of the project management but should be driven by the steering committee. For instance, the same message has to be passed on with the same strength and must reach each end user equally. Thus, everyone will head for the same goals which should be reached quicker and in better conditions.

In the same vein of keeping the project coherent and making every stakeholder focus on its success, the accent needs to be put on the limitation of the scattering of efforts by using only one tool or process per task, that is to say to avoid maintaining paper and digital systems for the same type of action.

INTRODUCTION

MSF-OCB requested the Stockholm Evaluation Unit to conduct the evaluation of the introduction of an Electronic Medical Record (EMR) in Kabinda HIV Hospital (CHK), in Kinshasa, DRC. An EMR is a digital patient record gathering patient history and medical data. In CHK situation, the deployment of the EMR solution aims at improving medical data process and flow inside the hospital in order to ease caregivers daily work and provide better medical care in IPD and OPD. It has been developed and deployed on site by MSF OCB as a response to the project field's need to better organise their activities of care delivery in a HIV context where the number of patients is increasing and patient care getting more and more complex.
This EMR has been deployed in Kinshasa as a pilot project from December 2017 to September 2018. The findings and recommendations of the present evaluation should pave the way to adjustments before a second pilot in Egypt and a rollout in MSF hospitals in 2019.

EVALUATION SCOPE

The evaluation objective is to appraise if the EMR is a relevant response to the needs expressed by the MSF field hospitals in general and by CHK in particular. It aims to assess if the EMR, as currently implemented, is a sufficient organisational lever to help caregivers in their day to day duty to deliver better care to HIV patients in a very demanding environment with limited resources. Therefore, it is based on the OECD / DAC criteria outlined in the Terms of Reference: relevance, appropriateness, effectiveness, efficiency, impact and replicability.

It covers every level involved in the implementation, both at field (Kinshasa) and headquarter level (Brussels). Headquarter and on-site management and project team members are involved as well as end users of every kind, from receptionists to lab technicians, including nurses and doctors. The evaluation started in September 2018 with headquarter interviews and documents review and the field mission took place from 28th October to 4th November.

At a later stage, this evaluation will potentially be followed by a second one to assess more generally the evolution of medical care quality after the EMR deployment.

METHODOLOGY

The evaluation methodology relies on the use of different information sources (see Annex III).

First, key documents were identified among those provided in the perspective of a desk review and were analysed. They allowed the evaluator to highlight themes to be discussed with involved headquarter staff members during semi-structured interviews. These interviews were conducted remotely and were the opportunity to identify the roles of the stakeholders located at headquarter level and to gather their points of view.

Then, the information collected enabled the evaluator to build a full framework of questions and criteria to be tackled during the on-site evaluation. The field visit consisted in individual face-to-face semi-structured interviews with each type of end user (physician, nurse, lab technician…) and with the Kinshasa EMR team. The initial plan of interviews evolved a bit to adapt to constraints due to the hospital organization and activities. Some additional documents were also analysed during the field visit because they were provided by the Kinshasa EMR team on site upon the evaluator's request.

LIMITATIONS

For many aspects, the present evaluation being based on interviewees statements remains a single capture at a specific moment of their perception of the EMR project and its impact on their daily work. Therefore, it does not pretend to reflect the complete reality, but shows how end users and local project team feel regarding the EMR introduction and manage to integrate this change to their work habits.

Also, while the evaluator identified on site other stakeholders who could have been interesting to interview, such as CHK and SIDA project management members but also medical coordination, to have other insights on the EMR implementation, there were no opportunity to add them to those already scheduled.

Also, as we often see in such evaluation context, the political and social situation in Kinshasa stand as another bias which prevents some end users to speak freely of their experience of the EMR, for fear of consequences on their job and their family's situation. Therefore, one has to keep in mind that some statements and remarks used in this evaluation were qualified by interviewees.

Finally, this evaluation did not consist in observing physician or nurses at patients' bedside, nor to collect any patient statements. Thus, patients' perception and concrete EMR use are out of this evaluation scope.

FINDINGS

Note:

An important element to keep in mind all along the reading of the present report is that, neither in the documents provided and analysed nor during interviews led, the distinction between the CHK pilot and the EMR project at large is made clear. All the documents and comments are focused on the experience of the CHK pilot and do not include elements on the global EMR project. This comes from the fact that, currently, the only concrete translation on the EMR project is the CHK project.

As a direct consequence, the appraisal made below deals with the CHK pilot as a starting point for all observations but, since the EMR project envisions different deployments as a mid-term objective, it often broadens the scope because some valid elements for the CHK situation can also be valid in other contexts. Therefore, the term EMR refers mostly to the tool itself than to the project.

RELEVANCE

Have the objectives and expected results of the EMR implementation been clearly defined?

This question first aims at identifying the role of the different stakeholders in the project objectives and expected results definition.
The various field and HQ interviews held highlight the fact that everyone does not have the same vision of the EMR objectives, according to their role in the project. The persons who were involved at an expert or management level in the project define large and long-term objectives such as the improvement of the quality of care, whereas end-users hardly mention this kind of objectives. Instead, a great diversity of sub-objectives is often named such as data traceability, removal of paper, lever for work efficacy or a better data management, a better communication tool, etc; the objectives often being mixed with the tool benefits. This shows that the communication of the EMR main objectives was not clear enough onsite, despite the involvement of end-users. This involvement was organised since the beginning of the project (collection of needs during semi-structured interviews, focus groups…) until now, while using the tool (translated by reframing meetings, EMR meetings, demos…). But the strategic vision of the project, its progress and direction may not have been transmitted in such meetings whereas it could bring coherence to everyone's commitment to the project. Indeed, the Kinshasa EMR team only holds strategic meetings about medical coordination of the project with the MedCo, the Medical advisor and the hospital medical team, or about the project management itself with the Brussels team. This may explain why general information, like objectives and expected results, does not reach end-users.

The second aim of the question is to identify the project objectives and expected results.
Regarding implementation objectives, pre-visit and pre-inception reports indicate that, from the moment MSF OCB decided to start the project in CHK, they evolved. First, only an implementation in IPD was planned, but rapidly, the need in OPD was identified as well to ensure a better follow-up of patient who often come to IPD from OPD and can return to OPD after IPD. The same observation was made with Triage. This decision would ensure no rupture in the workflow and in data transmission. Thus, the main objective seems to have changed from the need to easily access the right information for IPD staff to that of improving the overall workflow by sharing patient data between services, mainly lab results.

Both objectives and results do not appear as clearly defined, or at least, were not clearly communicated since the EMR stakeholders at all scales do not agree on them.

Do the objectives of the EMR implementation correspond with identified needs?

This question first tackles the methodology used to choose Bahmni among other solutions.
Bahmni was chosen following a benchmark of seven solutions, based on general needs determined by MSF OCB from functional needs, HR needs, hardware requirements to company sustainability. The different solutions corresponded very unequally to the need of the EMR, some being not EMR softwares (Tier or Fuchia). 3 solutions were open source based. Bahmni best matched MSF criteria and, in addition, offered potential possibilities of creating intersectional synergies, mainly with MSF OCP who already used the tool and brought MSF OCB confidence thanks to their experience. Also, two downsides were already identified when choosing the tool: the poor flexibility in report generation and the absence of alerts or notifications system.

However, it is obvious that the tool was chosen before the pilot site: the criteria match was based on general needs[1] corresponding to most MSF operating fields, in order to be used widely (ex: prevent key information from getting lost, make data available across services, customizable data set…), and not on a specific site needs, like the CHK's (ex: structuring process such as order of actions for each end user, managing priority among lab requests, looking for patient files according to specific criteria…). But the gap between initial needs and the CHK's for the EMR to be operational is significant. This partly explains why the initial planned time and costs were exceeded. The EMR objectives in the CHK translates into helping with organisational issues due to paper format, that is to say better sharing patient information between wards, but more precisely replacing paper in every process. This last objective has so many impacts at all levels of the project organization that the implication for the EMR become very specific and cannot remain at a general scale.

The question also tries to assess the satisfaction brought by the EMR implementation (ratio quality/cost), in other words to determine if the objectives set were appropriate to meet identified needs.
Retrospectively, the satisfaction is mixed about the EMR implementation among the project team. One of the main difficulties was that Bahmni lacked flexibility to be easily implemented. Small changes require specific development from ThoughtWorks and some rigidity have delayed the launch of the solution in CHK: for instance, activity reports or form printouts are hardcoded which does not allow the tool administrators to change their content easily. The integration to the lab module, Open Elis, was also deceptive as the module cannot integrate some variables which still have to be managed on a paper form (for VL or TB). In other words, the project which was first thought as "simple" appeared more complex in its concrete implementation.
The initial maximum duration of the project until its launch was 1,5 year but had to be increased by nearly half a year before the implementation was complete.
Thus, the issue of the project costs is raised. This project was supposed to become an opportunity for MSF sections to work better together, even to find synergies and common uses to be able to pool resources and means to develop a general tool usable with other diseases, in other contexts. The first months of the project show that the implementation required to specify a lot of functionalities to be appropriate to the CHK context, which would not necessarily be suitable to another context, and without being really autonomous on simple actions such as adding a form for instance. Considering these elements, the cost for the outsourcing of the EMR customization seems very high (280 000$ globally, including a second implementation) but still has to be compared with the situation where MSF would have chosen to be more autonomous thanks to an extra member of staff dedicated to the EMR implementation to deal with more customizations currently made by ThoughtWorks.

It is difficult to say whether the EMR implementation objectives meet identified needs as they were not clearly set from the beginning of the project. But, one can say that there is a certain mismatch between general needs and objectives initially identified and those outlined at the field level after a few months of use. This could be explained by a lack of deepening during the phase of needs collection.
In addition, if the tool is chosen prior the deployment site, it is important to communicate about the objectives the tool is supposed to meet to the site management and to make sure that the information is spread. If not, the needs expressed prior the developments and deployment will be taken by end-users as objectives that have to be met and will automatically create disappointment.

APPROPRIATENESS

To what extent does the EMR project tackle the identified issues?

The above question deals with the issue of the EMR tool acceptability.
It is difficult to assess this topic because, as mentioned above, according to the different kinds of stakeholders of the project, the tool is not supposed to focus on the same issues. The objectives are multiple and not harmonized. Onsite, the EMR team does not follow the evolution of specific acceptability criteria that could have been set before the launch or even during the EMR implementation. Therefore, the question is appraised below on the basis of the identified objectives named by interviewees.

If the emphasis is put on general objectives (improving patient care quality or improving workflows in CHK), because the implementation is still very recent in OPD and IPD (less than 3 months), it is far too soon to appraise them.

If the emphasis is put on lower scale objectives (sharing information between wards, enabling a quick access to patient data or bringing efficacy into daily work), some initial answers can be brought by the interviewees. End users clearly state that the search for a patient file and the access to patient data are far easier than before the EMR implementation and that they save time by not moving to different places to gather all the information they need. They also say that the

[1] cf. Software assessment – Bahmni

communication between OPD, IPD and the lab is really better: information does not get lost, is stored in one place and that everyone is less disturbed in their daily work.

From this perspective, one can say that the issue of the general workflow has improved and that it is working better than before. In this particular regard, the EMR tackles at least a part of the issue. However, the EMR tool alone cannot be an overall solution to organisational and care quality issues which was the starting point of the EMR implementation[2]. That is why it needs to be complemented by an organisational approach which should look at the information flow, the duplicated tasks, the coexistence with the paper-based system, etc.

To what extent was the project team involved in the tool conception and implementation process planning?

This question aims at appraising the way the EMR team (both HQ and Kinshasa) and CHK stakeholders were involved both during the EMR conception phase and in the planning of its implementation, and, as the case may be, if issues were raised on these occasions.

CHK was involved as soon as it was identified by MSF OCB to become a potential pilot site for the EMR. Their previous experiences with IT solutions to monitor their activity or for epidemiological needs were not successful because of a lack of IT governance and, therefore lack of coherence[3]. After the other potential pilot site withdrew from the EMR project, all stakeholders, that is to say Congo mission, SIDA project and CHK, confirmed their will for CHK to become a pilot site.

2017 was dedicated to the project preparation between CHK and the whole project team. CHK staff was involved to identify their needs[4] from all points of view (functionalities, organization, management, equipment, HR, infrastructure…). Among them, one can highlight the needs for a real time access to lab results, for simplification of data encoding process, for a unique and easy access to the main information... On this occasion, it has been possible for future end users, management staff, medical coordination and EMR teams to bring forward some concerns. For instance, at the beginning, the IPD only was supposed to be equipped with the EMR, but the different focus groups scheduled during the pre-inception visit with supervisors and medical / paramedical staff highlighted the need to equip OPD as well to enable continuity in patients' follow-up, as they often move from a ward to the other.

If CHK stakeholders have been involved in the tool conception to determine the main functionalities, they were less involved in the implementation process planning. The Kinshasa EMR team only adapted the rhythm of implementation according to users' readiness and training which depend a lot on staff internal availability and activity. Also, it has to be noticed that there was a delay in the solution releases by ThoughtWorks because of a complement of needs which was not clearly indicated at the beginning of the developments. The Kinshasa EMR team also had to take this aspect into consideration to review the initial planning.

To what extent are the project team and local end-users involved in the tool evolution?

This raises the question of the management of the EMR evolutions (identification, escalation, validation? implementation) between headquarters, Kinshasa stakeholders (EMR team and end users), but also with ThoughtWorks, if need be.

End-users are the first stakeholders at the origin of the tool future evolutions. They can communicate a need for change to the EMR team on two occasions: when they ask for support, and during their team's monthly meetings with the EMR team. End-users remarks feed a document where the EMR team gathers and prioritize suggestions. If these requests are very simple and feasible by themselves, the EMR team can provide an answer directly by taking action on the EMR. If the requests need deeper insight, the EMR team follows with an informal discussion with the team supervisor. The document is regularly discussed with Brussels project manager to adjust priorities, then is sent to Bahmni to get their input in terms of technical feasibility, time needed and cost. The arbitration remains Brussels' responsibility before starting developments planning.

Evolutions also require servers and database updates. Therefore, the question also tackles the organisation of releases in the hospital and its potential consequences on end users.

When a group of new developments is available (as experienced during previous releases), it is transferred by the maintenance team in Brussels from GitHub to tests servers. Then the bunch of functionalities is tested by the EMR team and by user champions, picked in every team, who are kind of beta testers. They validate together before a specific demo is scheduled for teams to discover the functionalities.

When a release is planned, the EMR team announces it to the supervisor of each team so the users are notified. The

[2] Cf. Terms of reference

[3] Cf. VT-CH-01 ToR Pre-Inception Analysis and Inception v1

[4] Cf. Potential requirements v3

release itself takes approximately 20 minutes before the EMR is restored (instead of 45 minutes at the beginning of the project) and that the staff can access the system again.

The tool evolutions directly stem from the field, and, more especially, from end-users. Some of them are also involved in the test phase of new functionalities along with Kinshasa EMR team. This shows that, on this aspect, the project is user-centric and tends to ensure a better consideration of specific needs.

To what extent does the hardware meet user's expectations?

Both quality and quantity of hardware equipment are to be assessed in this question, as well as the motive for the wards allocation. End users satisfaction is taken into account.

The EMR requires a simple configuration in terms of performance: from this point of view, the computers choice was good.

On the one hand, the Triage, Reception, OPD and Psycho Social Education were equipped with desktop computers, one in each room. The lab and pharmacy were equipped with laptops (four in the lab and one in the pharmacy) to avoid clutter in their limited workspace. This allocation, also based upon the number of users, ensures that everyone can access a computer, and thus the EMR, all along the working day.

On the other hand, the computer allocation in IPD was different considering a superior number of users and different tasks taking place in different spaces of the ward. Therefore, three desktops including two at the admission, and one laptop on a table with wheels are in current use today, instead of 2 desktops initially planned. However, among IPD users' feedbacks, one of the main information was that this allocation does not fit the needs of IPD staff. Concretely, in IPD, there are three phases where information is encoded in the EMR: just after admission by a nurse thanks to a desktop, during hospitalisation thanks to the laptop where a physician can ask for lab tests, and just after discharge by a nurse thanks to a desktop. During both admission and discharge, data is collected at patient bedside on a separate page and then encoded into the EMR at a desk. The low number of available computers, the fact that data are copied twice and the constant emergency context in the ward often cause extra-work and loss of time in data transmission (situations where a patient is already hospitalized but no data was encoded in the EMR) and sometimes traceability issues (when a user has just opened an EMR session to access information, but did not disconnect, and that another staff wants to use the computer right away).

Overall, the hardware meets users' expectations. Only one ward, IPD, gave negative to mixed feedback about it.

To what extent is the quality of connexion adapted to the use of the EMR tool?

This question aims at appraising how the Internet connexion was put in place and if it meets end users' expectations mainly in terms of speed.

In the CHK, the connexion is spread thanks to a local network which had to be upgraded for the EMR implementation. Laptops are connected via WiFi and desktops via cable.

Currently, the connexion speed is evaluated as good by end-users in the CHK. They experienced difficulties as of June 2018, especially for WiFi connexion, generating end-users' frustration and slowness in their work, mainly in the lab. This issue was tackled by changing the WiFi configuration and solved before OPD and IPD launches to avoid such annoyances during consultations.

Were appropriate and timely adaptations made in response to direct feedback or unforeseen issues during implementation?

The topic of the organization of the developments (initially planned or not) and evolutions is to be tackled here from a project management point of view.
Since the beginning, there is no typical roadmap document to organise the EMR developments. The Kinshasa EMR team already mentioned this need with Brussels project team and it is planned to start preparing it as of March 2019. Until now, the first developments were based on the need collection work done at the beginning of the project by the MIO data modelling analyst and the IT Project Manager, then refined by the Kinshasa EMR team. From its launch, users' feedbacks were collected by the Kinshasa EMR team to build a document defining and prioritizing future improvements for 2019. This document will be soon shared with ThoughtWorks to analyse feasibility and costs before MSF OCB decides what to plan for 2019: this will be the roadmap.
However, this document, as planned today, will not give any mid-term or long-term vision about how the tool will evolve, in what framework, to reach what objectives. It rather looks like a list of prioritized needs which will may lead to a lack of coherence in the end.

Thanks to the permanent feedbacks collection, some evolutions of the EMR were added during the implementation of the different functionalities used in services. For instance, the PSE staff needed to clarify relationship between patients (i.e: mother/father, child, brother/sister) or sometimes to be able to generate a new patient ID because of a change of cohort. This was made possible after the EMR implementation in PSE. But the main evolutions during the implementation were process or workflow related to adapt to the EMR. When an IPD physician made a lab request, several times a day, the request was not followed by the required samples at the lab. Therefore, a new process was introduced in IPD to reduce the oversights of samples, a process which could not be integrated immediately in the EMR.

As a conclusion, some adaptations were indeed made to answer unanticipated difficulties which appeared during the implementation. These adaptions were essentially linked to the workflow as the needs requiring a technical intervention could not easily be integrated for the tool flexibility remains limited.

EFFECTIVENESS

To what extent has the EMR implementation been achieved? What were the reasons for achievement or non-achievement of objectives?

The implementation should be assessed on the basis of the number of effectively equipped wards and implemented functionalities compared to planned equipped wards and initially planned functionalities.
The EMR implementation has been fully achieved compared to the initial plans. All the targeted wards were equipped with the EMR, and if a comparison is made with the very beginning of the project (pre-visit stage), more wards than expected were finally equipped (OPD, Triage were not included for instance). All the functionalities were implemented compared to the initial prioritized plan shared and agreed with the CHK and with ThoughtWorks[5].

The EMR implementation should also be appraised according to its effective capacity to reach planned objectives from a user viewpoint.
From end users' perspective, as mentioned above, the announced objectives were not clear to everyone. Therefore, everyone has their own interpretation on whether the EMR reached its main objectives. Generally, end users state that the EMR partly meets their expectations mostly for two reasons: first, because its cohabitation with the paper-based system causes duplicated tasks and slows down what could be done thanks to the EMR; second, because it is still incomplete or partially adapted to daily tasks to fully replace what is currently done on paper (no workflow is fully digitized today). An update on the real objectives could be helpful to reframe everyone's efforts to make it a successful project.

To what extent is the EMR tool perceived as useful in the following areas?

Timely data processing / access to patient information

The aim of this section is to identify among end users what digitized part of the process is the most useful in the EMR.
Unanimously, the timely access to lab results is the most useful functionality according to end users. Before the EMR was implemented, lab results were available in the patient record at best, the end of the day, and most of the time, the following day which delayed a lot the decision of a therapy by the medical team, and thus, reducing the chance for it to work for the patient. If VL and TB results could be also fully integrated in the EMR, this process would be complete and very helpful to the staff.
More generally and according to all services, the access to patient information is quicker than before, thanks to the easy way to look for a patient file. The time gains have not been measured though.

Data accuracy, reliability

This section goal is to identify if the EMR allows end users to avoid mistakes due to data reliability and to understand how, if the case may be.
Compared to the previous situation, the EMR helps to read patient information (no doubt due to the writing or erasures) but does not solve all data reliability and accuracy issues. Most controls on the EMR data are done with the paper-based record which is not a safe way to triangulate information as it is even more subject to hazard. Coherence controls cannot be easily integrated into the EMR to make sure data, such as lab results, respect reference values or trigger alerts when passing the limits (i.e.: min/max). Currently, there is only a control on the admission date which cannot be in the future. Besides, data validation workflow only exists for the laboratory part, whereas clinical data can also lead to mistakes if wrongly encoded.

[5] CHK Inception Summary_CommDG_Version1_CommDG

The EMR monthly meeting helped identify some flaws in the completion of patient records, mainly in IPD, and to schedule a reframing session between the EMR team and the staff to insist on how the forms have to be filled in. Both the workload and lack of availability of computers were indicated as the main issues to perform these tasks properly every day.

Administrative workload for data processing

The issue raised here is that of the speed of end users' daily work, of the potential time gains and their evolution since the beginning of the EMR implementation in CHK.
Overall, the EMR is considered as a lever for efficiency in the long run. Currently, time gains are noticed in every team, at least to look for patient records and information. Quicker lab results access is also time saving according to end-users. However, some parts of the workflow could be added to the EMR to materialise its strong potentials. The coexistence with the paper-based record among both IPD and OPD staff remains the biggest obstacle for the EMR to fully reveal its assets for the hospital organization.

Lab request management

The management of lab requests and results is the most appreciated functionality and the best integrated so far according to end users. It both has positive and concrete outcomes on staff work and patient care. Nursing staff does not have to move to the lab anymore to get patients' results to accelerate medical decisions, and lab staff does not have to interrupt their work to look for results. The EMR lab part mainly alleviates the mental workload of IPD nurses as they can stay in the ward, with patients, while not having to keep in mind to go and check their results in the lab.

Some lab tests though are still managed both in the EMR and on paper forms (VL, TB) because of epidemiology requirements and, as a result, generate additional administrative burden both for nurses and lab technicians. They could be integrated to the EMR to provide a unique procedure for every lab test, making no exception to the digitization of the lab part.

Besides, there are still some difficulties in the lab part when some tests requests in the EMR do not have samples or samples arrive to the lab without any corresponding tests request. This slows down patient care and often requires lab technicians to double the procedure.

Data analysis and reporting

This topic aims at assessing how data is used in wards (to what end) and if its quality level is sufficient for IPD and OPD staff to carry out their tasks safely.
Both in IPD and OPD, clinical data quality is perceived as moderately satisfactory to perform medical and paramedical daily tasks according to physicians and nurses. The coexistence with the paper forms leads to some confusing situations which have to be clarified between the different members of staff involved on a patient record. It causes loss of time. Also, a few reframing meetings had to be organized by the EMR team to explain the way forms have to be filled in, to avoid missing important data, and therefore loss of time. The impossibility to set reference values (i.e.: min/max and not only threshold) and set alarms if data are out of the limits also questions the quality of data which rely on human analysis only.

From a reporting point of view, the EMR is rather not satisfactory. The basic reports included in OpenMRS neither correspond to the general needs expressed by Brussels project team while choosing Bahmni[6] ("*customizable simple query-based reports on patient, service and hospital level*"), nor to CHK's needs[7] (mainly activity and staff-based report). This is why specific reports, one for each activity type, had to be designed and developed. These reports look like Excel sheets with an export of the database with filters on dates. The reports cannot be easily personalized and do not allow a sufficiently flexible activity monitoring according to the data of interest and the various changes of activity due to operational research.

In addition, while the EMR team indicates that monitoring, surveillance (or evaluation) and epidemiological purposes were disregarded among the EMR tool objectives right after the needs collection onsite, the expectation from the CHK end-users differed as they were not informed that these expected functionalities were out of scope from the inception of the project. Therefore, the potential objectives or expressed needs which are ruled out in the project should be notified to make the final objectives clear to everyone.

[6] Cf. Bahmni evaluation

[7] Cf. PT-SH-Software Adatpation KickOff Questionnaire_CHK_v1

Patients' safety and confidentiality

The EMR has to be appraised based on its contribution to data security and confidentiality and potential evolution on this aspect since the beginning of the implementation.
A paper-based file can be lost, opened and read by anybody. On the contrary, the EMR keeps data in one place and only allows authorized staff to access information: individual accounts were created for each user with personal passwords. Each user has a specific role associated with some access (read and/or write…) defined per functionality. The roles are set up by the EMR team who can change them according to the needs.

But new risks appeared with the EMR implementation. Patient files are easily exportable from the EMR to another format (PDF). To protect patient information, USB connections were blocked to prevent their extraction and their corruption by any kind of virus. The EMR team also worked with supervisors to raise awareness about these risks. But the major risk comes from the previous system: most of the EMR benefits in terms of data confidentiality are annihilated by the persistence of the paper file and this is perceived as contradictory among staff members.

As a conclusion, the EMR could improve significantly both patients' safety and confidentiality but, as long as the paper records is kept, previous risks will remain on this specific aspect.

Cohabitation with related softwares such as Tier.net and Fuchia

The introduction of the EMR in CHK has to be put into perspective with the prior existence of other softwares collecting patient data to make sure it does not create data duplication and if it has any consequences on the previous tools.
The use of several tools at CHK is not a problem for the end users as data is only consulted in one system (the EMR), Fuchia and Tier being activity monitoring tools fed afterwards with patient data extracted from paper records. To enable the follow-up of patients who already came to CHK, a data migration has been organised from Fuchia to the EMR, but it was incomplete as, for instance, neither the patients' name nor their history have been migrated. It required the staff to proceed to a full medical interview to collect history directly from the patient and to compare it to the Fuchia form. At the time of writing, the use of Fuchia should have been stopped at CHK, because the EMR has taken over the data collection of Fuchia at CHK level while making it available near real time which is an added value compared to Fuchia.

Tier is a longitudinal tool whereas the EMR is a cross-sectional tool. Initially, the EMR was supposed to monitor IPD patients only (unstable cohort) but currently monitors OPD patients as well (stable cohort). Tier includes data on both cohorts but collects less data. Both Tier and the EMR will coexist but, according to epidemiologists and to the operational research focal point, it remains unclear what the role of the EMR is going to be from an epidemiological point of view (as it monitors, like Tier at a larger scale, the CHK unstable cohort -IPD- and includes mortality causes).

Maintenance requirements

The topic appraised here is the organization of the EMR maintenance and its benefits in general. It is mostly focused on actions performed directly in CHK as the first action level is located onsite.
The Kinshasa EMR team and Brussels support team can solve some maintenance issues, first onsite, then remotely. The number of needed actions tends to slow down because the system is now better handled than at the beginning. The maintenance needs are therefore manageable.

From the beginning of the implementation, the Kinshasa EMR team was confronted to approximately 10 incidents due to an OpenMRS system malfunction for which ThoughtWorks was solicitated. If the Kinshasa or Brussels EMR team mentions an emergency, a solution can be found shortly by ThoughtWorks, but in general delays are perceived as rather medium to long (more than three days in general). As an instance, the problem of request length for reports once lab data have been migrated to the EMR took a week to be solved.

Troubleshooting and technical support

The organization of global end user support is tackled in this section as well as users' understanding of procedures and satisfaction.
The EMR team shows a great availability and know-how to solve most issues promptly. There is no specific procedure to bring an issue forward (like a ticketing tool for instance) but the staff members are helping each other when possible, before calling the Kinshasa EMR team thanks to the dedicated phone number displayed on every computer. This system currently works well according to end users.
If neither the Kinshasa nor the Brussels EMR team knows how to deal with an issue, the support team in Kinshasa or Brussels sends a ticket to ThoughtWorks which provides help by email or conference call.

As a conclusion, from an end user's point of view, the provided support is efficient.

Were training, accompaniment and support sufficient for users to properly utilise the EMR?

Training

This section first deals with the organization of training sessions provided by the Kinshasa EMR team and received by final users in CHK, and then with its adequation to end users' needs and computer skills (according to them) and the tools designed in addition to the sessions. Post-deployment readjustments of knowledge are not tackled below but in the support section and the data quality section.

The training of end users was organised in several phases to ensure users would be sufficiently skilled to master the EMR. First, an evaluation of everyone's computer literacy level was conducted and led to a split of users into groups level. The firsts groups received a basic computer training provided by the MIO data modelling analyst and the Brussels eHealth manager to be able to type, open a file, print easily. They joined the other groups for the EMR training, provided by the Kinshasa EMR team.
This training consisted in both theoretical explanations and practice for users to manage a concrete situation. Training session were difficult to organize due to activities organization and to the quantity of work among teams in CHK. Therefore, approximately three two-hours sessions were scheduled with each team. However, there were many exceptions to the duration of an average session and the EMR team had to adapt a lot. Many staff members received individual but shorter training session. This was also the case for newcomers and when a new bunch of functionalities required an update of users' skills. It allowed to train each and every user while preserving patient care, but caused some discrepancies of skills and also of information between staff members, which are still visible today as processes are not mastered equally.

To complete the training sessions, some user guides were developed by the Kinshasa EMR team, but, because of the tool quick evolutions, they soon became outdated and have not been replaced yet. Also, most users did not know about user guides existence and could not use them as a consequence. The EMR team waits for the implementation of future improvement to update the user guides. Also, to help users improve their computer skills, some simple applications such as a typing training module. It was most appreciated by end users but finally, most of them do not have time to train.

The provided training was globally sufficient for the users to utilise the EMR but could have been more efficient if the follow-up initiatives were more adapted to CHK organization and workload.

Support

The way support is organized for end users is appraised below and includes the process in place, the potential documentation provided and the role of the different stakeholders.

There are 2 levels of support: Kinshasa, with the EMR team, is the closest from end users and also the first intention support; Brussels is the second intention support level. As understood, most support requests are tackled at first level. Information on support activity at Brussels level was insufficient to be assessed.

Support requests do not respond to a specific process but a dedicated cell was put in place to deal with them. Within the EMR team, a support agent was recruited to address support requests. Inside the EMR office, a dedicated telephone is installed. The phone number is indicated on each computer in use. A good practice sheet is also displayed in every room. Also, a chat service, Gitsy, is installed on every computer: it was supposed to be a simple means to contact the EMR support and to create a sort of community among the staff to get patient information more easily. However, this chat service is not adapted to the staff as their availability to ask or answer questions online is not compatible with their work. Therefore, this tool rapidly lapsed.

The entry points for support requests are essentially phone calls and direct questions (face to face), considering CHK is a small place where buildings are very close to one another. Also, from habits and culture, staff would rather go and ask directly someone than they would use digital means to contact them. These means allow users to get quick answers to their issues. For all these reasons, a ticketing tool is excluded by the Kinshasa EMR team.

Currently, the Kinshasa EMR team tackles an average of eight requests a week, without very basic requests which can be solved easily by phone. This figure tends to double following the release of a bunch of new functionalities, situations which turn to be more difficult for the EMR team to deal with from an availability point of view. The EMR team reactivity was evaluated as generally good by users.

As a conclusion, support for the EMR is globally efficient in the current framework but would not be adapted if the number of end users was growing.

To what extent is data quality ensured?

This section tackles the issue of data quality, not from the usefulness of the EMR point of view like above, but from a process point of view. The existence or not of validation workflow, coherence controls, end users' techniques to check data consistency are assessed below.

Currently, only the lab results included a validation workflow. It consists of a validation step before lab results are made available to OPD and IPD staff. However, for availability reasons, the validation is done by the lab technicians, who encode data, and not by the supervisor which gives less value to it (the absence of a second opinion on encoded data, can let more mistakes go through). Still, it remains a way to double check data. Clinical data are not validated this way and are immediately accessible.

Apart from a format control (date, number, text, choice), the EMR does not include the possibility to set up coherence controls for variables. For instance, for lab results, there are reference limits above or under which results are considered critical. They cannot be integrated to the EMR: therefore, the control of data and the evaluation of a patient general condition, is only based on human visual control.

Because there is no concrete way to identify incoherent data within the EMR but that it coexists with a paper-based record, staff checks data consistency comparing the two sources. And most confusions come from a data discrepancy between the two. Data have to be checked by contacting the encoder, an information which is not always easy to find as forms cannot all be "signed" by the encoder. The need for data triangulation causes loss of time and delays in the patient therapeutic care.

However, one major incoherence identified very soon after the EMR launch has been solved by reinforcing the knowledge of a process. Sometimes, whereas a patient already came previously to CHK but does not mention it to the staff, they would create a new patient file with a new ID and insert new data in it. It prevents the staff to access the patient's history, previous treatments and lab results collected during its first CHK visit and it causes a real loss of time in the re-initiation of care. Once the problem is identified, the medical team would choose the right file to continue care and the additional ID would be reallocated to another patient. To avoid such situations, the EMR team organized a reframing session where they insisted on the process to follow before creating a new patient file: looking for the patient in the system thanks to his name and ID (if the patient has his card), and if no file shows up in the results, then creating a new one. Since, such incoherent situations are less frequent, but it cannot prevent patients from giving a different name while they already came to CHK.

To what extent is the risk of unavailability of the tool managed?

The risk of unavailability of the tool is assessed through the prism of the existence or absence of a business continuity plan, its maintenance and diffusion among the staff.

The major risk in CHK, and especially for desktops users, is the power cuts, which happen several times a day. This risk was identified before the EMR launch and anticipated thanks to the implementation of inverters which allow users to continue to use the computer and finish what they started to do safely. They are used on a daily basis and respond to this main risk.

However, this measure is the only active one for now and is not included in a broader business continuity plan (BCP) at CHK scale. Normally, as an organization with high risk activities, CHK should have a BCP but does not seem to have one to which the EMR BCP could be integrated to deal with risks at the right scale. The EMR BCP is currently being written by the Kinshasa EMR team and Brussels project manager. The draft document shows the categorisation of risks, the maximum accepted time to come back to normal before triggering the "alert" and fail soft-mode, and the different actions and stakeholders which would be involved. At this stage, it is not clear whether this document focused on the EMR will feed the (future?) CHK BCP and work with it, neither how it will be implemented among the staff or how it will be maintained to be viable when needed.

Currently, the risks for the EMR tool to be unavailable are partly and insufficiently managed.

What can be done to make the EMR project more effective?

Onsite, interviewees were asked about the approach used for the EMR implementation and their potential wish to change it in order to improve the project outcomes.

One main axis can be identified to improve the project, and several sub-axes stem from it.

The global project approach works in a top-down direction and even if end users are involved since the beginning, the global goals were defined by MSF OCB team (not only the eHealth team) and then agreed with the Congo mission and the SIDA project. To reach one objective, there are multiple aspects which have to be examined to reach an efficient implementation. When a functionality is tested by the EMR team and put into its context, sometimes, it does not fit the process or something blocks, and it has to be better explained and redeveloped if need be. It causes a loss of time and sometimes has a deceptive effect on future users because the implementation is delayed or does not correspond to the needs or constraints. In the EMR project, the precise analysis and specification phase were insufficient to have an efficient implementation.

This observation matches a frequent remark from all end users who mention the incompleteness of the EMR tool both in terms of functionalities (even simple ones), of ergonomics (information display not at the right place) and of data available for input (i.e.: no possibility to specify the information when you choose "Other" in several dropdown menus). That is why the paper-based patient record is currently maintained: the EMR cannot fully replace it while end users call for a definite choice between paper and digital record. This intermediate situation, though reassuring, is contradictory and generate confusion among users regarding the real goal of this pilot. More concretely, the coexistence of both systems is too burdensome to be managed on a daily basis and reduces the EMR positive effects: procedures are often doubled, divided (partly in the EMR, partly on paper, like some lab tests) or delayed (like data encoding in IPD), it sometimes slows down the work by causing doubts (EMR data not corresponding with paper forms data) and it maintains risks which could be ruled out by the EMR.

The lack of a good initial analysis of the workflow also translates in the way the allocation of digital equipment was done in IPD. The needs were far underestimated (quantity) and wrongly estimated (type). Because desktops were prioritized, the encoding of data is made twice, once at the patient bedside and once in front of the computer, with a doubled risk on data reproduction. Because there are only two computers in the admission part and most of the time four or more staff, it is very difficult to have a timely data encoding. Because IPD staff is working in a permanent emergency situation (few hours to analyse a patient condition and to determine what therapeutic regimen can save them), and with few available computers, there are frequent oversights of session logout with risks for traceability or even identity monitoring.

Therefore, a better and deeper insight on the needs and workflow is key to improve the project effectiveness.

EFFICIENCY

Were activities/strategies implemented with the best use of available financial resources and time?

This section first tackles the way the project is monitored since its inception from a financial point of view (planned full budget, actual full budget, budget to come, recurrent and one-time costs…).

From a financial point of view, there is no evidence showing a monitoring of the overall costs of the CHK pilot and, a fortiori, of the EMR project (absence of budget plan, either on the short-term or the long-term).

Bahmni was chosen among other solutions identified, mainly open source solutions, but as other sections of MSF had a good experience with the tool, it rapidly appeared it would meet most expectations and that intersectional work for Bahmni development in a long run perspective could be envisioned.

ThoughtWorks invoices are tracked monthly with the total amount of hours per consultant. An additional cost of 7 to 8% of the total planned budget dedicated to the realization of the first three releases was accepted during the project via an amendment to the initial Statement of Work. It is not clear that a limit had been set prior the beginning of the project. The cost of equipment needed onsite are also monitored on an annual basis and the planned needs (equipment, training, staff) are also estimated for the project (quantities), but not in terms of budget. Also, the EMR evolutions are effectively prioritized and discussed with the project team in Brussels but the provided documents do not show any dedicated provisioned budget for the project.

Also, for the EMR maintenance which cannot be done by MSF staff, ThoughtWorks did not provide any maintenance contract: it is included in the Statement of Work that a fixed number of consultants for each period is available for the project whether it be for maintenance, support or development. The fact that maintenance cannot be estimated apart is problematic for the project follow-up and could be a reason why the overall initial cost was exceeded. MSF OCB has already asked ThoughtWorks to change the way this part of the contract is dealt with currently. However, even if ThoughtWorks appeared sustainable when MSF investigated, ThoughtWorks' dependency on ThoughtWorks worldwide may affect its ability to be able to propose another way of organizing maintenance (incomes have to be more stable).

This section also deals with the management of skills development and autonomy globally (for the EMR team as a whole – Kinshasa and Brussels –, and for end users). Thus, it includes the initial training provided by Bahmni to the EMR team, the progressive knowledge enhancement of the EMR team, the division of skills between MSF and ThoughtWorks, the training provided by the Kinshasa EMR team to end users and its effectiveness at large.

It appears that staff members who most need to master the EMR did not receive a full training on the tool. The initial training given by ThoughtWorks was attended by the EMR Tech lead from Brussels who deals with support and by the person who was in the CHK before the EMR team was recruited but who is not part of the project anymore (MIO data modelling analyst). The current team mostly learn in an autodidact way thanks to Bahmni documentations and Google searches. A few-months handover was also organized between the actual eHealth manager and his predecessor in the CHK, the MIO data modelling analyst. The current Kinshasa EMR team is still learning about the tool although they are more autonomous than at the beginning of the project, mainly for simple setup (add a variable) or software administration (create account, modifying rights and accesses). The transition could have been more efficient but also the global current knowledge better mastered if a full initial training had been scheduled for the current team.

About skills division, there is no document between the Kinshasa EMR team, Brussels support and ThoughtWorks formalising each other's areas of competence: everyone knows what he can or cannot do and escalates the request if needed. When ThoughtWorks is solicited, they offer simple but timely support via email (explanations, documentation) and sometimes organize a session to share screens and explain more concretely a procedure. This can work as long as the current staff remains in the project but cannot be sustainable if there were to leave and be replaced. Also, the skills should be split up according to where they are needed and not according to who received them.

Regarding the training dedicated to onsite end-users, skills development and maintenance is organized by the EMR team but lacks an overview of mastered or unmastered skills among the staff, be it a basic computer skill or a specific EMR skill. Each newly arrived staff member is being trained, each new release of functionalities is preceded by an ad hoc training for every concerned end-user. There was no assessment of the different trainings given since the beginning, either initial or ad hoc trainings. The EMR team identifies the potential flaws of the training afterwards, according to the kind of support request they receive. When some questions are recurrent, they are tackled during monthly reframing meetings. This allows a quick answer to end-users needs and issues, but remains a short-term one. An evaluation or test would bring an overview and could help the EMR team organizing workshop of skills reinforcement for staff which could increase their long-term efficiency in the EMR use.

In conclusion, the situation, though working now, lacks long-term perspective and anticipation.

To what extent existing financial and technical MSF resources have contributed to the EMR implementation?

This section highlights the resources used inside MSF for the EMR implementation in CHK context.

It appears that MSF mostly uses existing skills, which were completed on site, and equipment resources.
To implement the EMR, MSF hired two persons in the CHK: an eHealth manager and a support agent, that is to say two full time equivalents (FTE). In addition, at the beginning, another person, the MIO data modelling analyst, helped identifying the needs and evaluating end-users' readiness during half a year (the eHealth manager predecessor). Globally, onsite, 2,5 FTE can be considered for the EMR implementation. In addition, the current supervision of the project and part of the maintenance and support is made from Brussels, which can be considered as 0.5 additional FTE. As a whole, approximately 3 FTE are dedicated at MSF to the EMR implementation.

General equipment, servers and hardware are also provided by MSF, either via third party suppliers in Kinshasa or via internal resources (logistics and IT mainly). Their maintenance is mostly done onsite or at least, within the Congo mission which reduces costs.

What efficiencies can be identified in the EMR implementation could help further deployments in terms of cost reduction?

This section intends to identify if any indicators are monitored since the beginning of the project, such as the cost per patient or the average time needed to treat a patient.

If these indicators exist at the scale of CHK and are monitored by the HIV project, it is too soon to analyse the situation and to link them to the EMR introduction. The EMR implementation in OPD only dates back to mid-July 2018 and in IPD to end of August (with many changes until mid-October): staff is barely coming out of the running-in period and, the EMR use will only start to be more stable as of November. These elements should rather be measured after a six-months period of stability and then again in a year to observe evolutions. One limitation will have to be considered though: the

tool will continue to evolve in the following months, with new functionalities, therefore this evaluation design should be able to take into account the way these changes can affect the analysis of these indicators.

IMPACT

What impacts does the EMR implementation have on end-users' daily work ?

This question first tackles different aspects of end users daily work, such as their relationship with patients, with colleagues and the speed of their tasks.

The EMR implementation impacted end-users' differently according to the ward they work in and according to the position they have.

First, concerning the relationship between staff and patients, the EMR did not have a big general impact, the human link being preserved in every situation. In some cases, in OPD, one can consider that it brings a positive aspect: consultants observed some curiosity from patients and sometimes that the EMR helps raising patients' awareness about their condition by allowing them to see their evolution for instance.

Second, concerning the relationship of staff with their colleague, the EMR brought two changes. The first one is that the EMR channels tensions which can emerge from an error of data encoding as it allows a full traceability of data modifications: there is no doubt anymore about who did what and when. The second one is that it generally reduces disturbances in each other's work, increasing the capacity to stay focused and therefore the quality of the work. This statement only has to be qualified regarding the IPD where too few tasks were digitized to observe such an evolution. The EMR channels tensions which can emerge from an error of data encoding as it allows a full traceability of data modifications: there is no doubt anymore about who did what and when.

Third, concerning the speediness brought by the EMR use, the findings are mixed. The triage, laboratory and OPD staff clearly stated that the EMR accelerated their daily work. The pharmacy and IPD staff on the contrary rather feel to lose time globally.

This leads to the main benefits and defects highlighted during end-users' interviews, as they draw on the previous feelings and perceptions.

BENEFITS	DEFECTS
- Better data management: retention, preservation, traceability and storage	- Default in ergonomics (important data not easily accessible)
- Unity of the information source	- Default of consideration of epidemiology needs
- Better identity monitoring	- Uncomplete migration from Fuchia (no patient histories)
- Efficient communication with other wards (timely data, harmonised formats, utility of every data)	- Lack of flexibility in the set up (lack of autonomy of the EMR team)
- Time saving for file creation and research and for lab results access	- Uncomplete tool (no alert system for alarming lab results, workflow for a lab request partly included)

The biggest concern of end-users is the continuation of the paper-based patient record system which really prevent the EMR from delivering all its benefits. That is why the EMR is only perceived as a *potential* time saver at a general scale. Paper is still needed for some requests to specify some information (lab analyses such as VL or TB, PSE sessions, prescriptions) which are already included in the EMR but not fully. Some workflows were also partly integrated to the EMR (PSE sessions report, request of samples to the nurses in IPD and the hospitalization monitoring are excluded from the EMR) which implies that the paper record remains. Paper is also maintained by the EMR itself where forms can be printed once filled in and attached to the paper record. The coexistence of both systems often creates confusion regarding data reliability among the staff which has to double check it to avoid errors. In every case, it generates an increased work load particularly blatant in IPD, where the encoding is mostly delayed compared with the actual data collection time, and in pharmacy, where there can be up to 3 sources of information (voucher – currently maintained for activity and stock monitoring –, patient, EMR) and where the validation of drug dispensing is made twice.

On the other hand, the EMR clearly alleviated some great difficulties encountered in CHK before its implementation. First of all, the amount of time spent on looking for a patient file or for information in a patient file or in other wards decreased by up to 70% according to some staff members. Physical moves towards other services, and mainly to the

lab, do not occur that much anymore, except to reach for the EMR team support or to confirm an information in case there is some confusion. This allows more continuity in everybody's tasks and automatically reduces the risks of oversight, of errors in data encoding or in medical decision.
Second, the EMR preserves traceability of patients records and of data in a patient record. Before its implementation, every day records or data were lost or forgotten somewhere and could not be retrieved. It caused a slowdown in patient care and a duplication of some medical examinations or lab tests in the best cases, but could also lead to a patient's death because medical treatment was put in place too late in a patient with severe condition. The EMR accelerates and preserves data availability for every staff member, allowing a timely patient care.

Does the EMR implementation have any unforeseen positive or negative impact?

This section aims at identifying real impacts which were not anticipated by the project team, especially focused on processes. It also appraises the processes which were put in place as a reaction to observations or difficulties encountered by users.

The EMR team clearly identified resistances for each category of user involved in the project (from end-users who encode data up to CHK management). They followed-up with future technical solutions, support, pedagogy on that which presented a higher risk for the tool adoption (extra work, habits changes, cumbersomeness of procedures). This strong accompaniment eases the tool adoption and explains why, overall, the tool is rather perceived positively by users.

However, the EMR implementation also revealed the need for new procedures.

First to respond to new anticipated risks. The EMR brought in computers between patients and staff. They may transmit germs and diseases as they are supposed to be used by several staff members also in direct contact with patients. Therefore, since the EMR implementation has begun, keyboards of desktop computers and for laptops, keyboards and touchpads are protected with plastic protections to reduce the risks of transmission, following recommendation drafted in dedicated SOP by the Infectious risk advisor. This solution has been put in place by the Kinshasa EMR and logistics teams.
However, several logistics and organisational flaws can be mentioned, leading to a loss of the meaning of this process. First of all, the cleaning of these protections was only tackled as of September 2018 and the hygiene team only got involved at that stage. It was decided that the protection cleaning would be assigned to each team, and not to the hygienists. Supervisors were involved to inform their team about the new process. Depending on the ward, protections are not put on every computer which shows the process is rather less respected and that a leader on that topic is missing. Then, the SOP document is too general or not adapted to the CHK situation: desktop computer mice are not protected, the recommended cleaning product being liquid, logistics and EMR teams decided to replace it with computer wet wipes which are not disinfecting.
Considering that this new process is not working well, monthly hygiene meetings are attended by the Kinshasa EMR team since September to find a better solution between EMR, hygiene, logistics teams and supervisors.

Second, new procedures were needed to respond to some difficulties which were not anticipated. For instance, the lab noted that the number of impossible analysis increased due to a workflow problem, mainly in IPD: some tests requests in the EMR did not have samples or samples arrived to the lab without any corresponding tests request. This was identified and discussed during a monthly meeting the EMR team holds with each team.
The problem came from the fact that, although the physician could ask for a test in the EMR, the nurses had no way, apart from oral transmission, to get the information, and thus, did not send any sample to the lab. The solution found was to add at each patient bedside, along with monitoring paper documents a table where physician tick the tests they ask for in the EMR so the nurse knows what to do and ticks again the cell when done. The transmission of this new process was done from the EMR team to the supervisor who forwarded it to the staff.
However, this appears as a temporary solution because, as long as this process is not fully integrated to the EMR, there will be oversights from IPD physicians or nurses who already work in a permanent mentally stressful and demanding context and can forget.

Third, to change a pre-existing workflow which does not work properly anymore. Regarding activity monitoring, previously, the consultants, care assistants or psycho-social advisors were in charge of their daily, weekly or monthly activity report to their supervisor thanks to their register. With the EMR, most registers do not exist anymore and activity monitoring reports can be generated in the EMR and accessible to supervisors. But consultants, care assistants and psycho-social advisors are still in charge of the reports which requires to keep track of their activity manually as they cannot access the reports.
This was not anticipated and it is currently discussed with the supervisors to transfer this task to them directly. However, reports are not that flexible today and cannot be easily filtered or tailored according to the data you are interested in.

The task transfer will thus only be possible once every needed report is implemented in the EMR.

These elements show that, even though, they could have been better anticipated or implemented thanks to a deeper analysis of pre-existing process and habits and stakeholders, users' feedbacks are considered and identified issues are being tackled.

REPLICABILITY

What are the prospects of replicability of the EMR project in other MSF settings?

This section tries to identify the motives for the choice of CHK as a pilot site for the EMR, whether they are dependent or independent from the specific context of Kabinda, and, from them, to identify the conditions of replicability of such a project in another context.

The CHK was chosen, following a roll out on pilot sites, for macro and micro reasons, dependent or not on CHK, and these reasons should be kept in mind to envision another similar project.

From a macro perspective, the CHK context is simple as they deal with one big pathology (HIV), implying a limited data collection. This is the main enabler fully dependent on CHK, but it is not enough to facilitate the project: therefore, the following criteria for replicability should also be looked for carefully.

From a macro perspective, the EMR implementation was greatly facilitated by the fact that the CHK is a 100% MSF organization: there was no external stakeholder, public or private, to deal with which brought a greater freedom of action. From a micro perspective, the choice of the tool being made before that of the site of implementation, a screening of the issues in CHK was done to know if the EMR could help solving them. Also, the infrastructure was already implemented (pre-existing local network) and required few improvements to allow the EMR use. Finally, there was a certain user-readiness in the CHK as most end-users were already familiar with computer use, and welcomed such a project. These are the condition for replicability which should be looked for in other contexts.

Are there any specific enablers/obstacles inherent to the context of DRC/Kinshasa on the one hand, and to the MSF HIV project on the other hand?

This question attempts to identify in the overall context of the pilot if some of the specificities help the EMR implementation or make it more difficult.

On the one hand, the context of DRC does not bring enablers for the project. From a political and regulatory point of view, the situation is rather neutral (no legislation or political will in favour of healthcare digitization is helping or complicating the project). From a technical point of view, theoretically, DRC provides a high-speed network in Kinshasa, but concretely, organizations cannot rely on existing infrastructures and have to put in place local network to ensure a certain level of service.

On the other hand, the context of HIV is both an enabler and an obstacle. It is an enabler because, in the CHK, it is combined to operational research which creates specific needs for which the EMR can provide some help: therefore, this context brings an opportunity. But the context is also an obstacle to the EMR implementation because the type of patients treated in the CHK (with very critical conditions) requires the CHK to provide care continuously whereas the introduction of the EMR requires a transition period. This period was difficult to find without impacting too much usual activities, mainly in the laboratory (constant flow of analyses) and in IPD (24/24h 7/7d activity).

What long term problems can be identified and how have they been taken into consideration?

This section appraises the sustainability of the CHK project, including from a financial point of view, mainly through the assessment of the work carried out on risks identification and anticipation.

On the one hand, potential issues linked to the CHK context were identified and anticipated by the EMR team. It includes risks of non-adoption of the tool, risks concerning the infrastructure robustness, risks of organisation (adaptation of the workflow to the tool and of the tool to the workflow) and risks linked to the inconstant activity load due to research activities.

On the other hand, some key elements are missing to ensure a good project management and control on a long-term basis.
For instance, today, there is no document showing that a planned annual budget is dedicated to the CHK pilot or, at a larger scale to the EMR project, and that limits were set. The needs of the project from a material and HR point of view for the year to come are defined, but not in terms of budget.

Also, the main needs of evolutions for the EMR itself (i.e.: a roadmap) and a corresponding planning are not available. A document gathering the users' feedbacks and their prioritization is currently being elaborated by the EMR team with the support of Brussels but does not aim at giving a long-term view of the tool functionalities. This is mainly due to the way feedbacks are collected during this first year of implementation: over monthly meetings with the different wards and over support requests which are continuous. Thus, the EMR tool lacks a main direction in its evolution which could, on a long-term basis, affect its coherence.
In addition, the choice to subcontract developments to ThoughtWorks while choosing a tool which finally lacks flexibility and requires a lot of adjustments to meet expectations, will maintain an important dependency towards the consultants for both support and evolutions. More specifically, the laboratory software, Open Elis, is not supported anymore which means that on a long-term basis, MSF will need to find an alternative (i.e.: ThoughtWorks would support it), creating potential additional recurring costs.

What local capacities and resources have been identified? How does the EMR implementation connect with these?

This section assesses how MSF uses its available capacities (equipment, HR, skills…) both on site and at headquarters level. It also identifies if some useful skills could be lacking.

First, there are available capacities which are already identified and used. IT and logistics teams already existed before the EMR project started and have been naturally involved in the EMR implementation on site which avoids the use of external and costly resources.

Second, there are available capacities which are under-utilized. The servers maintenance is partially managed on site but the Kinshasa EMR team could fully deal with it as one team member is skilled in servers administration. This could provide a timelier answer by allowing access to the logs or a switch from the active to the passive server in case of emergency, situations which are currently managed from Brussels via SSH.
To assist the EMR team in its support missions, some "champion users", already identified and involved for beta-tests, could help them in each service, becoming a referent or focal point for their own team. To make it successful, these people should be fully engaged and supportive of the project which could be the case if the medical needs were met by the EMR. Currently, the EMR partially meets the clinical and paramedical staff's expectations and is still evolving a lot. Therefore, it is too soon to involve "champion users" that much but this could be considered as a mid-term objective.

Third, there are some lacking or unmastered skills in the Kinshasa EMR team which could daily support the project. This includes back-end skills to improve and reduce diagnostic time during troubleshooting (high priority), business analysis skills to better analyze end-users' functional needs and elaborate more precise specifications (high priority) and training skills to have an appropriate approach with each end-user (lower priority). These needs imply additional trainings for the EMR team or, at least, its mentoring by skilled MSF staff during a period of time. Focusing on the EMR, one of the main lacking skills which could have an important added value for the CHK is the management of the reports module (how to create or modify one). This would imply a skills transfer from ThoughtWorks to the Kinshasa EMR team, so that the skill would be the closest possible to the end users who express their needs.

As a complement, some external resources could be useful during some periods when usual resources are overburdened, such as the releases of new functionalities. First, the EMR team could be assisted by an extra person to fully test the new workflow while the other two would continue to focus on users' support which tends to increase a lot after a new release. Second, in the different wards, an extra person every six staff members could reinforce the departments during the transition period: people can have more time and less pressure to acquire knowledge and get use to new functionalities.

CONCLUSIONS

The evaluation leads to the following cross-sectional conclusions.

On the one hand, some positive aspects have to be underlined.

First of all, the EMR brings to CHK a means to solve one major issue, that of data management which was very poor before the tool implementation and caused serious damages in terms of capacity of the hospital to take care of patients. Now, the unique storage place and the digitization of data ensures data traceability and a quick access to patient information anytime, anywhere. This last point especially improved in the lab part.

Second, the EMR project benefits from a local project team whose efforts focused on end users, in terms of training, support and follow-up (feedback), bring satisfaction and an overall adherence to the project. A good reaction capacity must also be noted to solve technical issues and work on alternative or temporary solution.

On the other hand, some aspects did not work well and could be improved.

First, a sort of ambiguity concerning the EMR governance remains at management level. Concerning the project financial management, there is a potential lack of a global vision including all aspects of the project (MSF own investments onsite and at Brussels (HR, equipment, maintenance, training…) and third party delegated parts), thus weakening the project replicability chances of success and certainly leading to greater costs compared to what could be expected. About the EMR goals, there is a lack of concordance between the medical coordination, the technical team, the epidemiologists and the project team. This translates into a lack of general coherent information at the end users' level which prevents everyone to have a common perspective for the EMR and to head for the same objective.

Second, the project initially begun in a top to down dynamic: the tool was chosen according to general needs for MSF OCB, with a view to more intersectional collaboration, and then, a pilot site was chosen and their needs identified to see if it could fit into the tool. This caused two different issues: firstly, a lack of deep analysis of the field real needs which manifests today through the coexistence with a paper-based system, some workflow and equipment issues but also through the tool incompleteness; secondly, a sensible feeling of confusion among end users when seeing such issues, which affects their commitment to the project.

Third, the EMR tool already shows its limits in terms of flexibility, a conclusion which can be considered a threat to the project replicability as it maintains a high level of dependency on the solution provider. The reports module cannot be set up according to the needs of (frequently changing) activities. Therefore, the activity monitoring can be done on the EMR only for recurrent activities and may also require a change in tasks assignment (from staff and supervisors to supervisors only). Another difficulty in the EMR is that, while it collects health data which often respond to reference values, coherence controls cannot be set up easily (no conditions between variables, no max/min limits, no alerts to highlight an abnormal result) to check the data. It appears as a flaw in data reliability.

The EMR project shows contrasted results which can be the bases of recommendations to be implemented to improve its outcomes, or in the perspective of another project.

RECOMMENDATIONS

As this evaluation falls within the perspective of other EMR implementations, the followings are voluntarily stemming from Kinshasa experience and propose ways to even better integrate the EMR in a future project. They are presented from a macro to a micro perspective, the last one being short-term-oriented and the simplest to take into account, but all are interdependent.

⇒ Recommendation 1: The steering committee should strengthen the project governance, that is to say make sure to involve the right people at the right level (i.e.: project epidemiologists should discuss more with Brussels, ICT should remain involved in the technical solution choice and maintenance). This will help clarify the goals and bring more coherence to the project, but also to increase the chances of success of another similar project.

⇒ Recommendation 2: For future improvements or project realization, recommendation 1 should lead to a solution that better defined the EMR objectives and expected results, and its potential adjustment to field/activity requirements . To achieve this, at the outset of the project or at least during a project shift or transitional period, both project management and ICT should focus more on:

1. identifying appropriate selection criteria for the solution and provider to limit flexibility issues and dependency level;
2. identifying and thoroughly understanding current workflow, sticking points, needs and to design a detailed solution taking the overall situation into account (workflow and workload included).

⇒ Recommendation 3: On the basis of the previous actions, project management should be able to improve communication of the strategic information at all project levels, but especially towards end users to make everyone commit to the project. From the moment end users are getting involved, the information provided should be precise to enable them to look to the future with a concrete idea of the final objective and should leave no ambiguity regarding the framework the project is part of.

⇒ Recommendation 4: As soon as possible, both steering committee and project management should prioritize the full transition to a unique system, that is to say not to leave end users use two systems (i.e.: paper and digital) at the same time. In CHK context, it means to complete the EMR functionalities/variables to abandon paper where possible (lab tests like TB or VL, pharmacy prescriptions). In future situations, it means to aim covering more tasks which are linked together as of the first release, thanks to the digital solution, to prevent the dispersion of end users' actions.

⇒ Recommendation 5: Project management and logistics should be very attentive to equipment needs in wards and should scan very precisely from the inception of the project the quantity and type of required hardware. This implies having a clear view of the workflows to simulate a real situation and identify the opportunities for optimisation.

ANNEXES

ANNEX I: TERMS OF REFERENCE

Introduction of Electronic Medical Records (EMR) in Kabinda Hospital, DRC	
Commissioner	Team Leader of eHealth Unit, Pierre-Louis Mercereau
Evaluation Focal Point	EMR IT Project Manager Dirk Gillebert
Evaluation Referent	Yann Libessart, Stockholm Evaluation Unit
Consultation Group	Pierre-Louis Mercereau, Dirk Gillebert, Armand Sprecher, Gilles van Cutsem
Duration	1 month

BACKGROUND

Field missions (Tabarre, Kundunz, Kinshasa) have expressed a need for an electronic solution to help them with treatment path and patient follow-up. Concerns were stated about the ability for the field to continue providing quality care while facing the growth and complexity of their activities. While this causes more acute issues in larger facilities, smaller projects too have expressed their interest in a system to streamline their medical operations through the digitalization of patient file.

In response, a project was created to introduce electronic medical records (EMR) in a wide variety of OCB projects, starting with 2 pilot projects including Kabinda Hospital (*Centre Hospitalier Kabinda* - CHK), which is part of the Project SIDA in Kinshasa and includes an IPD for acute patients and an OPD for the follow-up of patients with high viral loads.

PURPOSE and SCOPE

The EMR is currently being implemented in Kinshasa as a pilot project through 4 different phases from December 2017 to July 2018. Findings of the evaluation should focus on implementation and recommendations on potential adjustments, in particular towards a second pilot in Egypt and rollout in large OCB hospitals planned for 2019.

Ultimately, EMR aim to directly support the work of caregivers through the improvement of medical data processing and information flow, and subsequently the quality of medical care. A second evaluation could therefore be conducted at a later stage, once the EMR has been routinely in use for sufficient time at different locations, in order to assess whether those objectives have been achieved.

SPECIFIC OBJECTIVES

Assess the relevance, appropriateness, effectiveness, efficiency, impact and replicability of the EMR pilot project.

RELEVANCE

- *Have the objectives and expected results of the EMR implementation been clearly defined?*
- *Do the objectives of the EMR implementation correspond with identified needs?*

APPROPRIATENESS

- *To what extent does the EMR project tackle the identified issues?*
- *To what extent was the project team involved in the tool conception and implementation process planning?*
- *To what extent does the design of the EMR tool meet users' expectations in terms of ergonomics and content?*
- *Were appropriate and timely adaptations made in response to direct feedback or unforeseen issues during the implementation?*

EFFECTIVENESS

- *To what extent has the implementation been achieved?*
- *To what extent is the EMR tool perceived as useful in the following areas;*
    - *Timely data processing and access patient information (OPD, IPD, PSE)*
    - *Data accuracy and reliability*
    - *Administrative workload for data processing*
    - *Lab request management*
    - *Data analysis and reporting*
    - *Patients' safety and confidentiality*
    - *Cohabitation with Tier.net and Fuchia*
    - *Maintenance requirements*
    - *Troubleshooting and technical support*
- *What were reasons for achievement or non-achievement of the objectives of the EMR project?*
- *Were training, accompaniment and support sufficient for users to properly utilise EMR?*
- *What are the limitations/opportunities inherent in the EMR tool?*
- *What can be done to make the EMR project more effective?*

EFFICIENCY:

- *To what extent existing financial and technical MSF resources have contributed to the EMR implementation?*
- *What efficiencies can be identified in the EMR implementation could help further deployments in terms of cost reduction?*

IMPACT:

- *Does the EMR implementation have any unforeseen positive or negative impact?*

REPLICABILITY:

- *What are the prospects of replicability of the EMR project in other MSF settings?*
- *Are there any specific enablers/obstacles inherent to the context of DRC?*
- *Are there any specific enablers/obstacles inherent to the MSF HIV project*
- *What long-term problems can be identified, and how have they been taken into consideration?*
- *What local capacities and resources have been identified? How does the EMR implementation connect with these?*

EXPECTED RESULTS

- Report of 30-40 pages as per SEU standard format with key recommendations (English and French)
- Restitution of preliminary findings at DRC Coordination.
- Presentation at HQ in Brussels.
- Dissemination through websites and platforms: Tukul, Evaluation Unit.

TOOLS AND METHODOLOGY PROPOSED

- Review and analysis of project documents and relevant literature
- HQ Meeting/discussion/interviews with technical (medical, IT) and operational team members
- Direction field observation of the EMR and interviews with users

RECOMMENDED LITTERATURE:

- Evaluation of the Electronic Medical Record for Emergencies (EMR-E) in the Nutritional Programme in Bokoro, Chad, MSF Manson Unit for OCA, April 2016
- Practices to improve identification of adult antiretroviral therapy failure at the Lighthouse Trust clinic in Lilongwe, Malawi, Vorkas CK, Tweya H, Mzinganjira D, Dickie G, Weigel R, Phiri S, Hosseinipour MC.
- Reducing communication delays and improving quality of care with a tuberculosis laboratory information system in resource poor environments: a cluster randomized controlled trial, Blaya JA, Shin SS, Yagui M, Contreras C, Cegielski P, Yale G, Suarez C, Asencios L, Bayona J, Kim J, Fraser HS.
- Site readiness assessment preceding the implementation of a HIV care and treatment electronic medical record system in Kenya, Muthee V, Bochner AF, Kang'a S, Owiso G, Akhwale W, Wanyee S, Puttkammer N.
- E-health systems for management of MDR-TB in resource-poor environments: a decade of experience and recommendations for future work, Fraser HS1, Habib A, Goodrich M, Thomas D, Blaya JA, Fils-Aime JR, Jazayeri D, Seaton M, Khan AJ, Choi SS, Kerrison F, Falzon D, Becerra MC.
- Implementing medical information systems in developing countries, what works and what doesn't, Fraser HS, Blaya J.
- Success factors for implementing and sustaining a mature electronic medical record in a low-resource setting: a case study of iSanté in Haiti, de Riel E, Puttkammer N, Hyppolite N, Diallo J, Wagner S, Honoré JG, Balan JG, Celestin N, Vallès JS, Duval N, Thimothé G, Boncy J, Coq NRL, Barnhart S.

PROFILE /REQUIREMENTS for the EVALUATOR

- One evaluator available during 25 days, including 10 days for field visit in DRC during the first half of September 2018
- Experience on Implementing and/or Evaluating Data Recording and Data Management Initiatives in similar settings
- Demonstrable evaluation skills/competencies
- Public Health Expertise, with programmatic and preferably clinical experience in HIV an asset
- English and French Speaker

ANNEX II: LIST OF INTERVIEWEES

[First name, Last name, Title]	[Function]
Dirk GILLEBERT,	Project Manager
Rossen	IT leader (TBC)
Steering committee members	
Ramses DE NORRE	Tech lead
Gilles VAN CUTSEM	Medical Advisor & Focal Point for DRC
Nathalie TREMBLAY	Infectious risks Advisor
Gauthier ABDALA	eHealth Manager
Papy TEMBO NZITA	Receptionist
Elysée MANZIASI, Becker SUNGA	PSE
Esther OWANGA TAMBWÉ	OPD - Triage
Valérie CHALACHALA, Louis-Richard KANYONA	OPD - Nurse
Dr. Joëlle	OPD - Physician
Christian KALAMBA	OPD - Pharmacy
Eva MUNZIKA MUNTONDO, Michel BONDO, Prodige MBWALA	IPD - Nurse
Freddy MANGANA	IPD - Physician
Gentil LUSAMBA, Joseph KINIUNGU	Laboratory technician
Tony KALWANGILA	Physicians supervisor

ANNEX III: INFORMATION SOURCES

1) Documents reviewed

CATEGORY	DOCUMENT TITLE	COMMENTS (IF APPLICABLE)
Software assessment	Cohortfollowuptoolsreview-Report	
	Bahmni evaluation	
	Software assessment - Bahmni	
	Bahmni video and website	
	HIV_EMR system evaluation review interpretation.xlsx	
Feedback (during training and running)	Feedback Utilisateurs – S1	
Risk management	Potential_Actual resistance management	
	Stakeholder_s mapping.ppt&x	
	BCP v5	Provided on site
Support processes	180319-OCB Bahmni - Support Process (multiple documents)	
Objectives and requirements for the EMR (pre-inception and inception)	180212-Objectives for EMR in CHK v2.docx	
	CHK Inception Summary_CommDG_Version1_CommDG	
	Inception Summary	
	170520-Scope Statement Pré-Inception.docx - Shortcut.lnk	Cannot access / read the document
Training	Formation R3 and Formation R3B (multiple documents)	
	GUIDE UTILISATEUR IPD - GRANDES LIGNES-MEDECINS v0.0.1	Provided on site
	Guide utilisateur R3	
	Guide utilisateur Barhmni v1.0.1	
	Scénario Séance Pratique	
Data quality and control	Rapport qualité de donnée - encodage CHK Fev 2018 .doc	
	Baseline data	
	IPD_Data_Quality_REPORT (October)	Provided on site
Change management	Change management guideline	
	Change management strategy - v1_commDG	
Budget management	CHKSOW-Amounts invoiced	
	Chronogramme et Dépenses IT – ARO 2018 (2017 inclus) - CHK	
	ARO 2018 – BESOINS LOG EMR	
	ARO 2019 - Preps	
	180627-SOWAmendment_CHK_TW_OCBvf-SignedMSF	
	171218-SOW_CHK_TW_OCB-Signed	

2) MSF OCB Headquarter Interviewees

KEY INFORMANT PERSON/GROUPS	PROPOSED MEANS OF INVOLVEMENT	OUTLINE ISSUES TO BE EXPLORED
1. MSF OCB HQ team members		
Project Manager Tech lead	GoToMeeting interview	• Software selection method • Software setup organisation (ThoughtWorks (TW)/MSF) • Database design and management • Initial training organisation • Support and maintenance management • Dependencies regarding to third-parties (TW)
Implementor	GoToMeeting interview	• Software setup • Software deployment and maintenance
Steering committee members	GoToMeeting interview	• General objectives of the EMR • Strategic vision for the project • Project governance • Budget aspects • Dependencies regarding to third-parties (TW)
Infectious risks Advisor	GoToMeeting interview	• Prevention of infectious risks plan • SOP definition
Lab advisor **(not available)**	GoToMeeting interview	• Functionalities validation • Data collection forms validation • Involvement in tool evolution
2. MSF OCB SAMU team member		
Medical Advisor & Focal Point for DRC	GoToMeeting interview	• Functionalities validation • Data collection forms validation • Link with other MSF tools • Involvement in tool evolution • Perceived impacts during field visits

3) Field mission in CHK – Interviewees

KEY INFORMANT PERSON/GROUPS	PROPOSED MEANS OF INVOLVEMENT	OUTLINE ISSUES TO BE EXPLORED
1. MSF OCB on-site team members		
On-site E-health manager	Face to face interview / Demonstration	• Relevance with needs • Support and maintenance organisation • Training organisation • SOP for prevention of infectious risks introduction and monitoring • Feedback collection • Data quality management
2. End-users (number of planned interviews according to number of active users)		
Receptionists (1 out of 2)	Face to face interview / Demonstration of the EMR use	• Adequation of the tool functionalities regarding needs • Data reliability • Training adequation • Quality of support • Involvement in the tool evolution
PSE (2 out of 8)	Face to face interview / Demonstration of the EMR use	
OPD – Triage (1 out of 1)	Face to face interview / Demonstration of the EMR use	

OPD – Nurse (2 out of 3)	Face to face interview / Demonstration of the EMR use	• Perceived impact on day-to-day work • Perceived impact on quality of care • Perceived impact on relationship with patient • Perceived impact on relationship with other services / wards
OPD – Physician (1 out of 2)	Face to face interview / Demonstration of the EMR use	
OPD – Pharmacy (1 out of 2)	Face to face interview / Demonstration of the EMR use	
IPD – Nurse (3 out of 24)	Face to face interview / Demonstration of the EMR use	
IPD – Physician (1 out of 13)	Face to face interview / Demonstration of the EMR use	
Physicians supervisor	Face to face interview / Demonstration of the EMR use	
Laboratory (2 out of 6)	Face to face interview / Demonstration of the EMR use	

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