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STEM Development Impact Memos

Paediatric Blast Injury Partnership

Bringing Life-saving Interventions to Children Around the World

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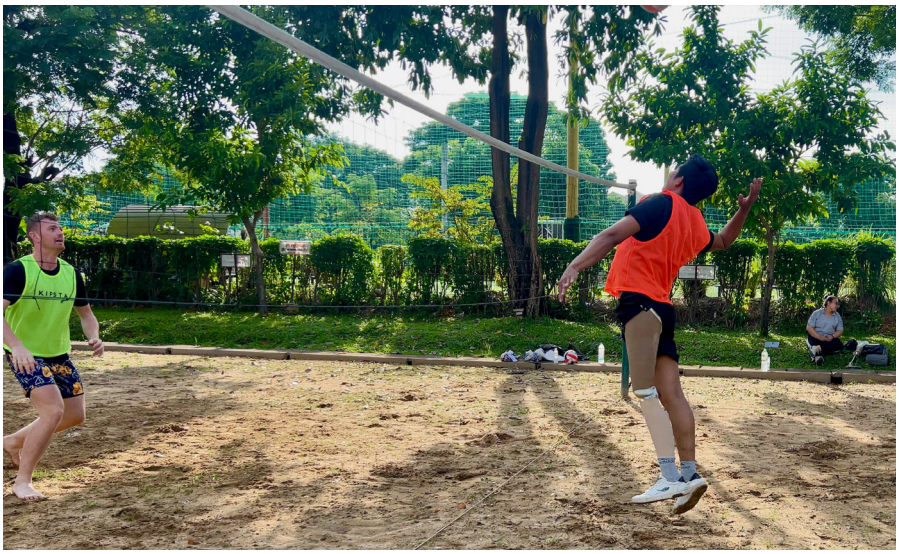
The Challenge

— Approximately one in six children live in conflict zones,[3] and are at risk of blast injuries.

— Thousands of children without limbs worldwide do not have access to appropriate prostheses.

— New research into their response to amputation and the development of new appropriate prosthetics offer dignity and life-saving interventions to children in conflict and emergency zones.



“This kind of research bridges academic research with humanitarian aid because it strengthens local institutions, drives innovation in a contextualised manner, which means that the solutions we come up with are usable and not imposed on local providers.”

Ghassan Abu-Sittah, director of the conflict medical programme at the Global Health Institute at the American University of Beirut

The Context

Approximately 1.5-million people have limbs amputated every year,[1] and the World Health Organisation estimates that fewer than one in 10 of them have access to prosthetics.[2] Many of these individuals are children. Approximately one in six children live in conflict zones,[3] putting them at risk of life-changing injuries. In Gaza, for example, UNICEF estimates that thousands of children have lost one or both legs.[4] Young people are also vulnerable to natural disasters, such as earthquakes,[5] particularly in lower-resourced settings.[6]

But despite their vulnerability and the widespread incidence of paediatric injury, there is a knowledge gap in how children respond to blast injuries in the long term. This raises questions on how to properly treat children in conflict and emergency situations. There is a lack of access to sustainable prosthetics that are appropriate for children and for a variety of terrains.

Unlike adults, children have to regularly change their prosthetics as they grow, but constrained resources mean that these young people cannot access the assistive technology that would allow them to lead a full and dignified life.

In 2018, an international team of academics, led by Imperial College London, established the Paediatric Blast Injury Partnership, which brings together institutions in the UK, Middle East, Southeast Asia, and Africa.

The partnership has a three pronged strategy: to capture what is known about treating children and share this information; to identify gaps in the current research and work to fill them; and to put their research into action to address the urgent need of children worldwide.

“People need prosthetics that are available, accessible and sustainable.”

Sisary Kheng, country director of Exceed Worldwide and the Cambodian School of Prosthetics and Orthotics

“There are very large numbers of young amputees globally and if they don’t have prosthetics, they can’t function in society, they can’t go to school.”

Prof Anthony Bull, Imperial College London

The Method

— The Paediatric Blast Injury Partnership has produced the Paediatric Blast-Injuries Field Manual,[7] which is available online for free or as a booklet. It has been translated into several languages, including Arabic and Ukrainian, and is currently used all over the world. A second edition will soon be published.

— Çukurova University in Adana, Turkey, with members from the partnership, is following 530 child amputees, who lost limbs in the 2023 earthquake to understand the long-term effects of blast-injury amputation and recovery. These findings will inform surgery and prosthetic best-practice for children injured in the future, and fill in many gaps in clinicians' understanding.

— Trials have begun for small-sized knee joints, called 'Mini' and 'Tiny', with the prospect of global low-cost local manufacturing. The team is also working on adjustable sockets, as children's limbs and socket sizes change rapidly as they grow.

"In Cambodia, we do not have a lot of choices for prosthetics: we only have one child size. For toddlers and children under four, we use the elbow joint for knee prosthetics."

Sisary Kheng, country director of Exceed Worldwide and the Cambodian School of Prosthetics and Orthotics

Benefits

— **Saving lives:** The partnership's research findings inform how to best treat children with injuries sustained in conflict and natural disasters. These interventions will save the lives of children.

— **Urgent need:** There are currently thousands of children around the world in need of prosthetics.

— **Affordable prosthetics:** To promote uptake and access, the partnership recognised that assistive technologies need to be cost competitive.

— **Locally relevant solutions:** Through its collaborations with international researchers and NGOs, the partnership ensures that its prosthetics and interventions are culturally and contextually appropriate. The technology will also be trialled on a variety of terrains to ensure that they are appropriate for the local environment.

— **Strengthening local research institutes:** Collaboration with local institutions ensures knowledge transfer and bolsters capacity on the ground in emergency situations.

— **Global network:** With its large global footprint, the partnership promotes knowledge sharing and advocates for international clinical best practice.

— **Future manufacturing capacity:** The project aims to foster local manufacturing, so that assistive technologies are available when supply lines are disrupted due to conflict or emergencies.

"Children are not small adults. They are different physiologically and anatomically, but children with conflict injuries are not part of the medical curriculum in most countries. So generally when war happens, people are having to learn on the kids that they're treating, and many die as a result of injuries when they could potentially have been saved."

Prof Anthony Bull, Imperial College London

“There’s a large need. In this current war in Gaza, we estimate between 4,000 and 5,000 children with limb amputation; in a centre we’re working in in Mosul, Iraq there are around 8,000; while the centre that UNICEF runs in Yemen has over 2,000 amputees.”

Ghassan Abu-Sittah, director of the conflict medical programme at the Global Health Institute at the American University of Beirut

For more information

Centre for Blast Injuries, Imperial College London
www.imperial.ac.uk/blast-injury/about

American University of Beirut Medical Center
https://aubmc.org.lb/pages/home.aspx

Exceed Worldwide, Cambodia
www.exceed-worldwide.org/cambodia

The Impact

— **For patients:** Children will have access to culturally and locally appropriate assistive technologies that will allow them to lead a full and dignified life. Research into paediatric responses to trauma could potentially save the lives of children who are injured in conflict or natural disasters, such as earthquakes. Appropriate early treatment reduces long-term complications and the need for additional surgeries and interventions.

— **For healthcare providers:** Guidelines, such as the Paediatric Blast-Injuries Field Manual, empower clinicians and healthcare specialists to provide the best possible care for their paediatric patients, and potentially save lives.

— **For healthcare systems and governments:** Locally manufactured and context-relevant prosthetics enable healthcare systems and governments to provide appropriate care and support for their populations. They also reduce the barriers to injured children’s school attendance and later on involvement in the economy.

Notes

1. AT2030 programme, ‘Product Narrative: Prostheses’, 2020. https://at2030.org/pn-prostheses
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3. Hargrave, J. et al. ‘Blast injuries in children: a mixed-methods narrative review’, BMJ Paediatrics Open, Vol. 3., Issue 1., 2019. https://bmjpaedsopen.bmj.com/content/3/1/e000452
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5. Uluöz, M. and Gökmen, M. Y., ‘The 2023 Turkey Earthquake: Management of 627 Pediatric Musculoskeletal Injuries in the First Month’ Children (Basel), Vol 10, Issue 11., 2023. www.ncbi.nlm.nih.gov/pmc/articles/PMC10670203/
6. UNICEF, ‘Children and Disasters: understanding impact and enabling agency’. May 2011. www.unicef.org.uk/publications/children-and-disasters/#:~:text=Children%20are%20highly%20vulnerable%20to,of%20physiological%20and%20social%20development
7. Paediatric Blast Injury Partnership, ‘The Paediatric Blast-Injuries Field Manual’, 2019. www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/centre-for-blast-injury-studies/PBIP-BlastInjuryManual2019_I_web.pdf

Funders

Aspects of the work has been supported by grants from EPSRC, NIHR and Save the Children.

STEM Development Impact Memos offer policy makers and stakeholders insight into projects in Imperial College London’s Global Development Hub and their real-world impact.

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