



PEDIATRIC HACKATHON

2019

Round-Up & Next Steps



MSF SWEDEN INNOVATION UNIT

AN INTRODUCTION

At the MSF Sweden Innovation Unit (SIU), we practice a human-centered design approach to innovation projects. Essentially this means that we strive to consistently put end-users first and ensure their needs are properly researched, understood and analysed as the first stage of any MSF SIU innovation project.

Since 2015 the SIU has been exploring different innovation cases brought forward by MSF field staff, and others within the organisation, looking to scale potential solutions for challenges they have identified first hand. In order to do this, the SIU champions a three-step process of initiation, development, and implementation.

The SIU initiated the Pediatric Innovation Hackathon in April 2018 in an effort to capitalize on the external and internal knowledgebase available in Stockholm for the annual MSF Pediatric Days which were held with a global MSF pediatric cohort the day after the hackathon. The presence of the core Pediatrics Days being held in Stockholm meant that broader Pediatric challenges, current care practices, and incoming priorities were being discussed by a broader MSF community signalling an opportune moment to engage this group and the wider movement in the Innovation Unit efforts to accelerate pediatric care practices of the future.

This document highlights why a hackathon was selected as a method of exploration, the challenges that were selected for the process, an insight into the outcomes from the two-day workshop, and into the anticipated and actual next steps.

INITIATION

Framing the challenge, performing research, analyzing insights, designing objectives

DEVELOPMENT

Generating and screening ideas, creating and testing concepts and prototypes

IMPLEMENTATION

Detailed implementation and design of solutions in the field, scaling up and diffusion

WHY DID THE MSF SWEDEN INNOVATION UNIT CHOOSE TO RUN A PEDIATRIC HACKATHON?

Hackathons have been a common feature of the innovation environment for the past few years, bringing together multi-stakeholder groups to ‘hack’ a designated challenge over a short and intensive period of time.

For the purpose of the MSF SIU Pediatric Hackathon, we brought together engineers, clinicians, entrepreneurs, developers, designers and end-users to brainstorm and build innovative solutions to address 4 key MSF field challenges. Starting from problem identification within the challenges identified in advance of the hackathon launch, teams (composed of approximately 4-6 members) aimed to develop an early stage solution prototype over a 2 day period supported by subject matter experts and guided by a team of skilled hackathon facilitators who provided a framework of understanding and navigating the challenges at hand, a key element to any hackathon.



05

Teams



04

Challenges



02

Days

A hackathon is not always the ‘right’ avenue when it comes to addressing a challenge, however, it can be a promising starting point to set the scene for collaborative efforts around complex challenges. The MSF SIU Pediatric Hackathon was seen as a perfect opportunity to initiate a collective engagement with diverse MSF stakeholders and external parties. This multi-stakeholder engagement is a central tenet of any innovation effort.

The humanitarian health environment, and healthcare generally, tend to be traditionally risk-averse to maintain evidence-based practices. However, in the face of new innovation opportunities and protracted challenges the humanitarian health space is now looking to adopt more agile processes – an approach hackathons are well suited to facilitate. In short, a hackathon was deemed fit for purpose for the SIU Pediatric challenges to hold space for creative problem-solving in a low risk and fast-paced collaborative environment.

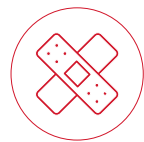
HOW WERE THE PEDIATRIC HACKATHON CHALLENGES SELECTED?

Through a series of semi-structured interviews with key stakeholders across the movement the SIU shortlisted a number of themes identified by stakeholders and grouped these into challenges that could fit the structure of a Hackathon.

The challenges identified through interviews with MSF stakeholders were the following:



01.
**Non-insecticidal
community-based
Malaria Prevention**



02.
**Creative Wound Dressing
and Management**

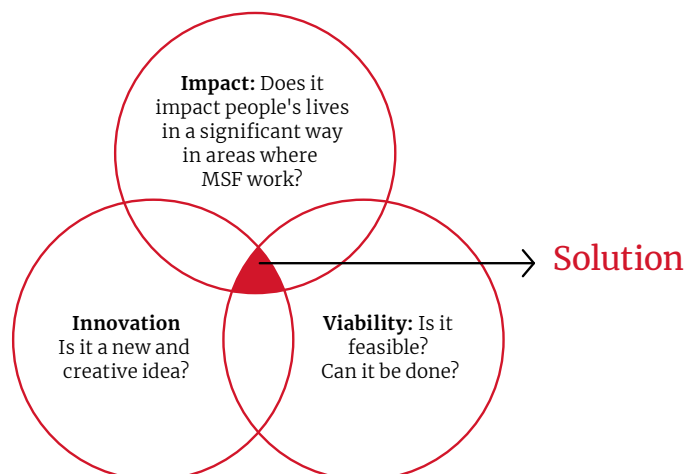


03.
**Fluid Management in
Neonatal Care**



04.
**Child-Friendly Spaces and
Interventions**

Each challenge group (of 4-6 people and expert contributors) was assigned to collaboratively produce a solution to their challenge by the end of the two-day workshop that would be in line with the following criteria:



NAVIGATING THE DESIGN-THINKING MODEL FOR PEDIATRIC INNOVATION

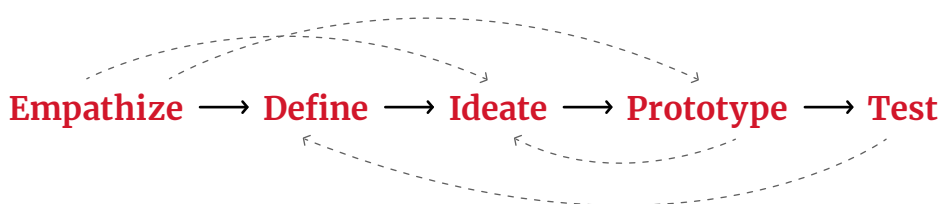
In order to achieve this goal, participants were guided through the five-stage Design Thinking model, originally coined by Hasso-Plattner Institute of Design at Stanford. In the first stage of empathy generation participants were encouraged to observe and empathise leading to a grasp of the experiences and motivations of field staff, patients and caregivers who would have encountered real-life instances of the selected challenges.

During the second definition stage of the design thinking process participants leveraged and reflected on their insights gathered during empathy generation to define the core problems at hand. Reaching the third stage of the process participants were finally encouraged to generate as many potential viable solutions to tackle the core problems within their challenge.

Once this step was completed the group moved on to hands-on prototyping of the most promising solution within their longlist. These minimal viable product (MVP) prototypes were then pitched amongst the group for rapid feedback and iteration. This rapid prototyping, pitching, and iteration helped the teams tease out the core constraints inherent to their products.

This MVP prototyping led to the final stage of the design thinking process - testing. During this testing phase teams regrouped to make alterations and refinements ruling out low hanging issues associated with their solutions and made final efforts to derive a deep understanding of their product and its users as possible before pitching to the collective groups and expert panel.

Crucially, it was stressed that these design thinking steps were not necessarily sequential - highlighting the need for openness to iteration, often forging multiple phases to run in parallel, each element providing key insight and methodology that should coexist with the others. This model is a highly useful framework for navigating complexity and encouraging co-creation.



THE SIU PEDIATRIC HACKATHON CHALLENGES



Challenge 01: **Non-Insecticidal Malaria Prevention**

How might we develop new community-level prevention tools and strategies that do not rely on mosquito nets and insecticides?

MSF is working on malaria from many different angles. Prevention activities include malaria net distribution and Indoor Residual Spraying campaigns and occasionally (though quite rarely) channeling of water and larvicide. Even with these tools in place, MSF continues to treat hundreds of thousands of cases of malaria a year with many presenting late or in severe condition leading to death. Other projects are looking at the different types of traps (attractive sugar base), genetic modification and malaria vaccine, though these are all projects whose outcomes are unlikely to be seen in the field for some time. In the meantime, what could be created to offer protection?

The Outcome

To tackle the growing resistance to artemisinin-based mosquito repellents Malaria group one proposed sourcing regionally produced natural ingredients, such as Citronella, that could be easily made into body and laundry soap. In addition to sourcing regionally grown ingredients with proven anti-malarial potential, this group suggested galvanizing social business models to enable further production sustainability and encourage effective community engagement.

The second malaria group also championed community-based interventions which has been widely recognised in the literature and emphasized in global policy making as holding a substantial potential in the prevention and control of malaria. Malaria group two presented a community-based intervention wherein community champions would be engaged and supported to periodically communicate key recommendations and opportunities for communities to mitigate against malaria outbreaks.

Community hubs and champions would be empowered to disseminate educational content to their respective communities in addition to supporting the epidemiological monitoring malaria cases.

Non-insecticidal Malaria Prevention Participant Insight **Dr Bhargavi Rao, Malaria & Infectious Diseases Specialist @ MSF**

01. In your perspective what is the greatest opportunity for malaria innovations to positively impact pediatric populations?

Preventing malaria: repeated infections can affect pediatric health not just in terms that particular infection, but also long term impacts on anemia, subsequent and other infections as well as neurodevelopment. Treatment is not enough – we need to prevent infections and whilst the current means we have at present have been effective to some degree, we need to keep innovating and pursuing every last mosquito (bite).

02. What did you see as a positive contribution made by the peds hackathon to realize this progress?

It was wonderful to see how such a diverse group of people – from scientists, designers and engineers – generated so many different approaches to preventing malaria in children. I found it very inspiring to have my own thinking challenged and it was great to see how people applied their creativity to this problem.

03. What do you feel the greatest challenge is for MSF to contribute to meaningfully drive malaria innovations?

Understanding the people we serve and understanding behaviour change. Useful innovation needs insights into the communities, the drivers of behaviour and the catalysts for change. Remember it's only an invention until it gets implemented!



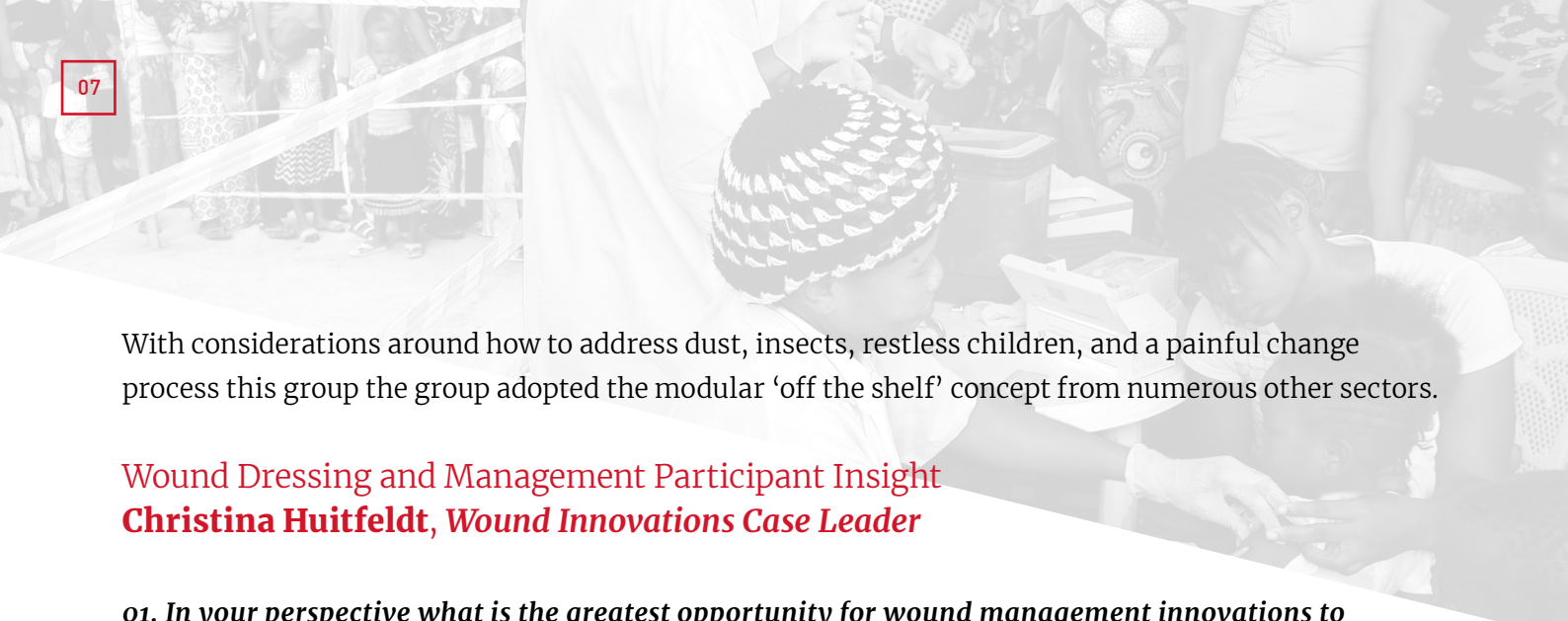
Challenge 02: Creative Wound Dressing and Management

How might we create a low cost, securing system that enables complicated wound dressings to remain in place?

In MSF context we are faced with many different types of wounds. They are often large and in awkward places and dressing materials are often not suitable. When they slide off this causes risk of infection and increase pain for the child. Further, when securing Intravenous lines or nasogastric tubes we are often forced to use thick adhesive tapes which cause skin damage as lighter, more breathable material is not as adhesive.

The Outcome

The group focused on this challenge produced a proposal around DIY modular protective suit kits as a low-cost securing system that enables wound dressing to remain in place, dry and clean. This concept adapted ideas and applications from other industries from retail to veterinary care.



With considerations around how to address dust, insects, restless children, and a painful change process this group the group adopted the modular ‘off the shelf’ concept from numerous other sectors.

Wound Dressing and Management Participant Insight **Christina Huitfeldt, Wound Innovations Case Leader**

01. In your perspective what is the greatest opportunity for wound management innovations to positively impact pediatric populations?

In MSF context field staff is faced with many different types of wound challenges in terms of wound size often involving complicated angles and sensitive areas, different levels of wound severeness and healing stages requiring individualized and well-assessed treatment. Wound care, in general, is complex and situation-based. Currently, available dressing materials are often not suitable. Most wounds are burns due to fire or boiling water and patients affected are mostly toddlers. These children are very exposed and in a sensitive stage of their lives, yet still with the natural drive to move and play. When dressings slide off this causes risk of infection and pain for the child. Further when securing IVs or nasogastric tubes nurses are often forced to use thick adhesive tapes which cause skin damage as lighter, more breathable material is not as adhesive. The environment where MSF operates is rather challenging as well in terms of heat and humidity, dust, dirt, and insects, moreover often being far away from regular access to medical and other societal support systems and with limited local knowledge about how to prevent and handle infections. Infection can lead to health-threatening and in some cases even life-threatening consequences.

In line with MSFs vision and mission to deliver emergency aid to people caught in crisis, to reduce suffering and restore dignity in these emergent situations, a mid-term opportunity for wound management innovations in the pediatric field could ideally be to reduce the risk of infection and pain and at the same time support the field staff with an easy to use and safe solution that can be applied to most of the different types of wounds. The key opportunity seems to lie in finding a simple and flexible solution to fit this complex challenge.

The current main approach we are exploring is the concept of a low-cost securing system that enables wound dressings to remain in place, dry and clean and protect the child from further harm while enhancing healing. The concept currently targets the s- called 3rd layer of the MSF wound dressing protocol.

The concept could have a rather huge impact for the lives of one of the most vulnerable populations facing an emergent and very painful situation. It could simplify wound care and make it more precise and safe without or with reduced risk of infections. Reduced painful bandage changes would also speed up getting back to improved quality of life, hence a more natural development and wellbeing for the child. Depending on the features of the final solution as well as the severity of the wound, the concept

could potentially also mitigate lifelong stigmatizing scars that else can have an impact on the patient's complete life chances and perception of own dignity.

In a longer perspective and next version of the concept it could also be relevant to more deeply analyze wound management as a whole and investigate in the current solutions and layers and processes closer to the actual wound and healing process. Potential scientific advances in this area though need to be carefully evaluated in terms of innovation and implementation readiness, relevance for low-cost settings and also with the awareness these solutions closer to the wounds need to be medically certified. Moreover, access to field testing might be difficult.

We now have a concrete starting point and concept, to continue working on adding research and analysis, to further develop a real mock-up based on these insights, to elaborate the business model and then to potentially prepare it for adjustments and inclusion in the current supply chain and wound management protocol. Without this innovation enhancing process, this would have been very difficult to achieve.

Further research has to validate our current thoughts and tune the solution. - The innovations could potentially add, adjust or influence approaches within wound management in general beyond pediatric field especially for low-cost settings.

02. What did you see as a positive contribution made by the peds hackathon to realize this progress?

The Pediatric Hackathon was an excellent way of bringing together a diverse team with a variety of expertise such as within wound care in MSF settings as well as in hospitals, research, patient needs, product development, innovation processes.

Ideas and solutions relevant to the challenge were explored in a very short and intense period of time. The well structured and creativity-enhancing guided innovation process helped us achieving a rather high quality of draft outputs to now further validate and eventually build on.

03. What do you feel the greatest challenge is for MSF to contribute to meaningfully drive wound management innovations?

The complexity of wound care, in general, makes it difficult to treat it in a standardized way, yet standardization often reduces costs. To be able to balance complexity and simplicity while considering also cost efficiency and finding a solution or system that is simple, yet flexible enough depending on the wound needs seems to be key. Additionally, the environment is another part of the challenge. Currently, the project has to be run without field testing.



Challenge 03: **Fluid Management in Neonatal Care**

How might we create a low-cost and easy to use neonatal fluid monitoring system for field medics?

Nurses struggle with neonatal fluid management in the field for many reasons. Whether this is calculating fluid volume requirements or drip factors (number of drops you need/minute coming from the IV bag to accumulate to the total volume required) for medication delivery and/or maintenance fluid our tools are often not adapted. Both receiving too much, or not enough fluid can cause worsening of a child's condition and/or death. We have limited support devices (i.e.: syringe pumps or other mechanical/electronic systems) in project locations usually linked to the high cost and concern for maintenance. Different tools exist on the market but so far have not been adopted, primarily for reasons of cost and usability.

The Outcome

The first fluid management group produced a prototype solution for more accurate measurement of fluid levels to enable clinicians to maintain their current process of fluid titration and communication while optimizing accuracy and mitigating against mismeasurement. [Lindsay I have no deck for this one but have reached out to a team member]

The second fluid management group proposed a new visual monitoring system for tracking multiple variables and allow for streamlined clinical team communication. This group proposed a whiteboard or blackboard system where key patient data points can be recorded using a standardised visual system which would serve as a baseline for care teams taking a mobile phone picture and transferring data to central M&E operational centers for analysis over time.

Fluid Management Participant Insight

Amel Benali, Technical @ Läkare Utan Gränser / Médecins Sans Frontières (MSF)

1. In your perspective what is the greatest opportunity for neonatal fluid management innovations to positively impact pediatric populations?

I would like to see more personalized approach to care, using machine learning why not create smarter alert systems so that nurses don't act based on routines but react according to needs, meaning that the stress of a high patient/nurse ratio is perhaps lowered. I also think neonatal fluid management is a broad problem for developing countries but also for developed countries with free healthcare. The patient to nurse ratio is not just a field issue it is an issue most hospitals face.

2. What did you see as a positive contribution made by the peds hackathon to realize this progress?

The field approach takes into consideration the cost and feasibility, which ultimately will direct people to think of solutions that could be implemented. The simplest solution is the most elegant, in this case

it is the most adequate. Creativity within constraint is a tougher challenge, but the constraints is what helps in the elimination process of design.

3. What do you feel the greatest challenge is for MSF to contribute to meaningfully drive pediatric fluid management innovations?

Medical device certifications, testing the ideas. Our team is working on monitoring solutions and a smart crib approach. I am having trouble imagining how we can get this tested. I remember the legal aspects of medical innovation being very challenging.



Challenge 04: Child-Friendly Spaces and Interventions

How might we create a package of tools that will support field teams in implementing child friendly space?

The importance of play for child development, health and wellbeing is so profound that the Convention on the Rights of the Child recognises it as a human right of children. Play is an essential tool in the treatment for sick kids with measurable and cost-effective impact. While children make up a large proportion of our patients, child friendly spaces and care are often deprioritized in humanitarian settings due to high patient load leading to high work volume and lack of staff knowledge. Knowing this, how can we best support teams to create safe environments, to train our staff to consider the needs of patients and their families, and to do this using locally available material and considering local customs and traditions.


The Outcome

The group focused on child-friendly spaces and interventions proposed the roll-out of standardised structured and unstructured play guidelines to support the operationalization of therapeutics play for pediatric cases along the patient pathway to:

- Prepare children for medical procedures through calming distraction via play
- Support pediatrics cases during medical interventions
- Accelerated rehabilitation and recovery through play

This proposal was centered around two core elements - a standardised framework to guide MSF field staff integrating play into their work and a second element focused on developing a play kit with easily sanitized and culturally transferable play tools (e.g. building blocks) in order to support implementation of the framework.

Therapeutic and Free Play have been shown to have strong evidence behind them in supporting patients and their caregivers throughout the patient pathway - from initiation of treatment to



rehabilitation and beyond the evidence this has already started to organically be implemented by MSF Field staff. The proposal of this team was heavily focused on empowering the clinical stakeholders already exploring this area to more broadly operationalise its scope and beyond that potentially look at the recruitment of community healthcare workers.

Child-Friendly Spaces and Interventions Participant Insight **Charlotte Elf, Head of Branch, Karolinska University Hospital Astrid Lindgren's Children's Hospital**

01. In your perspective what is the greatest opportunity for play innovations to positively impact pediatric populations in humanitarian settings?

The reflection which I get from the pediatric staff (and what I see myself) here at our hospital is about how much easier it is to treat children who, by prep. play is aware of what will happen to them. It saves time, less tears, less stress for the child, the parents and the staff. Next time the child will visit the hospital everything goes so much easier. When prep. play not has been possible, like for example after an emergency, the processing will help the child before eventually future treatments.

Play innovation areas create an environment which the child feel secure in. It is often recognisable, and a familiar environment gives less stressed children.

02. What did you see as a positive contribution made by the peds hackathon to realize this progress?

First of all, I think it is wonderful that MSF takes time for this question. I was clear that some of the participants saw play as mostly something "fun" but after discussion some of them said themselves that they know understood how play in hospitals could be so much more. To look upon the Right of the child, article 31 as serious business, is important - for all children - wherever they will be found in the world.

03. What do you feel the greatest challenge is for MSF to contribute to meaningfully drive pediatric play innovations?

One thing is the attitude, to spread the knowledge about how play can contribute to better healthcare for children, not only be a place for "fun". I think everyone without problem can say that play is something fun and important for all children's development. Having play in health care also means a chance for the child to understand, to participate and to cope with the situation.

The other challenge will be how to get this implemented in the area where MSF works. I am aware of the difficulties in organizing areas with play material. Hygiene perspective, risk of material that will disappear. But, by having staff that will carry the awareness of this subject, a lot of things can be done - quite easy. I liked the idea that came up, having local staff trained by example Child Life Specialists to focus upon this. Then the knowledge about local culture and traditions concerning play can contribute!

WHAT'S NEXT FOR THE PEDIATRIC INNOVATION CHALLENGES?

Based on the outcomes, interactions and connections that resulted from the Pediatric Innovation and Scientific Days the SIU are currently exploring various options for co-development of the challenges for potential future implementation in the field.

If you feel any of the aforementioned challenges are relevant to your interests or expertise, either within or outside of the MSF context, please feel free to reach out to the SIU Medical Lead Lindsay Bryson at Lindsay.Bryson@stockholm.msf.org

To stay up to date on all MSF SIU Innovation Cases follow us on LinkedIn: [website tiny URL](#) or visit our website: msf-siu.org.



THANK YOU.

— Know More About Us —

Say hello at
Fredsborgsgatan 24,
117 43 Stockholm

Contact us at
00 46 10 199 32 00



MSF SWEDEN INNOVATION UNIT