

MediCapt in the Democratic Republic of the Congo: The Design, Development, and Deployment of Mobile Technology to Document Forensic Evidence of Sexual Violence

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Abstract.

This review essay provides an overview of the MediCapt app and the steps Physicians for Human Rights has taken to design, develop, and field-test the app in the Democratic Republic of the Congo. It also explores advocacy opportunities that the app's emerging technology may facilitate down the road. This review essay also identifies the many challenges and questions that we have grappled with and lessons learned as we seek to deploy MediCapt in a low-resourced and politically unstable context and take it to scale beyond DRC. Finally, in sharing the details of this case study, we hope to

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emphasize both the promise of new mobile technology for human rights organizations as well as the significant legal and ethical responsibilities that accompany it.

Keywords.

Accountability, Sexual Violence, Mass Atrocities, Forensic Evidence, Medical Evidence, Atrocity Response, mHealth, mJustice, mobile technology, Human Rights, Justice

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MediCapt in the Democratic Republic of the Congo: The Design, Development, and Deployment of Mobile Technology to Document Forensic Evidence of Sexual Violence

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Introduction

This year marked the 70th anniversary of the verdicts of the International Military Tribunal at Nuremberg,¹ a milestone that precipitated the emergence of modern international criminal law.² Despite significant evolution in that body of law since 1946, it was not until 1998 that international courts and tribunals began prosecuting charges of rape during conflict as a grave offence in its own right.³ Even so, these cases remain notoriously difficult to prosecute. Many survivors of sexual violence choose not to report the violations for fear of reprisals, re-traumatization, community and family rejection, and economic hardship. And in cases where survivors do dare to come forward, their cases often fail due to lack of adequate evidence to support their allegations. This is true in international courts and tribunals as well as in judicial processes at the national level.⁴ The problem is especially acute in the Democratic Republic of the Congo (DRC), a country that has suffered war and profound violence for more than 20 years and has notoriously been described as the “rape capital of the world.”⁵

In response to this crisis, Physicians for Human Rights (PHR), a U.S.-based international NGO, launched in 2011 the Program on Sexual Violence in Conflict Zones,⁶ a multi-year training and advocacy initiative designed to reinforce national prosecutions for sexual violence cases. We train doctors, nurses, social workers, police officers, lawyers, and judges to enhance their technical capacity in two key areas: the provision of medical care and treatment to survivors of sexual violence; and the collection, documentation, analysis, management, and preservation of forensic evidence to support effective investigations and prosecutions of these crimes. Through multi-sectoral training, these stakeholders come to appreciate their respective roles in the judicial

¹ *Trial of the Major War Criminals Before the International Military Tribunal: Nuremberg 14 November 1945 – 1 October 1946*, (Nuremberg: International Military Tribunal, 1947), accessed November 22, 2016, https://www.loc.gov/rr/frd/Military_Law/pdf/NT_Vol-I.pdf.

² “70th Anniversary of the Verdicts of the International Military Tribunal, 01 October 2016,” *International Nuremberg Principles Academy*, October 10, 2016, accessed November 22, 2016, <http://www.nurembergacademy.org/events/70th-anniversary-of-the-verdicts-of-the-international-military-tribunal-01-october-2016/>.

³ The Prosecutor v. Jean-Paul Akayesu Case No. ICTR-96-4-T (1998) marked the first time an international tribunal (the International Criminal Tribunal for Rwanda) considered rape as a grave offence constituting a crime against humanity and an element of genocide. See “AKAYESU, Jean Paul (ICTR-96-4),” *United Nations Mechanism for International Criminal Tribunals*, accessed November 22, 2016, <http://unictr.unmict.org/en/cases/ictcr-96-4>. The Prosecutor v. Jean-Pierre Bemba Gombo ICC-01/05-01/08 (March 2016) was where the International Criminal Court for the first time fully recognized in a verdict the crime of rape as a weapon of war. See “Case Information Sheet: The Prosecutor v. Jean-Pierre Bemba Gombo,” *International Criminal Court*, July 26, 2016, accessed November 22, 2016, <https://www.icc-cpi.int/car/bemba/Documents/BembaEng.pdf>. See also Kelly D. Askin, “Prosecuting Wartime Rape and Other Gender-Related Crimes under International Law: Extraordinary Advances, Enduring Obstacles,” *Berkeley Journal of International Law* 21, no. 2 (2003), 288.

⁴ Nduku Kilonzo, et al, “Sexual Violence Legislation in sub-Saharan Africa: The Need for Strengthened Medico-legal Linkages,” *Reproductive Health Matters* 17, no. 34 (2009), 10-19.

⁵ “Tackling Sexual Violence Must Include Prevention, Ending Impunity – UN official,” *UN News Centre*, April 27, 2010, accessed November 22, 2016, <http://www.un.org/apps/news/story.asp?NewsID=34502#.WDC1A7IrKUK>.

⁶ “Program on Sexual Violence in Conflict Zones,” *Physicians for Human Rights*, accessed November 22, 2016, <http://physiciansforhumanrights.org/issues/rape-in-war/program-on-sexual-violence-in-conflict-zones.html>.

process, and we help cultivate sustainable networks of collaboration among medical and legal professionals who can work together across sectors on a case-by-case basis to better support the survivor at the center of the process.⁷ The program has been actively engaged in DRC and Kenya, as both countries have endured widespread, conflict-related sexual violence; both countries ratified the Rome Statute for the International Criminal Court and were each being investigated for mass crimes by the ICC⁸; both have implemented national constitutional and legislative reforms to strengthen the laws supporting stronger responses to sexual violence; and both have a growing cadre of trained medical and legal professionals who are skilled and interested in learning new forensic techniques for gathering evidence to support judicial processes.

In support of these programmatic goals, since 2012, PHR has been developing MediCapt,⁹ a mobile phone app meant to assist health professionals conducting medical exams in sexual violence cases. A smartphone application, MediCapt combines a custom-designed medical intake form for forensic documentation with secure mobile camera functionality for forensic photography. By combining these components, MediCapt helps to standardize and preserve critical forensic evidence of sexual violence. Clinicians can use the app to compile medical evidence, photograph survivors' injuries, and securely transmit the data to their law-enforcement counterparts who may be located at a police station several kilometers away. This tool includes sophisticated encryption, cloud data storage, and tamper-proof metadata, and it meets best practices for chain-of-custody considerations in evidence collection.

In many ways, eastern Congo is an unlikely place to launch a smartphone-based app to assist medical and legal professionals. When PHR first began exploring solutions with our Congolese partners, very few people had smartphones and there were major problems with the reliability of Internet access compounded by low bandwidth. But, as others have noted elsewhere,¹⁰ mobile phone use in Sub-Saharan Africa is becoming increasingly widespread and the range of possibilities opened up by deploying technology to help hold perpetrators of human rights violations accountable for their crimes is vast and potentially transformative.

This review essay will provide an overview of the MediCapt app and the steps PHR has taken to design, develop, and field-test the app in DRC. It will also explore advocacy opportunities that the app's emerging technology may facilitate down the road. This review essay will also identify the many challenges and questions that we have grappled with and lessons learned as we seek to deploy MediCapt in a low-resourced and politically unstable context and to take it to scale beyond DRC. Finally, in sharing the details of this case study, we hope to emphasize both the promise of new mobile technology for human rights organizations as well as the significant legal and ethical responsibilities that accompany it.

Conceptualizing MediCapt

From the outset, PHR identified medical professionals in particular as potentially powerful change agents, and intervened at a practical level to devise a way for clinicians to work directly with their law enforcement and legal colleagues to change how survivors receive medical care and access justice. During our earliest assessments in DRC in 2010 and 2011, we established that the evidence coming before national (military and civilian) courts was weak because, among other determining factors, clinicians were not conducting forensic medical evaluations of sexual violence survivors; medical charts were not being kept, or were incomplete and illegible; and clinicians were not using

⁷ Over the last five years, we have trained more than 1,500 health care providers, police officers, lawyers (prosecutors and defense counsel), magistrates, and judges around Kenya, DRC, and elsewhere.

⁸ The ICC was or is investigating numerous cases regarding the situations in the DRC and Kenya, respectively. See "Situations under Investigation," *International Criminal Court*, accessed November 22, 2016, <https://www.icc-cpi.int/pages/situations.aspx>.

⁹ In 2013, MediCapt won first place in the Safe Documentation category in the USAID-Humanity United Tech Challenge for Atrocity Prevention. See "PHR wins 2013 Tech Challenge for Atrocity Prevention with Mobile App," *Physicians for Human Rights*, February 13, 2013, accessed November 22, 2016, <http://physiciansforhumanrights.org/press/press-releases/phr-wins-2013-tech-challenge-for-atrocity-prevention-with-mobile-app.html>.

¹⁰ Christopher Tuckwood, "The State of the Field: Technology for Atrocity Response," *Genocide Studies and Prevention: An International Journal* 8, no. 3 (2014), 81-88.

forensic photography to document physical injuries sustained. We also noted that the medical, law enforcement, and legal communities tended to work in silos and stakeholders did not coordinate across sectors; nor did they share the same language or professional terminology, understand each other, or appreciate their respective roles in the justice process.

Through PHR's training workshops and advocacy initiatives, we worked with these medical and legal professionals to identify low-tech solutions to overcome some of these hurdles, taking into account limited resources and varying technical skills. One of the most successful initiatives we implemented, in close collaboration with our medical-legal network partners in eastern DRC, was the development of a standard medical intake form to document forensic medical evidence of sexual violence. Building on post-rape care forms used in other countries, including Kenya¹¹, South Africa¹², and the United States¹³, we developed the form with our Congolese colleagues and made sure it both met commonly accepted global practices and was also responsive to the cultural, legal, and resource-constrained contexts of the DRC. The standard form helps to reinforce the documentation of comprehensive data and consistent interpretation of medical findings; it prompts clinicians to ask more questions and collect more data; it reduces the opportunity for clinicians to include non-probative conclusions; and it streamlines the laborious documentation process by asking clinicians to check boxes and draw on pictograms rather than write out lengthy narratives (which can be especially challenging and time-consuming in low-literacy environments). And, because of the printed format, the standard form is easily legible, making it accessible to non-clinicians (police officers, lawyers, and judges) for use in their investigations, prosecutions, and adjudication of these cases.¹⁴ This standard form, known locally as the Medical Certificate, was featured as a model template in the International Protocol on the Documentation and Investigation of Sexual Violence in Conflict, launched by the United Kingdom in June 2014.¹⁵

While the emergence of the standard form helped to enhance forensic medical documentation in individual cases, we also noted that sexual violence cases were still stymied by basic infrastructure hurdles (e.g., poor roads, which impedes the delivery of documentation) and resource constraints (e.g., paper and pens to document evidence are often in short supply, and police officials often lack funds for petrol or access to vehicles to travel to a health clinic or crime scene). Through our sustained presence working with these communities, we were also acutely aware of the daily risks that medical, law enforcement, and legal professionals face by retaining hard copies of sensitive documentation, especially in hostile political environments. Community police stations sometimes lack storage resources, so sensitive case files can be left open on the dirt floor, where evidence could easily be lost or compromised. And frontline first responders and other stakeholders may themselves be threatened for preserving evidence as this material can incriminate alleged perpetrators. We also work with senior military judges who feared evacuating from their own homes in the middle of conflict – despite the fact that they were being personally targeted by rebel

¹¹ See *National Guidelines on Management of Sexual Violence in Kenya*, 3rd ed., 2014, accessed November 22, 2016, https://www.law.berkeley.edu/wp-content/uploads/2015/10/Kenya_Natl-Guidelines-on-Mgmt-of-Sexual-Violence_3rd-Edition_2014.pdf.

¹² See *National Management Guidelines for Sexual Assault*, 2003, accessed November 22, 2016, <http://www.cecinfo.org/custom-content/uploads/2012/12/SouthAfrica-Sexual-Assault-Guidelines-2003.pdf>.

¹³ National Protocol for Sexual Assault Medical Forensic Examinations, US Department of Justice, Office on Violence Against Women, 2013, accessed November 22, 2016, <https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf>. California Medical Protocol for Examination of Sexual Assault and Child Sexual Abuse Victims, 2001, accessed November 22, 2016, <http://www.caloes.ca.gov/GrantsManagementSite/Documents/2-923%20to%202-950%20Protocol.pdf>.

¹⁴ The South Kivu medical-legal network began using a hard copy version of this form in sexual violence cases in 2012, and in June 2016 national authorities in Kinshasa (the Ministries of Justice, Defense, Health, Interior, and Women, Family, and Children (formerly Gender), along with The President's Special Representative on Sexual Violence in Conflict and the Recruitment of Child Soldiers) obtained consensus to adopt the medical certificate nationally.

¹⁵ See "Annex 10: Sample sexual assault medical certificate," *International Protocol on the Documentation and Investigation of Sexual Violence in Conflict*, (London: Foreign & Commonwealth Office, 2014), 138, accessed November 22, 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/319054/PSVI_protocol_web.pdf; Second edition of the International Protocol on the Documentation and Investigation of Sexual Violence in Conflict, accessed March 30, 2017, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/598335/International_Protocol_2017_2nd_Edition.pdf.

factions – because they did not want to leave behind several years’ worth of sensitive documentation from the many mass crimes cases over which they presided in mobile courts. These judges worried about the destruction of these court records as well as the safeguarding of witnesses, survivors, and others involved in prosecuting these difficult cases.

Taking all of these infrastructural and political challenges into account, and building from the simple but powerful innovation of the standard form, PHR conceptualized a mobile app that sought to overcome these obstacles while at the same time facilitating comprehensive forensic documentation of evidence, safeguarding it from loss or willful tampering or destruction, and creating secure channels to transmit evidence from the health clinic to the police stations and courts.

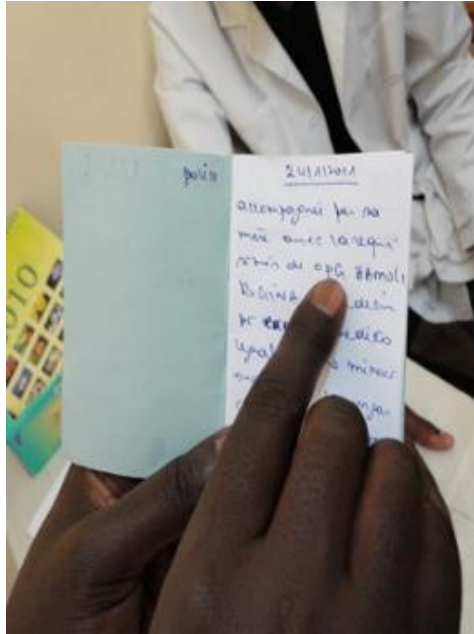


Figure 1. A typical medical record or “carnet” at a health center in DRC.

CERTIFICAT MÉDICAL D'AGRESSION SEXUELLE RÉPUBLIQUE DÉMOCRATIQUE DU CONGO			L'octroi du certificat médico-légal est gratuit pour les victimes de violences sexuelles selon la note circulaire n°251/143B/MPP/SK/2012 de l'Inspection Provinciale de la Santé.		HÔPITAL GR DE PANZI	
Document Confidentiel						
Loi n°06/019 du 20 juillet 2006 modifiant et complétant le Décret du 06 août 1959 portant Code de Procédure Pénale Congolais, Article 14 (bis) : "Conformément aux articles 48 et 49 du Code de Procédure pénale, l'Officier du Ministère Public ou le Juge requiert d'office un médecin et un psychologue afin d'apprécier l'état de la victime des violences sexuelles et de déterminer les soins appropriés ainsi que d'évaluer l'importance du préjudice subi par celle-ci et son aggravation ultérieure."						
Date d'aujourd'hui / / à heures			Lieu de l'examen médical			
A. INFORMATION SUR LE / LA PATIENT(E)						
1. Nom		2. Post-nom		3. Prénom		
4. Adresse				5. Sexe <input type="checkbox"/> Féminin <input type="checkbox"/> Masculin		
6. Âge <input type="checkbox"/> Non connu		7. Date de naissance / / <input type="checkbox"/> Non connu		8. Lieu de naissance <input type="checkbox"/> Non connu		
9. Etat civil <input type="checkbox"/> Célibataire <input type="checkbox"/> Marié(e) <input type="checkbox"/> Veuf / Veuve						
Noter: Si le patient est de sexe masculin, sauter jusqu'à la question numéro 14.						
10. Date des dernières règles / / <input type="checkbox"/> Non réglée <input type="checkbox"/> Post-ménopausique <input type="checkbox"/> Non connu			11. Nombre de grossesses		12. Nombre de naissances vivantes	
					13. Actuellement enceinte <input type="checkbox"/> Oui <input type="checkbox"/> Non <input type="checkbox"/> Non connu	
14. Le / la patient(e) a eu un rapport sexuel consenti au cours des 7 jours qui ont précédé l'agression <input type="checkbox"/> Oui <input type="checkbox"/> Non						

Figure 2. A portion of the standard medical intake form for sexual violence developed in DRC.

Early Design, Field Testing, and End User Feedback

In a setting in which forensic medical exams are rarely conducted, or conducted poorly, MediCapt was designed, first and foremost, to allow clinicians to collect and document medical evidence of sexual violence in a standardized, systematic manner. The app's early versions were essentially digitized configurations of the standard form into a digital format. Intended to reproduce the standard form, the app, however, also provides clinicians with prompts (demographics, history, physical, mental health) that may serve to enhance the quality of the medical encounter by reminding clinicians about the degree of comprehensiveness required (conducting a full body exam, taking forensic photos of injuries, requesting lab tests where possible) and providing them with decision support. This feature, subsequently, may enhance the care given to the survivor and the overall clinical skills of the physician. Once the evidence is collected, we envisioned an app that would securely transmit the data to law enforcement and the justice system, circumventing infrastructural barriers, overcoming communication barriers, and preventing the loss, destruction, or inadequate storage of data and evidence.

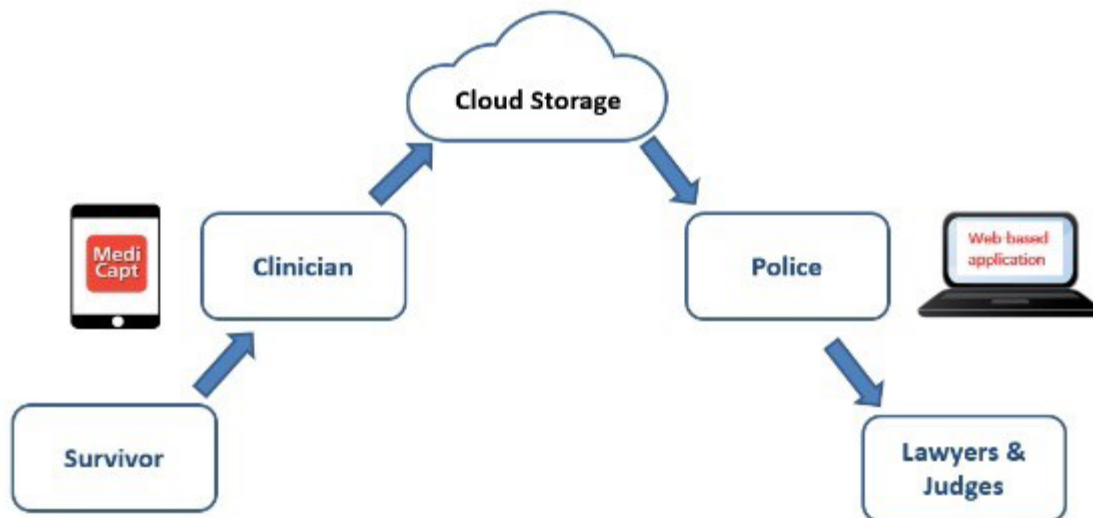


Figure 3. Proposed flow of information through the use of MediCapt.

The initial prototype - a simple conversion of the sexual violence standard form to a digital format - used an off-the-shelf, third-party platform called Magpi and contained more than 250 entries using simple logic features. In January 2014, PHR piloted this early iteration of MediCapt with eight Congolese physicians from Bukavu, Minova, and Uvira in eastern DRC who had previously participated in PHR's forensic training. These clinicians provided frank feedback and quickly became our collaborators in the app's design. While the clinicians liked the concept of the app and saw the benefits of digitizing the standard medical certificate, they also helped identify two key areas for improvement: a cumbersome user interface and the absence of any photo capture capacity. Moreover, despite building logic into the app, the clinicians requested a more intuitive interface, the ability to use a secured camera to take photographs, and additional functionalities such as a writable pictogram.

Following this first round of field-testing in DRC, PHR engaged a technology development company, Main Street Computing, to conduct a thorough needs assessment, user analysis, and technology landscape review. After determining that no other existing technology met the specific

needs articulated by the end users, we started from scratch to develop a completely new version of MediCapt. Given this opportunity, we chose to future-proof the technology – to ensure MediCapt maintains the ability to be a dynamic, nimble technology that can respond to different needs and contexts as appropriate. In other words, MediCapt is designed to be able to accommodate the relevant form required in different legal jurisdictions. The overall MediCapt architecture is now built as a modular system to allow for the creation of different forms and corresponding app skins. Significantly, the app is also designed to also accommodate the various languages and literacy levels of its users. With a robust forms-creation and forms-management backbone, MediCapt can now be used not only for the standard form in DRC, or any post-rape care or sexual violence standard form, but also for other human rights documentation and data collection efforts.¹⁶

MediCapt's Key Features

Working with technologists at Main Street Computing, we decided to disaggregate the goals of MediCapt, separating them into two separate objectives: the capture of details of a forensic medical evaluation, and the use of those details in the pursuit of justice. To execute this newly refined vision, we created both an Android app that would be used by the medical sector (data generators) and a web app that would be accessed by law enforcement in their investigations, by the judicial system as evidence of a sexual violence crime, and by PHR researchers (data retrievers) in a de-identified, aggregated manner for early detection of mass crimes and to trigger rapid response. This diagram outlines the approach used in developing MediCapt 2.0:

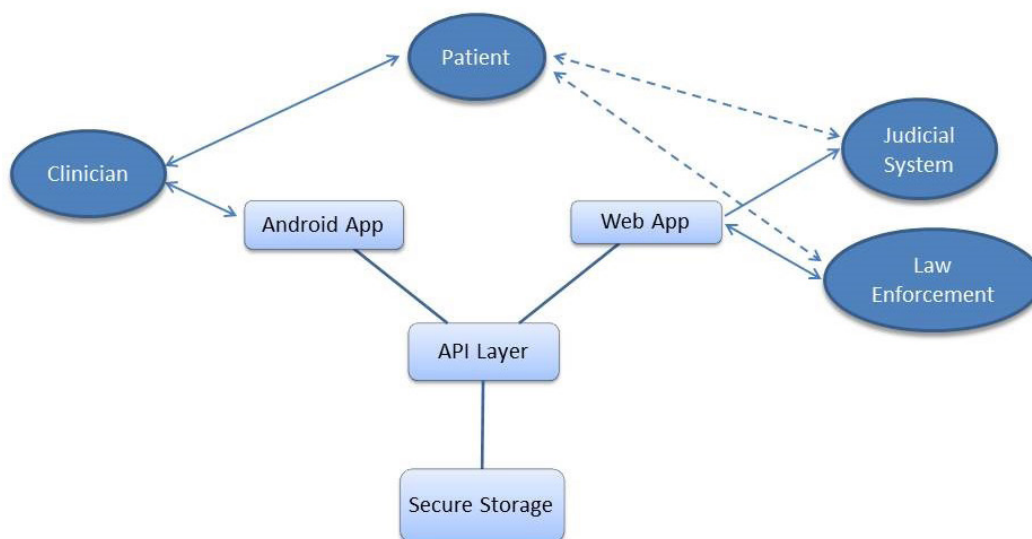


Figure 4. MediCapt information flow between mobile app and web app.

Given the intermittent and unreliable Wi-Fi connectivity in some remote areas of the DRC, we determined that offline functionality would be essential, and that the mobile app should be able to receive the forensic medical information, capture photographs, and then store this data until connectivity is established. Accordingly, we have chosen to use store and forward architecture that

¹⁶ The app was designed to accommodate lack of familiarity with digital interfaces by simplifying as much as possible the number of choices in the menu. To that end, we have attempted to minimize the number of possible interactions for the user toward the goal of keeping it accessible for those with low digital literacy. With regard to language, the app, as well as the back-end content management system (where forms are configured), is multilingual by design. The first two languages currently configured are French and English, but other languages are readily accommodated by adding language specific forms to the back end and language specific user interface elements to the app.

allows us to capture data and store it in an encrypted form on the hardware (smartphone or tablet), and then send that data to the server at a different time. An additional benefit of this architecture is that, if a connection is lost during transmission, the data that has already been transmitted need not be sent again, and, upon re-connection, the remainder of the data will be sent. These features are essential, given the limited bandwidth in the DRC.

MediCapt has also been designed to include the following additional features: (1) Camera: The basis of the camera feature on MediCapt is InformaCore – an open-source library for Android. InformaCore enhances the camera on the mobile phone by capturing and validating authenticity. In addition to using some of the core components of InformaCore and the camera on the mobile phones themselves, for security and confidentiality purposes, the photos are stored within the local database on the app and not within the photo gallery of the phone. (2) Writable Pictogram: The pictogram is one of the clinicians' preferred features of the standard form. We sought to replicate that in MediCapt, allowing clinicians to use digital pictograms. In this feature, health care workers have the ability to add markers to the pictogram (to identify where injuries or forensic information are found on the body). MediCapt then prompts clinicians to take a forensic photograph of the noted area, and they can add notes as well. (3) Authenticity: Establishing authenticity of the patient file is a key benefit of using technology for sexual violence documentation. The MediCapt mobile app currently captures crucial metadata including latitude, longitude, environmental sensors, time and date stamps, and other identifying information that will help establish the veracity of the record. (4) Encryption: Maintaining the security of the information inputted into MediCapt is crucial for the success of this application. All data stored in the local database is encrypted upon creation, and all photos taken are stored in encrypted format inside the database, not as separate files. No data is stored in an unencrypted state on the device.

Finally, we also hoped from the outset that MediCapt could be used for improved future monitoring surveillance and early detection of mass violence. Our design therefore allows for individual files to be de-identified to protect the privacy of the survivor, and for critical fields to be aggregated and analyzed. With this function, for example, it may be possible to look at geographic parameters, timelines, and clusters of crimes, and cross-reference this information with open-source intelligence concerning military and militia activity within a specific timeframe or location. This analysis would allow investigators and prosecutors to map trends or patterns of locations attacked, types of victims targeted, injuries sustained, weapons used, languages spoken, and military or militia uniforms worn by perpetrators. Not only will this data assist in documenting the prevalence of sexual violence and the widespread or systematic nature of attacks, it will also provide the factual and legal criteria necessary for reframing a series of seemingly-isolated, individual attacks as mass crimes or crimes against humanity. These indicators may also serve as compelling evidence to hold military or civilian leaders to account for the crimes committed by their subordinates under command responsibility – a key doctrine for war crimes prosecutions.

Partnering with Clinical End Users for “Co-Design”

As a general rule, any technology should be designed with the end users in mind, and, if possible, in close collaboration with them. We adopted a collaborative or co-design approach in which we made efforts to involve our clinical end users in all phases of the design: the initial needs assessment, the prototyping and refinement of the app, and the exploration of its usability in their clinical workflow and patient care routine. This was pursued over the course of three years, during which we engaged our clinician partners in multiple rounds of refining the app through training workshops, focus groups, and surveys. In each round, we solicited input on design, clinical matters, and usability, all related to the clinicians' unique practice settings and existing infrastructures, and upgraded and updated each subsequent version based on their feedback.

This ongoing dialogue helped uncover various systemic, institutional, infrastructural, and even cultural barriers to a successful implementation of MediCapt. Going paperless emerged as a key issue. In eastern DRC, most health care settings do not employ an electronic health record system (EHR), and the idea of capturing and recording health care data electronically is a foreign one not only to the clinician, but also to the patient. There is a cultural expectation that any documentation generated during clinical visits be produced as a hard copy – in the form of a hand-written “carnet”,

visit summary, or, in these cases, a sexual violence document. Patients expect to receive a hard copy to take to the police, hospitals need them for storage in paper charts, and administrators are often accustomed to providing a literal stamp of approval. Rather than disregard these cultural norms, we decided to create a printing feature as a work-around. However, this adaptation required additional modifications from the technology team, and it pushed back our expected field launch. Moreover, it presented additional hurdles in the form of material restrictions (e.g. lack of available printers and ink, copiers, and supplies).¹⁷

Additional barriers to a successful implementation of the app fell into three groups: (1) infrastructural; (2) systemic and organizational; and (3) personal behavior. Infrastructural problems included frequent periods with no electricity, and a lack of consistent Wi-Fi availability.¹⁸ End users overall lacked clarity regarding digital data storage and they did not uniformly understand the concept of cloud storage. From the organizational perspective, questions were raised about institutional buy-in and support at the hospital level as well as at the district, regional, and national levels. Finally, human factors played a substantial role in the perceived likelihood of adoption of this new technology. These behavioral issues included a wide range in technological literacy, a range in the clinicians' degree of openness to changes in their work flow, a range in their willingness to invest time in learning to use this app, and a range in their abilities to negotiate peer resentment and perceived jealousy after receiving advanced devices and monetary incentives to participate in our program.

Additionally, as mentioned above, our potential users for this technology extend beyond medical clinicians to include professionals from the law enforcement and judicial sectors. Among this larger group of end users, there is also a range of skill and comfort levels regarding technology adoption, digital literacy, and electronic data collection. Future phases of the app's development will therefore more closely involve these data receivers and processors (law enforcement and legal practitioners).

The field-testing is still in its early stages. To date, we have tested the usability of the app in simulated conditions with about 12 clinicians from five health facilities in North and South Kivu. We expect these clinicians to begin piloting the app with patients later this year.

Monitoring and Evaluation

Our team is designing a robust longitudinal monitoring and evaluation process.¹⁹ Ideally, MediCapt will enable us to look at each individual case – putting the survivor at the center – and ensure that all necessary medical data (history, physical findings, photographs of injuries, lab results) are collected and stored in one place, organized in a standardized and consistent fashion, and as comprehensively as possible in order to facilitate a successful legal process. Digitization and time stamping should further improve the capacity to track cases from initiation to conclusion and to identify delays in the submission and processing of an individual case. These features will ultimately bring greater accountability and transparency to a process that has been sorely lacking in efficiency, completeness, and timeliness.

¹⁷ Once clinicians input the information into the MediCapt mobile app, they will then have the ability to print directly from their mobile device (via Bluetooth technology) to allow for multiple copies of the standard form. These paper copies of the form will then be distributed to the survivors themselves, law enforcement, and prosecutors. The original record will still be saved digitally (in the cloud), ensuring the original forensic medical information will be preserved in the event that the paper copies are lost, stolen, or misfiled. The original forensic medical record would then be produced in court with chain of custody intact, if needed.

¹⁸ The app is designed to function when off the electric grid by accommodating offline access, and battery powered printers. If the device and printer are charged, the app can function off-grid for hours, and when back at the office or clinic, the app syncs with the back-end server once network connectivity has been established. Any commodity battery that has USB charging can be used to extend the life of the tablet and printer, including solar charged batteries, however at the time of this writing, we have not specifically tested this configuration.

¹⁹ We are still in the early stages of field-testing the usability and feasibility of the app in the clinical setting. We have not yet begun to compare data collection with the app against the process of using the paper form alone to determine if there are differences in accuracy, completeness, and ease of use, among other possible outcomes. We plan to evaluate these issues in the near future, via a "standard practice" control group. Similarly, we are developing an assessment instrument to gauge the acceptability of the app from the survivor perspective.

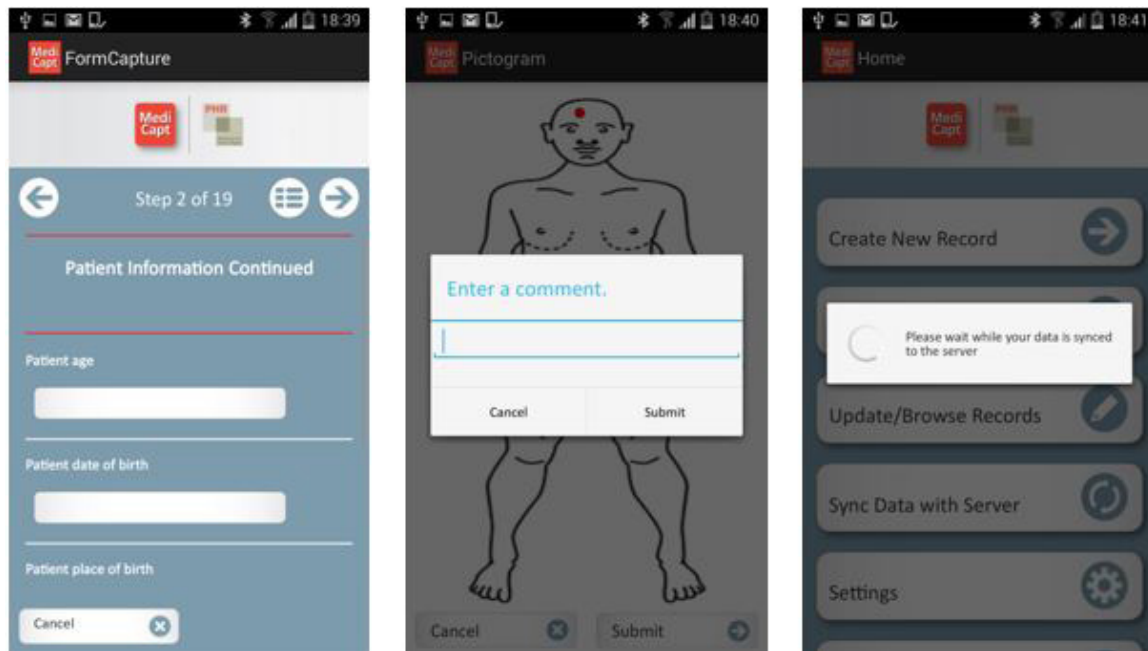


Figure 5. Images of MediCapt screens.

MediCapt will also facilitate the ability to look at de-identified aggregate data and gain important insights about process (how many cases are seen per week, per month, per location, per clinician, etc.), and also about outcomes (the number of cases tried, those ending in a conviction, etc.). Important epidemiological information could be extracted from the dashboard, for example, regarding age and gender distribution of cases, types of assault, injury patterns and weapons used, geographic locations. This population-level information and data mapping will be critical in revealing prevalence and patterns of violence and uncovering systematic atrocities and crimes against humanity. All of this said, we anticipate it may require years of study before we can determine the full impact of MediCapt on medical, legal, and human rights outcomes.

The Risks and Responsibilities of Human Rights NGOs Leveraging Technology in Pursuit of Their Missions

At present, there are roughly three categories of technology tools being used in human rights communities: those created to assist activists in gathering information and documentation to expose or highlight violations; those that collect, analyze, and preserve evidence that could be admissible in a court; and, finally, those that aim to secure or enhance communication among activists or even provide protection (e.g. Amnesty International's panic button app). All three categories of tools have serious risks associated with them, and require that the human rights and technology communities come together to identify best practices to address these risks.

MediCapt, which falls into the second category, has been particularly challenging as it requires that the user or manager of MediCapt be able to produce credible metadata that can be used by a magistrate, judge, or other person to assess the integrity of the evidence. There is a very real risk that hackers may seek weaknesses in the architecture of the app, and we have therefore focused on safeguarding the security of the app itself. Any attack might conceivably place the user and many others at risk. We have thus needed to address the question of what constitutes a fair warning to potential users.

Many related issues also need to be further explored. No information or evidence will be collected from a person without their informed consent, including their consent for how the information or evidence will be used. But once consent has been given, who then owns the information and evidence that is being collected? The scope of some of this technology also goes far

beyond personal information or evidence from a person's body or memory. With so many activists pursuing justice, the question of who owns the evidence is paramount. Unless these issues are clarified, we may witness the privatization of evidence collection, with attendant threats to chain of custody as well as accusations of bias.

Another crucial issue is how to assess the lifecycle of technology and when such technology needs to be retired because it can no longer be safeguarded. As organizations and funders direct significant resources toward the development of both new hardware and software, users must be made aware of any changes to older legacy products and security safeguards.

Situating MediCapt in Context

In addressing these questions regarding the development of MediCapt, PHR has tried to develop the most functional app possible with all relevant safeguards, knowing that information and evidence collected in DRC is too often lost, destroyed, tampered with, or languishes in a hospital because the police were unable to collect the information. PHR aimed to be absolutely mindful of the security issues involved in the development of MediCapt but not let the perfect be the enemy of the good – especially given the current state of impunity for crimes of sexual violence. What we have learned along the way is to see the development and use of the app as a process. We will need to ensure that changing contexts – political, technological, and judiciary – may at times impact how the app functions. It is our responsibility to ensure that PHR and our partners in DRC can be responsive to these developments in a timely manner.

Conclusion

MediCapt is being designed and developed with the hope that it will eventually be used by clinicians around the world. Currently, PHR and our partners in DRC are continuing to refine this technology while also attempting to increase the comfort levels of our end users with MediCapt's interface. After completing competency trainings – which will seek to model actual clinical settings with standardized (simulated) patients – we will partner with pilot hospitals to integrate this app into their standard operating procedures for patient care in cases of sexual violence. And, as national authorities adopt and roll out the standard medical form across the country, PHR will work with health, law enforcement, and legal officials to train and integrate MediCapt into that process as well. Along the way, we will be documenting both setbacks and successes and we will continue to learn from and collaborate with our many partners – the end users, technologists, citizen activists, clinicians and ethicists, human rights advocates, and funders.

We have been especially grateful to our DRC-based colleagues, who have placed their trust in us and provided vital input at every step in this process. With their help, we have remained focused on directing this new technology toward the larger mission of transforming justice systems. Ultimately, if survivors of sexual violence and other human rights violations can succeed in holding perpetrators accountable through the court systems in their communities because they are equipped with more compelling, comprehensive forensic evidence to support their allegations, we will have taken a major step forward.

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