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Disability and Rehabilitation: Assistive Technology

ISSN: 1748-3107 (Print) 1748-3115 (Online) Journal homepage: www.tandfonline.com/journals/iidt20

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**To cite this article:** Lauren Somerville & Liana Nagy (2025) The refurbishment and redistribution of disability equipment from the UK to low- and middle-income countries: a case study focusing on 2016–2021 redistributions to Romania, Disability and Rehabilitation: Assistive Technology, 20:3, 545-551, DOI: 10.1080/17483107.2024.2367717

**To link to this article:** https://doi.org/10.1080/17483107.2024.2367717

DISABILITY AND REHABILITATION: ASSISTIVE TECHNOLOGY
2025, VOL. 20, NO. 3, 545–551
https://doi.org/10.1080/17483107.2024.2367717

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RESEARCH ARTICLE

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# The refurbishment and redistribution of disability equipment from the UK to low- and middle-income countries: a case study focusing on 2016–2021 redistributions to Romania

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**ABSTRACT**

The surplus of used disability equipment contributing to waste in the UK and the lack of access to disability equipment in low- and middle-income countries (LMICs) are two issues in need of solution. To address such problems, UK charities refurbish and redistribute used disability equipment to LMICs. To date, there is a scarcity of data on how LMICs could access surplus disability equipment from UK organisations. This study aimed to collate and map out the process by which equipment is refurbished and redistributed from the UK to LMIC's and identify factors which influence the development and sustainability of the partnership. An explorative qualitative case study design was used. Nine semi-structured interviews were conducted with participants from sender (UK) and a receiver (Romania) organisation between January-February 2022, with real-time translation where necessary. Intelligent verbatim transcription was used, and data was analysed using latent thematic analysis. The process of collection, refurbishment and redistribution of disability equipment from the UK to a LMIC organisation was mapped. Three key themes were identified from the interviews: (1) Development out of need; (2) Service development requires an adequate working relationship; (3) Process consolidation and future. Strong, honest and transparent relationships between organisations was identified as underpinning the success of the initiative. Raising service provision standards to meet specific needs of LMIC organisations supports development of suitable equipment prescription. Development of similar partnerships has potential of reducing the inequity gap and waste. Global collaboration and planning are required to address challenges of access to disability equipment in LMICs.

**IMPLICATIONS FOR REHABILITATION**

- Refurbishment and redistribution of surplus disability equipment has emerged and continues to be developed as a response to a critical need for equipment provision in low- and middle-income countries (LMICs), as well as to reduce surplus waste of equipment within the UK.
- The development of strong, honest, transparent and continued relationships between organisations was identified as underpinning the success of the initiative, in particular raising service provision standards to meet specific needs of LMIC organisations to develop suitable equipment prescription for service users.
- Development of similar partnerships has the potential of reducing the inequity gap and waste. Global collaboration and planning are required to address challenges of access to disability equipment in LMICs.

**ARTICLE HISTORY**
Received 25 August 2023
Revised 6 June 2024
Accepted 8 June 2024

**KEYWORDS**
Refurbishment; redistribution; disability equipment; low- and middle- income countries; sustainability; partnership

## Introduction

Globally, over 1.3 billion people live with disabilities, a number which has substantially increased over the last decade due to demographic and epidemiological changes such as increased life expectancy, chronic health conditions, war, forced displacement, natural disasters and the long-term effects of COVID-19 [1–3]. Disability is recognised as a global health issue affecting an estimated 16% of the world's population, of which 80% are living in low- and middle-income countries (LMICs) [3]. Of those identified with disability it is estimated that the number of children (<18 years old) with disabilities is between 93 million and 150 million, reflecting the lack of recent data on children and young people [4,5]. An increasing body of evidence has shown that those living with disabilities experience reduced socioeconomic outcomes, including education, family and community life, and increased poverty compared to those living without disability [6,7]. The unavailability of assistive devices and technology, inaccessible public spaces and transportation, and discriminatory prejudice in society perpetuate a cycle of injustice on a global scale, resulting in the reduced participation in daily activity and reduced independence [1].

Access to disability equipment is not universally equitable, an estimated 90% of equipment provision needs, are not being met within LMICs [8,9]. Presently, 70 million people globally are estimated to need wheelchairs, but only between 5% –15% have access to them [10].

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/17483107.2024.2367717.

The WHO Global report on assistive technology [11] is the first of its kind to provide a comprehensive analysis related to access to equipment and makes recommendations for improving access regarding four areas: policy, personnel, product, and provision of service. It points out that the lack of access to assistive technology has critical impact on the daily life, education, health and well-being of the individuals who need such equipment, and their families.

The global need for disability equipment is estimated to grow above 2 billion by 2050, therefore, the need to improve access to equipment, maximise equipment life and the reduction of waste in landfills, especially in developed countries, need to be addressed [9]. In the UK, the absence of a cohesive national policy facilitating return and reuse of equipment across NHS trusts ($n = 218$) and Local Authorities ($n = 388$) results in a build-up of surplus equipment, considered no longer suitable for use, ending up in landfill [12]. Rates of assistive device abandonment can be problematic in both high and LMIC's and have been reported to range between 20 and 70% due to positive (improvement) and negative factors such as lack of user involvement in design and decision making [11].

Several Non-Governmental Organisations (NGOs) from the UK have started addressing the WHO recommendations suggested in the 2022 report [11] especially increasing access to quality products, training the personnel and facilitating service provision in LMICS. At the same time, they are seeking to reduce the waste of serviceable equipment into landfill. Among the 10 specific recommendations for moving forward, made by WHO in the 2022 report are the formation of international co-operations for service provision to ensure no-one is left behind (Item 10, page p104) and to invest in date and evidence-based policy to understand the specific needs of each country (Item 6, p103) [11]. Such organisations refurbish and donate surplus disability equipment to overseas partners in LMICs. Among these, a sender organisation (a UK based NGO) has sought to address these two specific issues of increasing access and reducing waste, since 2004.

Despite the magnitude of this issue, there is little knowledge and awareness on how LMICs could access disability equipment from UK organisations or form international co-operations to increase access-an issue which is also highlighted in the literature [11,13–15].

Therefore, this study, aimed to collate and map out the process by which equipment is refurbished and redistributed from the UK to LMIC's, and to identify the factors which influence the development and sustainability of the international partnership.

## Materials and methods

Following ethical approval for the study (HLS/2112/AJW/03, 8th December 2021) an explorative qualitative case study design was used to explore: (i) the process by which equipment is collected and distributed to the respective organisations and (ii) the factors which influenced the sustainability of international partnership.

### *Setting and recruitment*

The sampling protocol was agreed using Robinson's [16] four-point approach to qualitative sampling to ensure rigour and transparency. Purposive convenience sampling was used to recruit nine participants (staff members) from a sender organisation in the UK and a receiver organisation in Romania. One participant in the receiver organisation is both a service provider and a service user, as parent of a child with complex disability who accesses refurbished equipment from the UK. Separate emails were sent to sender and receiver organisations inviting participants to be interviewed after they have read all the relevant study information. All participants who responded were interviewed.

Romania has received five consignments of refurbished equipment between September 2016 to January 2022 when data collection was completed. Although Romania was a middle-income country for the duration of the study, it has passed the threshold in 2024 ($13206 GNI per capita) and is considered a high-income country [17]. This unusual economic development ranks Romania in the 65$^{th}$ position globally ($15660 GNI per capita) compared to the UK which ranks in 24$^{th}$ globally ($48890 GNI per capita) according to World Bank 2022 data [18–20].

### *Topic guide*

The interview protocols (Appendix 1 and 2) were developed by two members of the research team who have experience of working with people with disabilities using equipment in high- and low- to middle- income countries. Interview schedules were sent to the organisation leads in the UK and Romania to ensure questions were contextually appropriate, prior to ethics submission.

Either an in-person, at the sender organisation in the UKor an online Zoom interview, with participants at the receiver organisation was conducted between January- February 2022in English and Romanian (where needed). Real time translations was provided by one of the researchers who is a native Romanian speaker with research and clinical experience within the field of disability. Interviews were audio or video recorded if online and were subsequently transcribed by the interviewer, using intelligent transcription, adapting oral to written norms [21].

### *Data analysis*

Data analysis was guided by Braun and Clarke's [22] thematic analysis framework. Data saturation was achieved through interviewing, transcribing, reading and re-reading the transcripts several times by one researcher [23]. Data was then extracted, and codes developed using NVivo (Version 12) [24]. Codes were analysed to subtract the meaning and explanations in context, which developed into key themes. Initial codes and key themes were then reviewed by another researcher, who read all the transcripts for credibility and triangulation of data.

## Results

A total of nine participants were interviewed as part of a larger study ($n = 21$), which included service users' experiences of accessing disability equipment (manuscript in preparation). The participants of the present study are from the sender ($n = 5$) and receiver organisation ($n = 4$). They were therapy ($n = 5$) and non-therapy staff ($n = 4$) comprising of males ($n = 4$) and females ($n = 5$).

The process of collection, refurbishment and redistribution of disability equipment has been mapped out in Figure 1. The figure is split into two linear processes, one for the sender organisation and one for the receiver organisation. For the sender organisation the process starts with liaison with potential sources of used equipment, such as the National Health Service, Private Donors, Therapy Centres, Care Homes and equipment manufacturers. Equipment is then collected by the sender organisation volunteers and stored in regional hubs before being transported to the

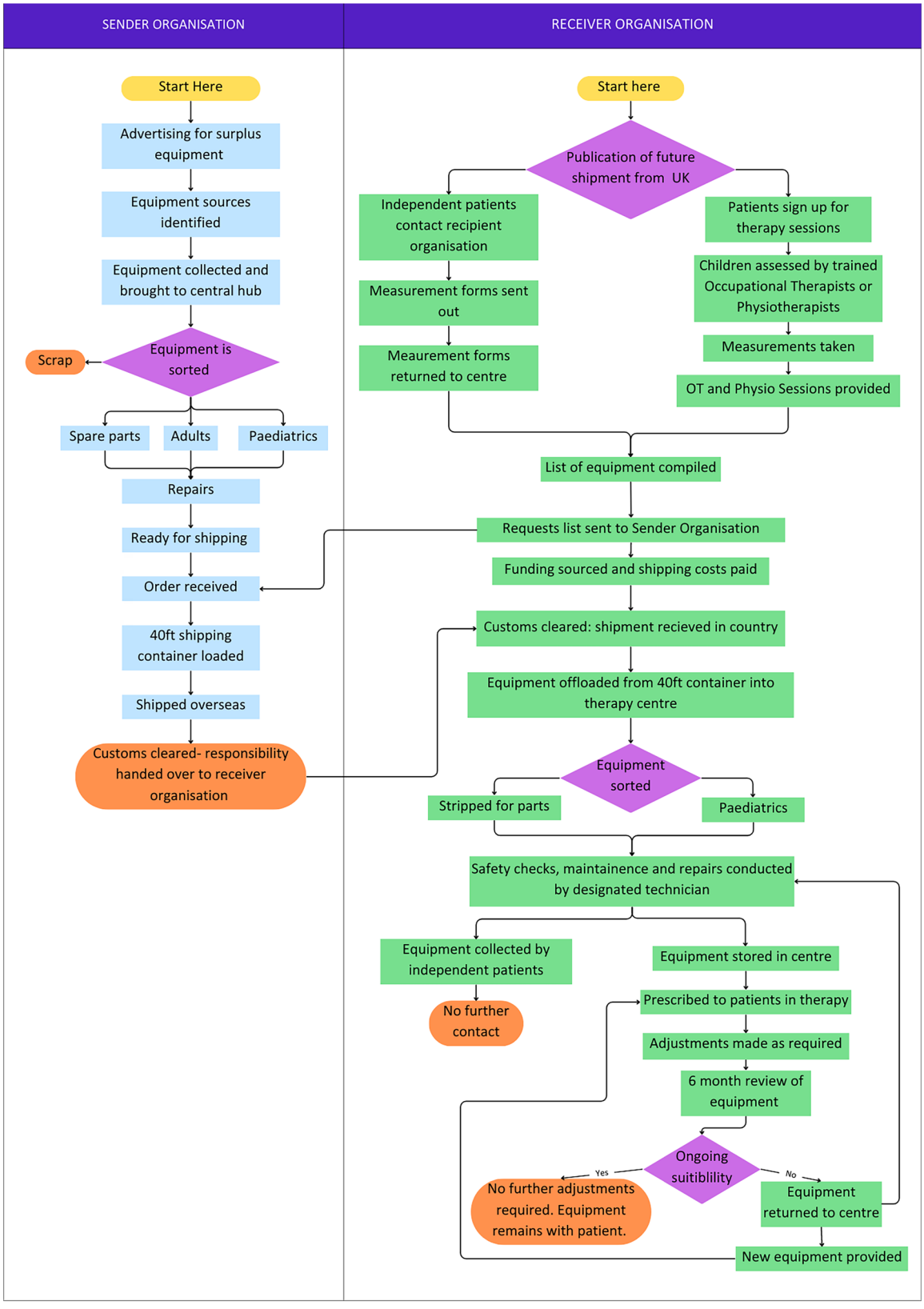


**Figure 1.** Process of refurbishment and redistribution of disability equipment.

central hub in Yorkshire for shipping. All paediatric equipment is brought directly to the central hub to be safety and quality assessed by therapy staff. Equipment checks and repairs are then undertaken on all equipment by trained volunteers received within the central hub, and when considered no longer fit for purpose are stripped for parts. Any material surplus to this is then sent for scrappage. Orders/requests are placed by the receiver organisation 6 months to one year ahead to allow for funds to be raised and equipment sourced where possible. When ready to ship, equipment is catalogued and loaded onto 40 ft containers from

the main hub. Once the shipment has cleared customs, the responsibility for the equipment transfers to the receiver organisation. Each organisation is responsible for customs compliance within their country, while payment of shipping and transport logistics is covered by the receiver organisation.

For the receiver organisation, the process starts with advertising to parents of children with disabilities and gathering orders/requests of equipment needed from the UK. Parents of children who do not access therapy services from the receiver organisation, will complete a form with the relevant measurements to ensure the correct size is requested. Patients at the receiver organisation will be fully assessed by Occupational Therapists or Physiotherapists. Once all the requests are received, a list is produced and sent to the sender organisation. Receiver organisations are responsible for covering the cost of shipping, so funders/donations are sourced.

Once equipment is received in the country and offloaded, sanitisation and secondary safety checks are conducted by the receiver organisations dedicated technician. Spare parts are sent as part of shipments to support ongoing repairs. Equipment is stored until the equipment users can collect it, or trained therapists assess the individuals for equipment needs and subsequent prescription. As part of the therapy service, parents are taught how to use and care for the equipment.

Reviews of prescribed equipment are undertaken every 6 months by therapy staff. If the needs of the patient have changed, equipment is returned, repaired, checked and sanitised again before being reissued to another individual. New equipment is prescribed by therapy staff based on availability. This process continues to be repeated until equipment is no longer serviceable as a whole piece, when it is then stripped for parts to use in repairs.

### *Results of the thematic analysis*

Three themes were identified from both Sender (-S) and Receiver (-R) as key components which drive the ongoing development and sustainability of this process, and these are related to the reasoning behind the development and the mechanism used for improvement and to sustain it.

### *Developed out of a need*

Historically, the service provision of refurbishment and redistribution of disability equipment was set up out of a recognition for the equipment needed during the Bosnian War in 2005. However, there are ongoing unmet equipment needs in the majority of LMICs including EU countries such as Romania and Bulgaria.

The theme of need also captures the need to reduce waste in the UK and to maximise the life of the equipment.

> "…because of the trauma and the physical trauma for some of these kids, it was obvious they needed disability equipment including adults. And it was very quickly identified that they didn't have anything so that is why Pt2-S started getting involved in identifying equipment and taking over in small vehicles to begin with." (Pt3-S)

> "we started getting enquiries from other interested parties……. other organisations, other charities and we started picking up interested parties." (Pt3-S)

> "the Romanian Government or the State, the System does not address this issue- the need for equipment is not addressed… the government may help with some aspects of finances, but doesn't help at all at home with, you know, daily living." (Pt4-R)

The desire to see good quality materials used and reduce waste was also highlighted.

> "the NHS is very averse to litigation and any reuse of their stuff would be liable to someone who would claim that they had slipped and claimed from them" (Pt2-S)

When asked what needs to be done to reduce waste in the UK if sending equipment overseas was no longer possible, another participant recognised that the current policy of the shelf-life of equipment results in increased waste within the UK.

> "Not have a blanket ban on five years. For example, we had… I think it was, 10x first size standing frames from the equipment store[…. .] They got to the end of their five year 'life', and off they go- I reckon only three have been used. Well, that shouldn't be happening[…. .] I think it should be done on the basis of how usable the equipment is, how safe it is, not on its age." (Pt7-S)

### *Service development requires an adequate working relationship*

The process is founded on a close ongoing relationship between organisations, with the case study organisation being considered the "gold standard" (Pt2-S), "excellent" (Pt4-R), "reliable" (Pt6-R) and "loyal" (Pt6-R), enabling both parties to have a trusting relationship.

> "It was consolidated on loyalty. I think we were honest in communicating things with each other. I think that they proved to be professionals in what they do and always keep their word and they are very reliable partners. We trust them…" (Pt6-R)

Stemming from the relational foundation, was a sense of intense pride individuals involved have in being part of the process, with volunteers and staff recalling their length of service and the number of shipments they have been able to participate in.

> "I have been part of every single transport, ever since he started. I have been involved even with unloading the equipment and then categorising and the whole process. I was part of that actually and we were able to redistribute this equipment to so many children and I'm hoping this will continue." (Pt8-R)

> "For the past 10 years we have probably recycled somewhere in the region of 700 metric tonnes of equipment, most of which would have ended up in UK landfill."(Pt2-S)

### *Process consolidation and future development*

The ongoing development of the refurbishment and redistribution process identified a lack of skills from receivers due to reduced exposure to disability equipment across LMICs.

> "It came about because of the Sri Lanka shipment and [name redacted], the physio there, sent me some photos and I thought, oh no! This is not good! So I wrote back [……] And he said, will you come and train us and that is how it started." (Pt7-S)

Without adequate training, experts identified that they would be merely moving the dumping ground from one location (the UK) to another (LMIC's).

> "People will go overseas for two weeks and they'll come home and complain about all this equipment and they'll say things like 'if it's not good enough for us it's not good enough for them'. Well, yeah, it is you just have to train them to know what to do with it" (Pt7-S)

Training provided an opportunity for expanding therapists' knowledge on how to use the equipment (Pt4-R) and served to improve the service provision within Romania (Pt8-R).

> "They were all trained by those two experts to deal with the equipment; [….] what is important, it was not just theory because they also had the opportunity to work to take the practical side of the training." (Pt6-R)

The development of training was identified as being foundational for the vision to see a sustainable model of practice within countries being developed, creating hubs or loan systems to maximise the lifetime of the equipment.

> "We are trying to establish a sustainability situation where we try, if we can, to encourage them to set up a hub for equipment which can be loaned out and brought back and loaned out multiple times." (Pt2-S)

The division of labour was identified as an efficient way to ensure equipment was cared for and provided to service users to a high standard.

> "We have a person in charge of refurbishing, to adapt the equipment and they make sure that everything is right for them. If there are any pieces missing or are not safe for distribution to the child, it will be refurbished." (Pt5-R)

Sender organisations recognised that their ongoing support was also integral to the success of setting up a sustainable model of practice.

> "Sustainability depends on a lot of their internal mechanisms, how they have set it up to manage it, but also their contact with us because we're here to help." (Pt7-S)

Two participants highlighted the challenges of ongoing collaboration based on experiences within customs and border control requirements.

> "The customs in Romania, there is a long process in papers, in documents, so for the last transport we worked for two months to get it in Romania." (Pt6-R).

Customs clearance is recognised as time consuming due to the large volumes of documentation required and can be financially costly to both sender and receiver organisations.

Both sender and receiver organisations recognised the complexity and ongoing nature of developing a working process by which equipment can be effectively refurbished and redistributed from the UK to LMIC's.

## Discussion

The data gathered across all nine interviews, capture the process of collecting, refurbishing and redistributing disability equipment from the UK to this particular LMIC and was mapped out in Figure 1. The themes identified show that need drives development initially but the sustainability of an international co-operation to ensure increased accessed to equipment relies upon robust professional relationships including good communication, rapport and loyalty. The interviews highlighted that training and ongoing alignment to the needs of the service users, are key to development and process consolidation.

### *Developed out of need*

The high demand and need for equipment within LMIC's has been reported across several studies [8,25–27] and continues to be identified within our study. This study identified that even when disability equipment is physically available in a country, the cost limits individual's capacity for accessing required equipment, especially if not supported or subsidised by government funding. This issue is not currently addressed by the UN within the sustainability goals and would benefit from further examination to identify feasible solutions for effective collaboration between organisations that facilitate more equitable access to equipment.

The country's limited resources and often lack of support from political or bureaucratic groups, such as governments, results in ineffective efforts to reduce the disparity to equipment provision [28].

### *Built on relationship*

Study participants consistently recognised that one of the strengths of the current process to refurbish and redistribute disability equipment from the UK to LMIC's is the investment in the relationships developed between organisations on a global level. This corroborates findings by Yao et al.'s [29] literature review which identified the facilitators and barriers to inter-professional collaboration with assistive technology. This study suggests that effective and transparent communication, the sharing skill sets, and the sense of team membership and professionalism are key facilitators in the provision of equipment among allied health professional services [29]. The focus on ongoing support and collaboration between organisations, therefore, suggests the need to develop a sustainable model that benefits both the UK and LMICs receiving the disability equipment.

### *Training and future development*

Savage et al.'s [30] report on equipment provision in LMICs identifies that one of the negative factors of the involvement of NGOs in the process of equipment provision is that these organisations invest only a limited amount of time and funding to training and development. Nevertheless, results from the current study have identified that both organisations, the sender organisation and the therapy centre in Romania continue to focus on the provision of training, skills and knowledge to enable adequate use of equipment by the service users in line with the WHO's Wheelchair service steps outlined in the most recent guidance [27]. The inclusion of trained physiotherapists and occupational therapist volunteers within the sender organisation has improved the quality of equipment sent, training provided, and future development of equipment provision within the LMICs which access equipment through the sender organisation. Without developing the clinical skill set of the sending and receiving organisations, the process has the potential to cause unnecessary harm to the communities it is trying to serve. Looking at the differences in perspective within sender and receiver organisations, when it comes to training, this is an aspect that was raised by the sender organisation in our study.

Arthanat, Simmons and Favreau's [31] study into assistive technology provision and occupational injustice identified that a framework can be used as a tool for stakeholders (consumers, service providers, researchers, technology developers, and policy-makers) to identify the inadequacies of assistive technology provision. The paucity of data on the process of refurbishment and redistribution of disability equipment from the UK to LMICs requires the creation of a clear and concise framework that can be adapted to various countries.

### *Strengths and limitations*

To our knowledge this is the first study that mapped out the process of refurbishment and redistribution of disability equipment

from a high- to low-middle income country, and explored the factors that can support partnership development. The study has the potential to inform organisations within LMICs in need of equipment, as to how they might establish a partnership that enables access to disability equipment. It also raises awareness of the need to prolong equipment life and reduce waste.

The study focused particularly on one LMIC country, Romania which was identified by the sender organisation as a gold standard in terms of process establishment and partnership sustainability. The principles guiding the partnership with all other LMICs which the sender organisation serves remain the same. However, since the study did not capture the views of receiver organisations from other LMICs, the transferability of the findings should be applied with caution and taking into consideration the background of each country. Reflective journaling and team discussions were undertaken throughout the project to reduce the impact of bias. The multicultural and professional background of the researchers living and working in Romania, South Africa and the UK, are likely to have influenced the analysis hopefully in a balanced manner [32].

Whilst this article focuses on the experiences of professionals and the process by which equipment is refurbished and redistributed from the UK to a LMIC, it must be noted that the article does not capture the voices of service users and clients, whose voices are central within service development [33]. Another manuscript (currently in preparation) explores the views and voices of $n = 12$ parents of children who received equipment providing detail on the impact of access to equipment and engaging in occupation. Parents highlighted the challenges they faced within institutional barriers, financial and cultural/attitudinal barriers alongside environmental challenges which limited theirs and their children's access to equipment and engagement in occupations. Parents also reported on positive impact access to equipment has made to the lives of their children and family as a whole. These factors need to be understood and considered within the future development of the service provision within the country, to meet the needs of the service users.

The refurbishment and redistribution of disability equipment from the UK to LMIC's addresses two key issues, of surplus of unused equipment in the UK and lack of access to equipment in LMIC's. More organisation within the UK or other high-income countries and LMICs, should seek partnerships to address the significant inequity faced by people with disability in LMICs regarding access to disability equipment. At the same time equipment prescribing and use in the UK or other high-income countries would benefit from a careful examination with a view to reduce equipment waste and the environmental impact.

## Conclusion

The findings of the study identify that the refurbishment and redistribution of surplus disability equipment has emerged and continues to be developed as a response to a critical need for equipment provision in LMIC's as well as to reduce surplus waste. The success of the initiative strongly relies on an honest and transparent relationship between partner organisations. The sustainability of such partnerships is strengthened by continuously raising the standards of the service provided, for example the quality of the equipment sent, matching the equipment sent to the specific requests of the LMIC organisation. In addition, the ongoing support and training provided to upskill the therapists in the receiver organisation has ensured adequate competency in equipment assessment and recommendations. The development of such partnerships in other LMIC's has the potential of reducing the inequity gap when it comes to equipment provision in LMIC's, whilst reducing waste.

Nevertheless, the issue of equipment sustainability raises several questions which should be considered by future research, given that a large amount of disability equipment is made outside of UK, for example in China and India, then shipped to the UK only to be used for a short amount of time. These items are then reshipped to countries like India, Sri Lanka, Kenya, South Africa, Romania, Bulgaria, and Ukraine, to name a few. The issue of sustainability is experienced differently by the sender and receiver organisations since their priorities are diametrically opposed: one focused on reducing waste by distributing equipment wherever needed and logistically feasible due to equipment excess and the other focused on maximising access, use and equipment life due to equipment scarcity. Future research evaluating the sustainability of disability equipment production, and the legislation guiding equipment use/re-use would be beneficial. The problem of access to disability equipment for people living in LMICs continues to remain an acute issue which is likely to require collaboration and action planning at a global level.

## Acknowledgments

The authors would like to thank all the participants for their time and the information they provided for this study.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

None.

## Notes on contributors

***Lauren Somerville*** is a newly qualified occupational therapist working within paediatric education services in London. Lauren has a wealth of experience working in low- and middle-income countries and the challenges this brings to participation and wellbeing for children.

***Dr. Liana Nagy*** is an experienced academic and occupational therapist currently working in higher education and NHS in the UK. Liana's research focuses on physical activity, participation and wellbeing for children of all abilities.

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