

Unravelling the performance of paediatric triage workers in Rwanda

A Realist inspired literature review

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Preface

I would like to proudly present you my master thesis, a realist inspired literature review that unravels the performance of paediatric triage workers in Rwanda. But not without first expressing a word of thanks to all those people without whom it would not have been possible.

First of all, I want to thank my promotor Dr. Dimitri Renmans and Co-promotor Prof. Dr. Hugo Devlieger from who I learned a lot. It was a real pleasure to work with these two open and helpful people. They were always ready to answer my questions, revise my drafts and give tips and tricks. Their interesting insights about both the structure and content really made it the work it is today.

Secondly, I would like to thank Dr. Lisine Tuyisinge to make time for an interview and provide some valuable insights about the local paediatric triage process.

Furthermore, I would like to thank all the professors and my co-students from the master global health. I worked together with some wonderful students and I admire all the efforts that the teaching staff did to help us discover the global health world. It was fantastic to follow these courses with such a broad variety of interesting people around me. A special thanks to all the fun times we had outside the scope of the master. I had 2 fantastic years and consider you all as friends!

I would also like to thank all my friends that supported me during- and showed interest in my (endless years of) education and who were always open to provide some recreation when I needed a moment away from my desk.

But most importantly, I want to thank my family. They gave me the opportunity to study what I want and always support me no matter what. And my girlfriend, who always listens and is super supportive.

Abstract

Context

Emergency medical services (EMS) play an important role to prevent under five mortalities. Paediatric patients need to be referred to the correct care pathway without any delay. A very important role herein is played by paediatric triage workers (PTWs) that perform a triage assessment of the paediatric patient's condition. If there are clear signs of an emergency, they refer the paediatric patient directly to a physician for further assistance. Currently, their role is widely understudied. A better understanding of how these PTWs operate and what affects their performance may give valuable insights on how to create a context in which they can perform optimally.

Methods

This realist inspired literature review identified contextual factors, actions and processes that underlie the performance of PTWs in Rwanda. These were molded into theoretical propositions and eventually merged into a program theory that explained on what the performance of these PTWs in Rwanda depends. Both scientific and non-scientific sources, from 2015 onwards, were included and the data was supplemented with 2 key informant interviews.

Results

The findings showed that a PTW is influenced by different factors that emerge on three contextual levels. The hospital setting needs to optimally support the PTW, collaboration with and support from fellow staff members is important and the PTW needs to be confident and communicative at the individual level. These factors are important to provide a good experience to the paediatric patient and guarantee a timely and correct referral.

Conclusion

This realist inspired literature review summarizes what works for a PTW to perform a qualitative triage assessment in a Rwandan context and explains why. Consequently, this information enables policy makers to develop more informed choices when it comes to the optimization of the PTW's performance. Additionally, this study advocates for paediatric triage education, further implementation of evidence based paediatric triage guidelines and a specific focus on sustainability when implementing new initiatives or policies.

Introduction

Paediatric emergency care still faces many challenges in low- and middle-income countries with severe under five mortality (U5M) numbers as a result (Duke & Cheema, 2016). Among others, there are challenges in terms of infrastructure, human resources and well-trained professionals that can effectively deliver paediatric lifesaving interventions (Hategeka, Shoveller, et al., 2017). But these challenges vary significantly between and within these low- and middle-income countries (Duke & Cheema, 2016).

Rwanda was able to reach the millennium development goals and consequently reduce their U5M by two thirds between 1990 and 2015. But concerns grow that it's not on course to reach the sustainable development goals that are set to be reached by 2030. With an U5M of 40,5 per 1,000 live births (in 2020) it's still behind the predetermined goal that U5M has to be at least as low as 25 per 1,000 (UNICEF, 2022; UNITED NATIONS, 2022).

Nonetheless, significant strides have been made by the Rwandan government to decrease U5M. In their vision to become an upper middle-income country by 2035 and a high-income country by 2050 they acknowledge the importance of providing equitable, accessible and quality health care services to their citizens (Gashumba, 2018).

However, when it comes to paediatric health care, there are many critical steps that precede health care services. The guardian(s) need to be aware that the child needs emergency care, they need to decide to seek care, there should be an urgent referral by rural health centers to

hospitals and these hospitals need to be accessible (Duke & Cheema, 2016; Jayaraman et al., 2021).

Too often life-threatening conditions go unrecognized by the parents and when the paediatric patient (between 28d and 5y old) eventually arrives in a Rwandan (district) hospital, specific attention should be given to emergency medical services to reduce U5M. Hospitals need to be able to provide immediate and high-quality care to paediatric patients because child mortality is frequently seen within 24 hours after admission in the hospital's emergency department (ED). This suggests that the child was already moribund at arrival (Hategeka, Shoveller, et al., 2017). Nonetheless, a lot of these deaths can be prevented if these paediatric patients are referred to the correct care pathway in the ED without any delay (World Health Organization. Department of Child and Adolescent Health and Development., 2005).

To identify the correct care pathway, a triage assessment is initiated in the ED as soon as a paediatric patient enters (World Health Organization. Department of Child and Adolescent Health and Development., 2005). This triage is defined by the Rwandan ministry of health as a process of sorting patients in a healthcare facility to determine their priority for treatment (MoH Rwanda, 2020). During this triage, a paediatric triage worker (PTW), which is a clinical staff member that is involved in the care of children, assesses the physiological criteria and analyses the symptoms of the paediatric patient. If there are clear signs of an emergency, the paediatric patient is directly referred to the correct physician for further assistance (MoH Rwanda, 2020; World Health Organization. Department of Child and Adolescent Health and Development., 2005).

Due to the importance of such a paediatric triage, many initiatives were developed to improve this process. The Rwandan government invested to improve the capacity of the health care system whilst giving special attention to the human resource situation (Rwanda MoH, 2011; UNICEF, 2020). To this purpose, in 2015 the emergency triage assessment and treatment training (ETAT+) was implemented in Rwanda to support health professionals to improve their paediatric emergency and admission care (Hategeka, Mwai, & Tuyisenge, 2017). This emergency triage guideline is specifically developed for triages in resource poor settings. It differentiates different pathologies early without the need for expensive tests (Duke & Cheema, 2016).

Nonetheless, reviews have highlighted major deficiencies of the quality of paediatric care in developing countries and above initiatives only tackled some of the emergency response factors that evidently form a complex emergency triage "puzzle" (Duke & Cheema, 2016; Hategeka, Mwai, et al., 2017). One largely understudied piece of the "puzzle" is the role that PTWs play in the paediatric triage process and in which context they are able to perform at the maximum of their capabilities (Hategeka, Shoveller, et al., 2017).

Although there could be argued that such a PTW operates in the center of this "puzzle", not a single scoping review, systematic review nor a realist synthesis investigate how these PTWs operate and how these PTWs facilitate a good or a bad triage outcome in a Rwandan context and why. There is a clear need to fill this information gap, a better understanding of how these PTWs operate and what affects their performance may give valuable insight on how to create a context that will improve their performance (J. Greenhalgh & Manzano, 2021).

That's why this study is inspired by the realist approach to dissect the role of the PTW in Rwanda by identifying contextual factors, processes and actions in the available evidence that influence the performance of these PTWs, both positively and negatively. The identified theoretical propositions will then be bundled in a program theory that will clarify the performance of these PTWs in the Rwandan context. Eventually this study will exploit possible recommendations for improvement in Rwanda, but also in other resource low settings as often similar challenges pop up in similar settings (Rycroft-Malone et al., 2012). Ultimately, this may be a valuable asset in tackling U5M in Rwanda and elsewhere.

Methods

A realist inspired literature review

The initial set-up of this study was to perform a realist synthesis that would unravel the performance of Rwandan PTWs. But as the analysis of the relevant literature advanced, it was clear that the literature on this niche topic was limited and fragmented. Therefore, we decided to shift from a pure realist synthesis towards the development of a realist inspired literature review on the topic of PTW's performance in Rwanda.

This realist inspired literature review, like the more traditional literature review, analyzed and summarized the recent literature that included findings related to our research topic (Grant & Booth, 2009). But unlike the more traditional literature reviews, our research method was strongly inspired by the philosophy of scientific realism. It does not just draw conclusions from empirical generalizations, but it gives theoretical explanations of what works for PTWs to perform well, how this works, when this works, in which circumstances and why (Dalkin, Greenhalgh, Jones, Cunningham, & Lhussier, 2015; Wong, Greenhalgh, Westhorp, Buckingham, & Pawson, 2013).

Realist reviews aim to identify the specific mechanisms and relevant contextual conditions that lead to a successful outcome. The interaction between this mechanism, the context in which it plays out and the consequent outcome is then framed into a context-mechanism-outcome (CMO) configuration (Dalkin et al., 2015; T. Greenhalgh & Greenhalgh, 2016).

Due to the scarce literature on this niche topic, we shifted from the ontologically in-depth realist synthesis methodology, that forms strict CMO configurations, to a realist inspired literature review. We then analyzed the literature and identified theoretical propositions that were similar to CMO configurations but more superficially summarized which actions and processes led to a good or bad performance of PTWs in Rwanda and why they did so. This enlightened us about what guarantees or blocks the productiveness of the Rwandan PTWs and why. Due to the social nature behind the productiveness of PTWs in Rwanda it can be seen as a social phenomenon for which a realist-based methodology could give interesting insights (J. Greenhalgh & Manzano, 2021).

These theoretical propositions were then used to refine an initial program theory (IPT) to form a refined program theory (RPT). We therefore undertook the same steps as put forward by Rycroft-Malone et al. 2012, as adapted from Pawson & Tilley, but focused on processes and actions instead of mechanisms (Rycroft-Malone et al., 2012).

The aim of this realist inspired literature was to identify the program theory that explains the performance of PTWs. This will enlighten us about what works or does not work for the Rwandan PTWs and when and why.

Developing an Initial Program Theory (IPT)

The first step of this approach aims at developing an IPT. This step was based on prior knowledge of the research team, expert opinions and broad PTW related searches in both scientific and non-scientific literature to identify theoretical propositions that could explain what, how and why certain triage outcomes were obtained (Dalkin et al., 2015). Like the CMO-configurations in the realist approach, our theoretical propositions are hypotheses that explain the conditions under which an outcome occurs and the process and actions that link the context causally with the outcome. All findings were gathered and pooled to form an IPT that gave an overview of the preliminary understanding of PTW performance in Rwanda.

Data collection

After the development of an IPT, a systematic search strategy was developed to identify evidence to refine the IPT.

Our study included all studies, either quantitative or qualitative, from both scientific and non-scientific literature, that gave information about contextual factors, actions and processes that influenced the performance of a PTW, both negatively and positively, in Rwanda. Additionally,

two realist interviews were performed with experts in the field of Rwandan paediatric emergency triage. Our study therefore incorporates a broader range of data compared to the inclusion of only quality appraised scientific articles used in a traditional literature review. Information from these other sources proved very valuable during the refinement of the IPT.

This study will include all sources from 2015 onwards as Rwanda made significant efforts to improve paediatric emergency care since then and results from before this period may give some false negative information about the current Rwandan health care system.

Non-scientific records were sought via google search engine until the search results were not related to the topic anymore. The scientific databases AJOL, PubMed and web of science were thoroughly searched for relevant literature. Every search string consisted of two layers: First the job role of interest (i.e., paediatric triage, emergency care for children, Triage Worker, Triage nurses, etc.) and second the geographical location (Rwanda).

Different spelling was accounted for, as well as medical subheadings (MeSH) if applicable.

Search queries were drafted following the evidence-based PRESS guidelines (McGowan et al., 2016). Impactful additional literature found during the process (snowballing, references, expert input, etc.) was considered and reported when included. The search strategy is elaborated in appendix 1.

Articles or documents were judged to be relevant if they were able to confirm or dispute parts of the IPT and therefore contributed to the refinement of the IPT.

Inclusion of relevant articles or documents was decided using an in/exclusion flowchart that investigated the exclusion criteria, retrievability and eligibility. The search eventually led to 28 scientific articles and 23 records of non-scientific literature to which 2 realist interviews were added. All the included records were closely related to the triage process in Rwanda after 2015 and the selection procedure is visualized in Figure 1.

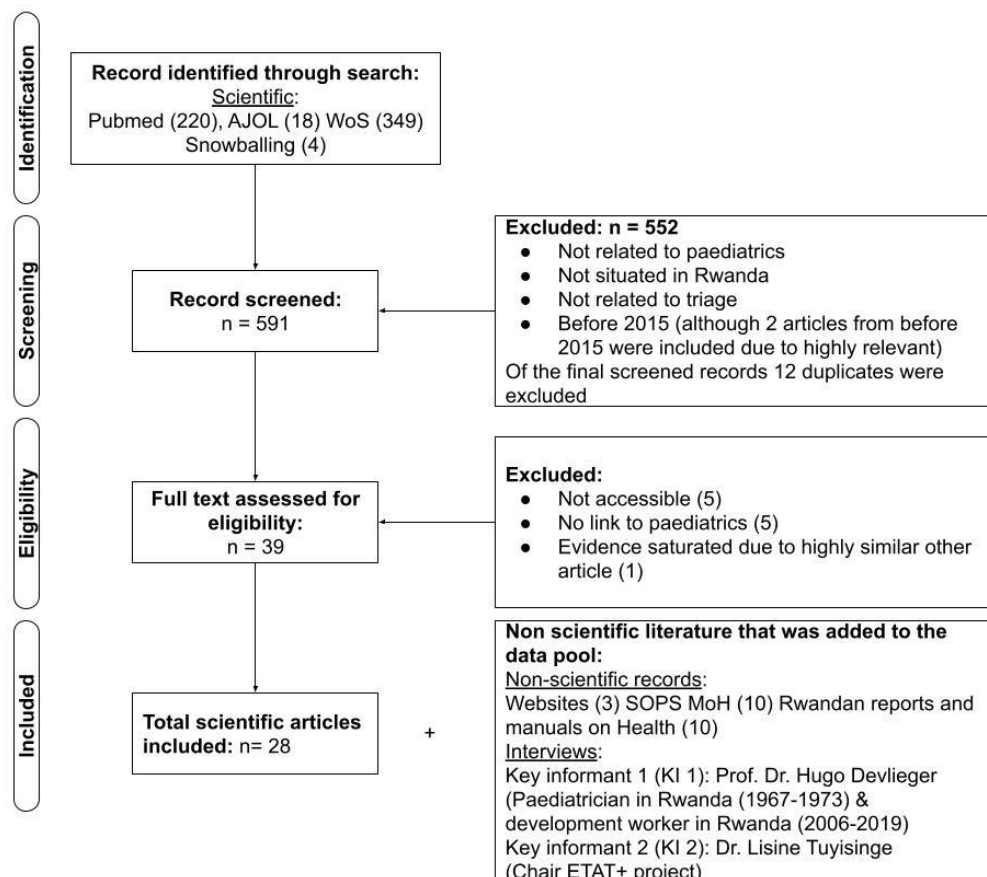


Figure 1: Inclusion / exclusion flowchart.

Data synthesis and developing a Refined Program Theory (RPT)

The retrieved articles and interviews were thoroughly reviewed and all items that were able to contribute to the refinement of the IPT were extracted and described in an Excel database.

This database contained all aspects that confirmed or rejected aspects of the IPT and linked them to the corresponding theoretical propositions from the IPT. Additionally, information that was interesting for the development of new theoretical propositions was stored as well.

With the help of this data, the initial theoretical propositions (annex 2) were broken down in smaller aspects and refined theoretical propositions were developed that explained their essence more in detail. Next to that, new theoretical propositions were formed. This led to a total of eight theoretical propositions that were related to the performance of PTWs in Rwanda after the realist inspired literature review. These theoretical propositions were eventually merged to develop a RPT underlying the performance of paediatric TWs in a Rwandan setting.

Results

The initial program theory

With the development of an IPT, a framework was developed that helped to further investigate the evidence related to the performance of PTWs in a Rwandan context (Rycroft-Malone et al., 2012). We defined “PTW performance” as the capacity of a TW to generate a timely assessment of the patient and a correct referral towards the right care pathway (in line with the latest guidelines), whilst appropriately and compassionately communicating with the patient and their guardian(s). To develop this IPT, contextual factors, actions and mechanism related to the performance of PTWs in Rwanda, were extracted out of key informant opinions, prior knowledge and evidence that was found during a preliminary literature review. From the findings, three theoretical propositions originated. They are thoroughly presented and explained in Appendix 2 and shaped into an IPT. This IPT was visualized in a logical model as seen in Figure 2.

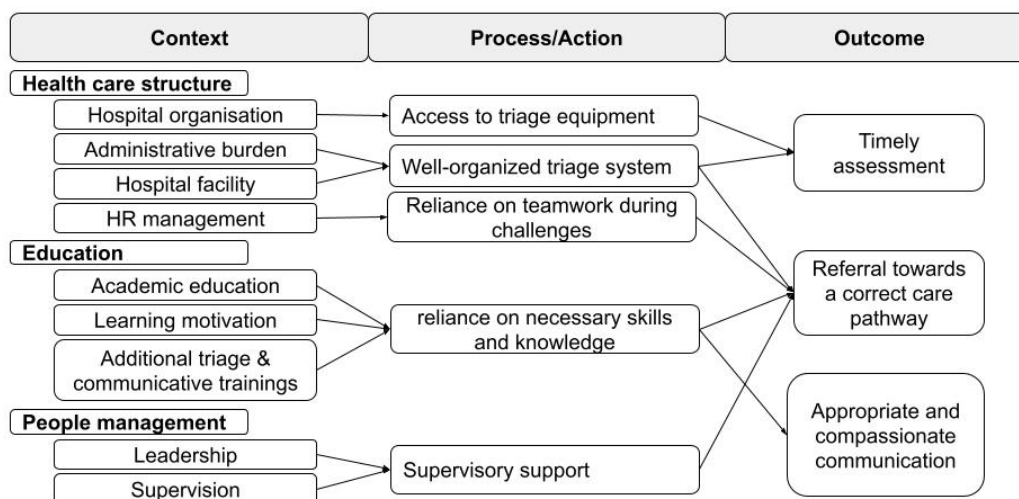


Figure 2: The initial program theory

The refined program theory

After thorough examination of the literature related to our research topic, the relevant data was extracted and compared with the IPT. We saw that the IPT could be broken down in smaller aspect to adequately describe the factors that influence the performance of PTWs in Rwanda. Additionally, some new factors emerged. To refine the IPT, eight theoretical propositions were drafted that explained which contextual factors influenced some processes and actions that underlie the performance of PTWs and what their concurrent outcome was (Table 1). They were classified on three contextual levels; (1) the hospital setting, (2) the team setting and (3) individual characteristics.

Table 1: The eight theoretical propositions that emerged after a thorough realist inspired literature review

1. Hospital setting	
1.	If the emergency department (ED) provides separate triage spaces for children and sufficient access to paediatric triage specific medical equipment, the TW has all the needed triage instruments at hand to make a timely and correct triage assessment. (Aluisio et al., 2017; Cancedda et al., 2018; Glory Iribagiza, 2022; Hategeka, Shoveller, et al., 2017; Hategeka, Mwai, et al., 2017; Hategeka, Shoveller, Tuyisenge, & Lynd, 2018; Jayaraman et al., 2021; Noble et al., 2020; Nyirasafari et al., 2017; Samuels, Amaya, & Balabanova, 2017; Tuyisenge et al., 2014; Uwisanze et al., 2021) + K1, K2
2.	An ED with enough health care workers that are qualified to perform emergency paediatric triages will make sure that there are PTWs present that can rely on their knowledge about paediatric triages so that the paediatric patient receives immediate attention from qualified personnel. (Cancedda et al., 2018; Gashumba, 2018; Hategeka, Mwai, et al., 2017; Hategeka et al., 2018; Nyirasafari et al., 2017; Pascasie & Mtshali, 2014; Rosman et al., n.d.; Rwanda MoH, 2011; Samuels et al., 2017) + K1
3.	If the hospital invests in the development of evidence-based triage specific emergency policies, standardized triage guidelines and innovative triage tools there is a clear evidence-based framework that provides a solid support structure on which PTWs can rely when difficult or unexpected situations occur during the paediatric triage process. (Byiringiro et al., 2021; Cancedda et al., 2018; Das, Gopalan, & Chandramohan, 2016; Duke & Cheema, 2016; Gashumba, 2018; Hategeka, Shoveller, et al., 2017; Hategeka, Mwai, et al., 2017; Hategeka et al., 2018; Hategekimana et al., 2016; Hirschhorn et al., 2021; Jayaraman et al., 2021; Kwizera et al., 2019; Noble et al., 2020; Pascasie & Mtshali, 2014; Rosman et al., n.d.; Rwanda MoH, 2011; Samuels et al., 2017; Tuyisenge et al., 2014; Tuyishime & Rosa, 2017; Uwisanze et al., 2021; World Health Organization. Department of Child and Adolescent Health and Development., 2005) + KI 1, KI 2
2. Team setting	
4.	PTWs that receive supervision and mentorship during their paediatric triage assessment are held accountable by more skilled PTWs and receive support to tackle the know-do gap so they are motivated to perform well during the paediatric triage process and have a stronger practical skill side. (Das et al., 2016; Hategeka, Shoveller, et al., 2017; Hategeka, Mwai, et al., 2017; Hategeka et al., 2018; MoH Rwanda, 2018; Rwanda MoH, 2011; Samuels et al., 2017; Tuyisenge et al., 2014; Uwisanze et al., 2021)
5.	An ED that collects records of the paediatric patient's admission and assessment contributes to an archive that can be used for research purposes and monitoring of the PTW's assessment performance so the PTWs can benefit from updated evidence-based guidelines and they are motivated to perform well as they are held responsible for their triage assessments. (Aluisio et al., 2017; Byiringiro et al., 2021; Enumah et al., 2016; Hategeka, Shoveller, et al., 2017; Hategeka et al., 2018; Hirschhorn et al., 2021; Jayaraman et al., 2021; Noble et al., 2020; Nyirasafari et al., 2017; Rwanda MoH, 2011) + KI 2
6.	A team that is transdisciplinary in nature and builds upon good leadership creates an enabling environment for collaboration, communication and feedback between the different team members which results in more motivated PTWs due to more support. (Cancedda et al., 2018; Gashumba, 2018; Hategeka, Mwai, et al., 2017; Jayaraman et al., 2021; MoH Rwanda, 2018a, 2018b; Noble et al., 2020; Rosenberg et al., 2020; Samuels et al., 2017; Tuyishime & Rosa, 2017; Twagirayezu, Busisiwe, & Umutoni Cishahayo, 2021; Uwisanze et al., 2021; World Health Organization. Department of Child and Adolescent Health and Development., 2005) + KI 1
3. Individual characteristics	
7.	PTWs that followed paediatric triage specific education (and refresher courses) are more skilled and consequently they are more capable to confidently perform a paediatric triage assessment, and respectfully approach the patient or it's guardian to provide the right referral with respect for the paediatric patient and its guardian. (Aluisio et al., 2017; Cancedda et al., 2018; Duke & Cheema, 2016; Gashumba, 2018; Hategeka et al., 2018; Jayaraman et al., 2021; MoH Rwanda, 2018a, 2018b; Rwanda MoH, 2011; Samuels et al., 2017; Tuyisenge et al., 2014; Twagirayezu et al., 2021; Uwisanze et al., 2021; World Health Organization. Department of Child and Adolescent Health and Development., 2005) + KI 1, KI 2
8.	An accessible TW that pro-actively communicates with the patient's guardian(s) will develop mutual trust between him and the guardian(s) which will increase the guardians input concerning the patient's disease signs and optimize the guardians ED experience. (Aluisio et al., 2017; Byiringiro et al., 2021; Das et al., 2016; Gashumba, 2018; MoH Rwanda, 2018b; Samuels et al., 2017; Uwisanze et al., 2021) + KI 1, KI 2

These new theoretical propositions were combined per contextual level and merged into a refined program theory that explained which actions or processes facilitated or blocked the performance of a PTW and which contextual factors were important to create a context in which a PTW flourishes. This RPT was visualized in a logical model as seen in figure 3.

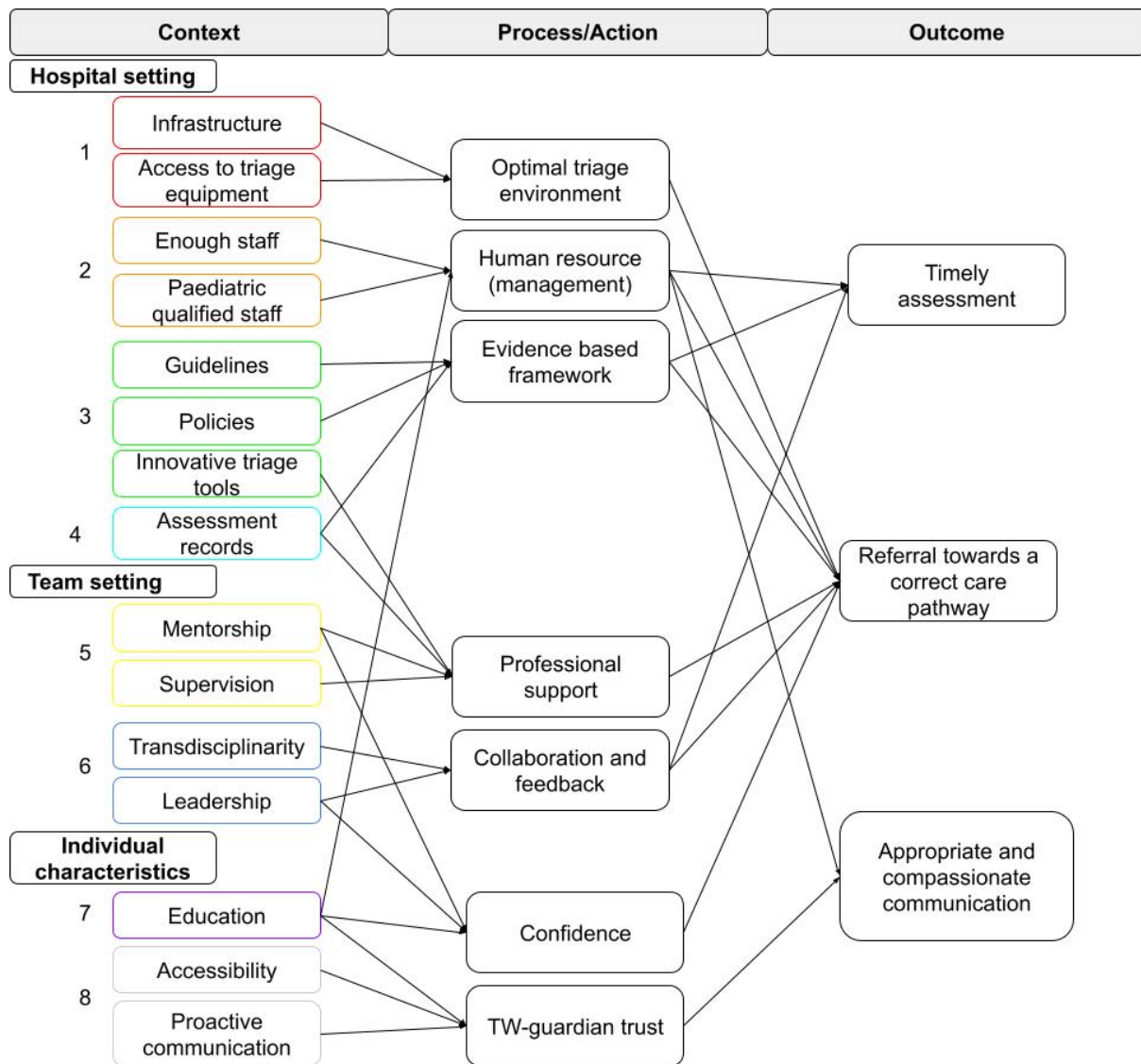


Figure 3: The refined program theory

Here we will elaborate further on the RPT and discuss its aspects at the different contextual levels. The influence of contextual factors on actions and processes and their corresponding outcomes will be chronologically discussed.

1. Hospital setting

As in every professional environment, the work of an individual is highly dependent on the environment in which the individual operates. Consequently, the performance of a PTW is susceptible on the support that the person receives from the hospital setting.

On the one hand, there is a clear need for infrastructural and medical resources. Paediatric triage assessments often happens outside or in the hallway where it's often unhygienic and there is insufficient light to observe all the disease signs and objective symptoms. Although the WHO ETAT+ guidelines mention that a paediatric triage can happen at any place or everywhere, both key informants mentioned that the ED needs triage rooms that are spacious and bright enough (KI 1, KI 2). Triage rooms do not only give the PTW an ideal environment

to work in, they also contribute to the privacy of the paediatric patient. In addition, these rooms need to have the necessary medical equipment, such as weight and height scales, blood pressure monitors, oxygen saturation monitors, temperature monitors, etc., that are necessary for a PTW to make a triage assessment (Cancedda et al., 2018; Hategeka, Shoveller, et al., 2017; Uwisanze et al., 2021).

On the other hand, the hospital has to invest in adequate human resource management so that the shift schedule in the ED takes into account that there are enough staff members present during a shift and that the triage worker of service is qualified to perform paediatric triages ((Cancedda et al., 2018; Hategeka et al., 2018; Pascasie & Mtshali, 2014; Rwanda MoH, 2011; Samuels et al., 2017; Uwisanze et al., 2021), KI 1).

Finally, the hospital has to acknowledge the importance of patient files. These documents are of high value to record the actual state of a patient in an objective document that serves as a guide for the follow-up care. But when these records are properly archived, this data may also prove of high value for research purposes and the optimization of governance documents such as procedures and guidelines ((Hategeka, Shoveller, et al., 2017; Noble et al., 2020; Rosenberg et al., 2020), KI 1). Consequently, the PTW has access to standardized triage guidelines, emergency policies and innovative triage tools that are based on the latest scientific evidence and give guidance to the PTW and all other staff members. Examples are the ETAT+ standards, the standard operating procedures that are published by the Rwandan ministry of health and a project that uses artificial intelligence to support PTWs by identifying clusters of disease symptoms that may be related to severe paediatric pathologies ((Kwizera et al., 2019; World Health Organization. Department of Child and Adolescent Health and Development., 2005), KI 1, KI 2).

These factors could influence actions and processes. When understaffing problems in the ED are reduced, no double shifts are needed and the PTWs don't have to do overtime which could affect their performance. Consequently, there should always be a TW present that is qualified to perform the paediatric triage assessment (Hategeka et al., 2018). During their day-to-day operations, the PTW is supported by an evidence-based framework based on the latest guidelines and has access to innovative triage tools and all other necessary triage instruments to make a qualitative triage assessment (Hirschhorn et al., 2021). The availability of an archive containing all the paediatric patients' assessments gives a chance to monitor the PTW, discuss critical cases with the team and develop new guidelines and tools ((Noble et al., 2020; Rosenberg et al., 2020), KI 1, KI 2).

Therefore, the reliance on sufficient and well trained PTWs shortens the response time that is needed to assess new paediatric patients. This supports the guidelines of the WHO that state that a paediatric patient needs to be assessed as soon as they enter the ED (World Health Organization. Department of Child and Adolescent Health and Development., 2005). Additionally, with the help of an evidence-based framework, the TW has the adequate support structure and resources to refer the paediatric patient to the correct care pathway. A framework makes sure that the PTW is supported during unexpected and difficult circumstances (Duke & Cheema, 2016; Noble et al., 2020).

2. Team setting

In Rwanda, a team setting that lends support to PTWs that operates in the ED contains a multitude of actors. First of all, a visionary leader that creates a supportive team culture in the ED is very important (Samuels et al., 2017; Tuyishime & Rosa, 2017). According to the literature, such a supportive team highly values trans disciplinaryity (Rosenberg et al., 2020; Twagirayezu, Busisiwe, & Umutoni Cishahayo, 2021; Uwisanze et al., 2021). Not only should such a team consist of health care workers and specialists with different backgrounds, the presence of supervisors and mentors were also perceived as important (Hategeka, Shoveller, et al., 2017; Hategeka et al., 2018; Tuyisenge et al., 2014; Uwisanze et al., 2021).

An environment that accounts for these contextual factors may improve the processes and actions that underlie the performance of PTWs. Such a visionary leaders for example. They

supervise and steer their team towards an enabling environment in which they help all team members to grow into their job role and to effectively collaborate and communicate with each other (Twagirayezu et al., 2021). An important aspect of communication is the transfer of patient information from the day-shift to the night-shift and vice versa (KI 1). This is very important to guarantee a continuity of qualitative care for the paediatric patient. When it comes to collaboration, mentors, which are mostly more experienced PTWs, support their younger colleagues to overcome difficult situations but also to tackle the gap between knowledge and practice (Hategeka, Mwai, et al., 2017). Next to that, the supervisor of a TW, which is often the mentor, monitors the PTW closely and holds the PTW accountable for incomplete procedures. The earlier mentioned assessment records help the monitoring process (Hategeka et al., 2018). They provide work points that can, among other things, be discussed on feedback moments in which the PTW, it's supervisor and the medical practitioner discuss critical cases. The conclusion of these feedback moments is communicated during a debriefing session where the whole transdisciplinary team sits together to give each other feedback and where there is a reflection on extraordinary cases from the perspective of the different specialties in the team (Noble et al., 2020). These debriefing sessions were stressed as very important, by both key informants to provide clarification and optimize procedures. Consequently, it improves the quality of care (KI 1, KI 2).

This transdisciplinary teamwork, mentorship and communication makes sure that there is sufficient collaboration between the specialties and that the PTW is capable of referring a paediatric patient with different morbidities to the correct care pathway, or multiple care pathways that are needed for a good recovery (Tuyishime & Rosa, 2017). Additionally, feedback contributes to optimization of the day-to-day operations and therefore, it not only motivates the entire team, it also contributes to the improvement of practical skills (Uwisanze et al., 2021) .

3. Individual characteristics

On the individual level, the PTW needs to be sufficiently skilled to perform the paediatric triage assessment. In the Rwandan context, this skillset can be viewed from two different angles. First of all, multiple sources stressed the lack of well-trained PTWs in Rwandan hospitals ((Hategeka, Mwai, et al., 2017; Hategeka et al., 2018; Hategekimana et al., 2016; Tuyisenge et al., 2014; Twagirayezu et al., 2021), KI 1, KI 2). The triage workers of service are often A2 nurses that had no additional training with a focus on paediatric triage in specific. This often led to a deficit in triage knowledge and essential skills (Hategeka et al., 2018; Twagirayezu et al., 2021)

Key informant 2 mentioned:

“If TWs are not trained, they will not understand and they will neglect importance (of triage). They are all very happy to be trained because then they know the importance of the triage.”

Secondly, refresher courses are seen as important to keep this knowledge up to date (Hategeka, Mwai, et al., 2017; Tuyisenge et al., 2014).

Additionally, next to the essential skills, the PTW needs to be accessible for the paediatric patient and its guardian(s) that are on the receiving end of the triage process (Aluisio et al., 2017; Gashumba, 2018; Samuels et al., 2017). In Rwanda, pro- active communication is important to adequately interact with each other (KI 1, KI 2).

As earlier mentioned on the hospital level, there is a clear need for qualified staff to guarantee actions and processes that strive towards a good quality of care in the ED. Education makes sure that PTWs have the essential knowledge, practical experience and confidence to perform a triage assessment (Hategeka, Mwai, et al., 2017). In addition to that, the correct education pays attention to communication so that the PTW is trained to respectfully and proactively interact with the patient and its guardian ((World Health Organization. Department of Child and Adolescent Health and Development., 2005), KI 2). This leads to a trust relation between the PTW and the guardian of the patient which is in a paediatric context very important as due to the fact that children are often unable to communicate their feelings and symptoms, but the

guardian might be capable to do so (KI 1). Therefore, such a trust relations will optimize the information about disease symptoms that a PTW gets from the guardian(s). But also, from the side of the PTW it's important to show enough empathy to build this trust. Key informant 1 articulates this as the following:

“An adult is capable to express itself, but children are not always capable to do so. That’s why a triage nurse for children always has to go more in depth and not only look superficially (to signs and objective symptoms). The relation between the TW and the guardian is therefore very important and there needs to be trust (so that the guardian communicates symptoms)”

Due to a good relationship, the input of the guardian(s) concerning the paediatric patient's disease signs is ought to be more complete which leads to a better referral to the correct care pathway. But the PTWs communication skills and the trust relationship with the patient and its guardian can also lead to a respectful handling of the patient and its guardian(s) and a corresponding less overwhelming ED experience for the patient and its guardian (Byiringiro et al., 2021).

Discussion

This literature review has investigated the contextual factors, actions and processes that lead to the timely and correct triage assessment of paediatric patients by a PTW and the adequate communication from this PTW towards the paediatric patient and its guardian(s).

In the initial stage of this study, we developed an IPT that preliminary explained the performance of PTWs in Rwanda. In short, the findings showed that the PTWs were relying on the organization of the health care structure, the correct education of the PTW and the people management in the hospital. When the Rwandan hospitals took these factors in mind, the PTW could depend on a well-organized triage system, had the necessary skills and knowledge to make a correct triage assessment and the individual operated in a team where teamwork was key.

After interviews with two key informants on the topic of the Rwandan triage system and a thorough literature search of both scientific and non-scientific literature, all of the initial contextual factors and their corresponding actions and processes resurfaced. Nonetheless, the realist inspired literature review identified more information that led to the development of an RPT. This RPT exposed new contextual factors and concurrent processes and actions on three levels, the hospital setting, the team setting and individual characteristics. The new program theory is extensively discussed in the result section above and a visual representation can be found in the form of a logical model in figure three.

In this discussion, we elaborated further on contextual factors, actions and processes out of the theoretical propositions that were already widely mentioned in the literature and explained why they were perceived as important to optimize the performance of PTWs. Additionally, we exposed the overlap between different theoretical propositions on different contextual levels, identified knowledge gaps for which research recommendations were proposed and proposed some policy recommendations that could support the PTWs during the paediatric triage process.

As this is a realist inspired literature review, this study captured theoretical propositions that are believed to impact the performance of a PTW in a Rwandese setting. And it should be stated that a lot of the theoretical propositions were well described in the literature whilst others were only sporadically mentioned.

The lack of paediatric triage related education and refresher courses was widely mentioned in the literature. But currently there are already initiatives in place that try to positively influence the knowledge and skills of PTWs. WHO developed a set of guidelines specifically for paediatric triage in resource low settings, the ETAT+ manual, and the Rwandan paediatric society regularly organizes trainings courses of 5 days to help PTWs improve their skills and implement these guidelines in their hospital (World Health Organization. Department of Child and Adolescent Health and Development., 2005). Such guidelines were during the study often

pointed out as a very positive influence on the PTWs as it motivates them and they have something to rely on (Duke & Cheema, 2016; Hategeka et al., 2018).

Both key informants mentioned the importance of ETAT+ to improve the performance of PTWs. As a closing note, key informant 2 strongly advocated for the following:

“I would like to advocate for more hospital facilities where they should implement ETAT+ but also advocate for parents to go to a TW trained in ETAT+”

Next to that, there is currently a Rwandan master in nursery that focusses on improving nursing knowledge in the African context (Tuyishime & Rosa, 2017).

A lack of mentorship closely followed a lack of education as a negative influence on the performance of PTWs. Two articles from before 2015 (inclusion date) already stated that clinical mentorship improved paediatric quality of care in Rwanda (Anatole et al., 2013; Manzi et al., 2014). And although there are a multitude of articles that describe mentoring programs and initiatives that are set up in (rural) Rwanda to implement such a positive mentoring (Rosenberg et al., 2020; Uwisanze et al., 2021), there are other sources that still stress the lack of mentoring for PTWs (Hategeka, Shoveller, et al., 2017; Hategeka et al., 2018; Uwisanze et al., 2021). Additionally, these mentorship programs are hard to sustain due to the fact that there is often turnover of the mentoring staff and a lack of resources to guarantee the travel of these mentors to different hospitals (Hategeka, Mwai, et al., 2017a; Twagirayezu et al., 2021). And interestingly these mentorship programs were not mentioned during the key informant interviews. Overall, this shows that the focus on training and education increases, but the questions raises if there is a need for a better and more sustainable implementation of mentorship initiatives to guarantee a resilient mentorship program (Hategeka, Mwai, et al., 2017)

Finally, multiple studies mentioned the value of admission and assessment records in the process of developing an evidence-based framework and monitoring the PTWs (Hategeka, Shoveller, et al., 2017; Hategeka et al., 2018; Hirschhorn et al., 2021). But it's important to mention that both key informants and the ETAT+ manual argue that the filling of administrative documents, such as the assessment records, have to be seen as secondary in an emergency situation ((World Health Organization. Department of Child and Adolescent Health and Development., 2005), KI 1, KI 2). The priority should lie on the triage of the paediatric patient and clinical handling to provide them immediate emergency care. Administration should come second in such situations.

Overlap at the different contextual levels

Although the RPT divides context, processes and actions on three levels, it must be stated that there can be contextual factors that influence actions or processes across these levels. The innovative triage tools and feedback coming from assessment records may supplement the mentorship that is given by a mentor to offer professional support to the PTW ((Noble et al., 2020), KI 2) In addition to Organization? the professional support, a good mentor together with a good ED leader, may have individual conversations with the PTW next to the feedback moment with the ED team in which they can support the PTW in its professional development as they know what is important in the triage process and where to emphasize on ((Tuyishime & Rosa, 2017), KI 2). Therefore, their individual support may boost the confidence of a well-educated TW which may even further increase its performance. Such a well-educated individual may even support the human resource management at the hospital as it gives the opportunity to develop a shift schedule in which they can assign triage workers that are qualified to perform a paediatric triage (Hategeka et al., 2018).

Research recommendations

Although this realist inspired literature review gives a good overview about the theoretical propositions that influence the PTW, some of the theoretical propositions need to be studied more in depth in future studies. Like earlier mentioned in the result section, there is a clear need to define further in which context optimal team collaboration and feedback is supported.

But there are also some other aspects of the findings that need to be researched more in depth to fill gaps in the literature:

A first topic that is little talked about in the literature is which medical resources are needed to perform a qualitative paediatric triage. Hategeka et al. 2018 provides some interesting insights about the medical resources that a PTW needs during the triage assessment but it would be valuable to have a research team conduct a study on what is needed in terms of infrastructure and human/medical resources to make sure that the PTW has everything at its disposal to perform a qualitative triage assessment. Furthermore, a comparison between the ETAT+ guidelines and the current standard operating procedures that are published by the Rwandan Ministry of health may give valuable insight on how these standard operating procedures can be optimized.

Additionally, the communication and relationship between the PTW, the patient and its guardian is widely understudied. Not a single study was found on the psychology behind a visit to the ED by the patient and its guardian(s) and only few studies mentioned the importance of good communication between the PTW and the guardian(s) (Aluisio et al., 2017; Gashumba, 2018). Both key informants saw this as an essential aspect of the paediatric triage process and expressed the need for further research to assess what can optimize the relationship between both parties, how the paediatric patient and its guardian(s) experience the paediatric triage process and what their views are on privacy, communication with the TW, the ED setting, etc. Eventually this could optimize the trust between the PTW, the patient and its guardian(s) as well as improve the ED experience for both the patient and its guardian(s) (KI 1, KI 2).

Next to that, the literature rightly stated that a transdisciplinary team with a clear leader that takes teamwork in mind will optimally support the TW towards a good paediatric triage performance (Tuyishime & Rosa, 2017; Uwisanze et al., 2021). This is also something that pops up in numerous articles and was mentioned by both key informant (KI 1, KI 2). But none of these studies define the relationship between the PTW, the mentor, the leader and other members of the staff. This leads to ignorance about what these studies define with “teamwork” and how good “teamwork” is described. Out of the interviews came clear that there is not always a good relationship between the nurses, such as the PTW, on the one hand and the physicians on the other hand (KI 1, KI 2). This raises the question of how the studies that mention the importance of teamwork viewed the gap between these different staff members and how they overcame it to provide a Rwandan ED in which teamwork is key.

Finally, financing was seen as a very influential factor in some studies and by both key informants. Performance based financing would motivate the PTW to carry out a qualitative triage assessment (Das et al., 2016). On the other hand, the PTWs were seen to prioritize the administration (triage assessment records and admission records) that is necessary to receive their performance-based financing above the necessary handlings that are imminent in an urgent situation where a paediatric patient is in a critical condition (KI 1). Therefore, it could influence the care that the paediatric patient receives. As there is currently insufficient information available about the influence of performance-based financing on PTWs and this discussion would drift off from the essence of this paper, we encourage further investigation of this topic.

Policy recommendations

Knowing the different contextual factors, processes and actions that influence the performance of a PTW, both positively and negatively, may give important information on how to shape a context in which the PTW's performance is optimized. With this optimized context, implementation researchers can develop policies and recommendations because in a similar context, individuals are likely (although this is not always true) to make the same choice (Rycroft-Malone et al., 2012). Ultimately, this may be a valuable asset to tackle U5M in Rwanda, and by extension sub-Saharan Africa as due to the fact that these recommendations may prove valuable in other low- and middle-income countries due to similar low-resource settings.

These improvements and recommendations should be developed with the factor implementation in mind. Earlier in this study we already raised the question if the implementation process of the mentorship intervention in Rwanda was able to keep going over a longer period of time. Therefore, future interventions and policies should focus more on the development of a well elaborated implementation procedure to guarantee resilient interventions. Research that investigates the sustainability side of policies and interventions in Rwanda could be a valuable asset to improve the resilience of these policies and interventions.

Additionally, both the literature and the key informants expressed the importance of providing a qualitative education and additional trainings to PTWs. Therefore, the Rwandan policies should promote a career in nursing and encourage the implementation of initiatives, such as ETAT+, that provide evidence-based guidelines and corresponding training to promote best practices concerning paediatric triage. A specific support of innovative triage tools is also of importance to support the PTWs.

Strengths and limitations

This study filled the knowledge gap that was present when it comes to paediatric triage in Rwanda. This is the first study that specifically focuses on the role that the PTWs play in the paediatric triage process. As seen in the literature, there are numerous studies that investigate interventions such as mentorship support, resources, communication, guidelines, etc. which are related to the outcome of a paediatric triage. But none of them have put the PTW in the center of their research, however they are essential when it comes to a good triage assessment as they are the individuals that perform it. Therefore, the realist inspired literature review presented here gives a needed overview of the context that is necessary for a PTW in Rwanda to perform optimally.

Due to the realist nature of this study, this paper is more focused on the specific situation in Rwanda and investigates, with the help of theoretical propositions, the influencing factors on the performance of a PTW more in depth than a traditional systematic approach would do (Mirzoev et al., 2021). But it must be taken into account that extrapolations to other settings should be made with caution because these settings often have different contextual factors that could lead to processes and actions that generate a different outcome.

Our research topic was also very niche, so the existing literature was not very extensive which made it impossible to test all aspects of the IPT in detail. However, gaps in the literature were addressed and research recommendations were proposed. Additionally, no quality appraisal of the included literature was performed as we believed interesting insights could be derived from all records

Additionally, as it's a realist inspired literature review, the focus was not specifically on interviewing stakeholders. Although, many interesting insights were provided by these stakeholders that were often un retrievable from the literature, the perspectives of PTWs that are currently in service, as well as the next link, the medical doctor in charge of the ED were not taken into account. The input of paediatric guardian(s) was not included and no field visits were performed to personally observe the paediatric triage process.

Finally, the research team consisted out of independent researchers that were no Rwandan residents. This made sure that the performance of PTWs was studied from an objective view but could have introduced some biased views on specific contextual factors as they were currently not acquainted with the Rwandan culture.

Conclusion

The role that PTWs play in the paediatric triage process is widely understudied. Therefore, this realist inspired literature review explains what works for a PTW to perform a qualitative triage assessment in a Rwandan context and why. To do so there were several theoretical propositions extracted out of scientific and non-scientific literature and additional information

was provided by two realist interviews. These theoretical propositions were then bundled into a RPT that explained in which context the PTW's performance is optimal and why.

A PTW that is capable of making a timely triage assessment after which it refers the paediatric patient to the correct care pathway whilst compassionately communicating with the patient and its guardian(s) will provide a good triage performance. This study found that this outcome was dependent on contextual factors, processes and actions derived from three levels.

In the hospital setting the study identified infrastructure, access to triage equipment, enough staff, paediatric qualified staff, guidelines, policies, innovative triage tools and assessment records as contextual factors that made sure that there was an optimal triage environment, a good human resource management and an evidence-based framework.

At the team setting level the study identified mentorship, supervision, trans disciplinarity and leadership as essential contextual factors to provide adequate professional support, enable collaboration and promote feedback in the team.

The third level looked at the individual characteristics needed for a PTW and concluded that education, proactive communication and accessibility of the PTW were contextual factors that lead to a confident PTW and a PTW that has a good trust relationship with the patient and its guardian. This ultimately led to appropriate and compassionate communication between them.

Although there is further research needed in specific aspects of this program theory, it contains valuable information of what is needed to optimize the environment in which a PTW operates and consequently it enables policy makers to develop more informed choices when it comes to the optimization of the PTW's performance. Additionally, this study advocates for paediatric triage education, further implementation of evidence based paediatric triage guidelines and a specific focus on sustainability during the implementation of new initiatives and policies.

References

- Aluisio, A. R., Félix Umuhire, O., Mbanjumucyo, G., George, N., Kearney, A., Karim, N., ... Levine, A. C. (2017). *Epidemiologic Characteristics of Pediatric Trauma Patients Receiving Prehospital Care in Kigali, Rwanda*. Retrieved from www.pec-online.com
- Anatole, M., Magge, H., Redditt, V., Karamaga, A., Niyonzima, S., Drobac, P., ... Hirschhorn, L. R. (2013). Nurse mentorship to improve the quality of health care delivery in rural Rwanda. *Nursing Outlook*, 61(3), 137–144. Retrieved from <https://doi.org/10.1016/j.outlook.2012.10.003>
- Byiringiro, S., Wong, R., Logan, J., Kaneza, D., Gitera, J., Umutesi, S., & Kirk, C. M. (2021). A qualitative study to explore the experience of parents of newborns admitted to neonatal care unit in rural Rwanda. *PLoS ONE*, 16(8 August). Retrieved from <https://doi.org/10.1371/journal.pone.0252776>
- Cancedda, C., Cotton, P., Shema, J., Rulisa, S., Riviello, R., Adams, L. v., ... Binagwaho, A. (2018). Health professional training and capacity strengthening through international academic partnerships: The first five years of the human resources for health program in Rwanda. *International Journal of Health Policy and Management*, 7(11), 1024–1039. Retrieved from <https://doi.org/10.15171/ijhpm.2018.61>
- Dalkin, S. M., Greenhalgh, J., Jones, D., Cunningham, B., & Lhussier, M. (2015). What's in a mechanism? Development of a key concept in realist evaluation. *Implementation Science*, 10(1). Retrieved from <https://doi.org/10.1186/s13012-015-0237-x>
- Das, A., Gopalan, S. S., & Chandramohan, D. (2016). Effect of pay for performance to improve quality of maternal and child care in low- and middle-income countries: A systematic

- review. *BMC Public Health*, 16(1). Retrieved from <https://doi.org/10.1186/s12889-016-2982-4>
- Duke, T., & Cheema, B. (2016, February 1). Paediatric emergency and acute care in resource poor settings. *Journal of Paediatrics and Child Health*. Blackwell Publishing. Retrieved from <https://doi.org/10.1111/jpc.13105>
- Enumah, S., Scott, J. W., Maine, R., Uwitonze, E., D'Arc Nyinawankusi, J., Riviello, R., ... Jayaraman, S. (2016). Rwanda's Model Prehospital Emergency Care Service: A Two-year Review of Patient Demographics and Injury Patterns in Kigali. *Prehospital and Disaster Medicine*, 31(6), 614–620. Retrieved from <https://doi.org/10.1017/S1049023X16000807>
- Gashumba, D. (2018). *REPUBLIC OF RWANDA MINISTRY OF HEALTH FOURTH HEALTH SECTOR STRATEGIC PLAN*.
- Glory Iribagiza. (2022). Inside Rwanda's only pediatric surgery room.
- Grant, M. J., & Booth, A. (2009, June). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*. Retrieved from <https://doi.org/10.1111/j.1471-1842.2009.00848.x>
- Greenhalgh, J., & Manzano, A. (2021). Understanding 'context' in realist evaluation and synthesis. *International Journal of Social Research Methodology*. Retrieved from <https://doi.org/10.1080/13645579.2021.1918484>
- Greenhalgh, T., & Greenhalgh, T. (2016). Realist Synthesis: An Introduction Realist synthesis : an introduction, (April).
- Hategeka, C., Mwai, L., & Tuyisenge, L. (2017). Implementing the Emergency Triage, Assessment and Treatment plus admission care (ETAT+) clinical practice guidelines to improve quality of hospital care in Rwandan district hospitals: healthcare workers' perspectives on relevance and challenges. *BMC Health Services Research*, 17(1). Retrieved from <https://doi.org/10.1186/s12913-017-2193-4>
- Hategeka, C., Shoveller, J., Tuyisenge, L., Kenyon, C., Cechetto, D. F., & Lynd, L. D. (2017). Pediatric emergency care capacity in a low-resource setting: An assessment of district hospitals in Rwanda. *PLoS ONE*, 12(3). Retrieved from <https://doi.org/10.1371/journal.pone.0173233>
- Hategeka, C., Shoveller, J., Tuyisenge, L., & Lynd, L. D. (2018). Assessing process of paediatric care in a resource-limited setting: a cross-sectional audit of district hospitals in Rwanda. *Paediatrics and International Child Health*, 38(2), 137–145. Retrieved from <https://doi.org/10.1080/20469047.2017.1303017>
- Hategekimana, C., Shoveller, J., Tuyisenge, L., Kenyon, C., Cechetto, D. F., & Lynd, L. D. (2016). Correlates of performance of healthcare workers in Emergency, Triage, Assessment and Treatment plus Admission care (ETAT+) course in Rwanda: Context matters. *PLoS ONE*, 11(3). Retrieved from <https://doi.org/10.1371/journal.pone.0152882>
- Hirschhorn, L. R., Frisch, M., Ntawukuriryayo, J. T., VanderZanden, A., Donahoe, K., Mathewos, K., ... Binagwaho, A. (2021). Development and application of a hybrid implementation research framework to understand success in reducing under-5 mortality in Rwanda. *Gates Open Research*, 5, 72. Retrieved from <https://doi.org/10.12688/gatesopenres.13214.1>
- Jayaraman, S., Ntirenganya, F., Nkeshimana, M., Rosenberg, A., Dushime, T., Kabagema, I., ... Byiringiro, J. C. (2021). Building trauma and ems systems capacity in rwanda: Lessons and recommendations. *Annals of Global Health*, 87(1). Retrieved from <https://doi.org/10.5334/aogh.3324>

- Kwizera, A., Kissoon, N., Musa, N., Urayenzeza, O., Mujoyarugamba, P., Patterson, A. J., ... Meier, J. (2019). A Machine Learning-Based Triage Tool for Children with Acute Infection in a Low Resource Setting. *Pediatric Critical Care Medicine*, 20(12), e524–e530. Retrieved from <https://doi.org/10.1097/PCC.0000000000002121>
- Manzi, A., Magge, H., Hedt-Gauthier, B. L., Michaelis, A. P., Cyamatara, F. R., Nyirazinyoye, L., ... Ntaganira, J. (2014). Clinical mentorship to improve pediatric quality of care at the health centers in rural Rwanda: A qualitative study of perceptions and acceptability of health care workers. *BMC Health Services Research*, 14(1). Retrieved from <https://doi.org/10.1186/1472-6963-14-275>
- McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V., & Lefebvre, C. (2016). PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *Journal of Clinical Epidemiology*, 75, 40–46. Retrieved from <https://doi.org/10.1016/j.jclinepi.2016.01.021>
- Mirzoev, T., Cronin De Chavez, A., Manzano, A., Agyepong, I. A., Ashinyo, M. E., Danso-Appiah, A., ... Kane, S. (2021). Protocol for a realist synthesis of health systems responsiveness in low-income and middle-income countries. *BMJ Open*, 11(6). Retrieved from <https://doi.org/10.1136/bmjopen-2020-046992>
- MoH Rwanda. (2018a). EMS_Strategic_Plan_2018-min.
- MoH Rwanda. (2018b). *Maternal Newborn and Child Health Strategic Plan*.
- MoH Rwanda. (2020). *Management of Emergency Triage*. Retrieved from <http://emssa.org.za/>
- Noble, H. E., Scott, J. W., Nyinawankusi, J. D., Uwitonze, J. M., Kabagema, I., Maine, R. G., ... Jayaraman, S. (2020). The impact of data feedback on continuous quality improvement projects in Rwanda: A mixed methods analysis. *African Journal of Emergency Medicine*, 10, S78–S84. Retrieved from <https://doi.org/10.1016/j.afjem.2020.07.007>
- Nyirasafari, R., Corden, M. H., Karambizi, A. C., Kabayiza, J. C., Makuza, J. D., Wong, R., & Canarie, M. F. (2017). Predictors of mortality in a paediatric intensive care unit in Kigali, Rwanda. *Paediatrics and International Child Health*, 37(2), 109–115. Retrieved from <https://doi.org/10.1080/20469047.2016.1250031>
- Pascasie, K., & Mtshali, N. G. (2014). A descriptive analysis of emergency department overcrowding in a selected hospital in Kigali, Rwanda. *African Journal of Emergency Medicine*, 4(4), 178–183. Retrieved from <https://doi.org/10.1016/j.afjem.2013.10.001>
- Rosenberg, A., Uwitonze, J. M., Dworkin, M., Kabagema, I., Dushime, T., Nkeshimana, M., ... Jayaraman, S. (2020). Fostering Trauma and Emergency Research Capacity in Rwanda Through Collaboration: Research Capacity Building in Rwanda. *Journal of Surgical Education*, 77(5), 1018–1023. Retrieved from <https://doi.org/10.1016/j.jsurg.2020.03.027>
- Rosman, S. L., Karangwa, V., Law, M., Monuteaux, M. C., Briscoe, C. D., & McCall, N. (n.d.). *Provisional Validation of a Pediatric Early Warning Score for Resource-Limited Settings*. Retrieved from http://publications.aap.org/pediatrics/article-pdf/143/5/e20183657/1076887/peds_20183657.pdf
- Rwanda MoH. (2011). *HUMAN RESOURCES FOR HEALTH STRATEGIC PLAN*.
- Rycroft-Malone, J., McCormack, B., Hutchinson, A. M., DeCorby, K., Bucknall, T. K., Kent, B., ... Wilson, V. (2012). Realist synthesis: illustrating the method for implementation research. *Implementation Science*, 7(1). Retrieved from <https://doi.org/10.1186/1748-5908-7-33>
- Samuels, F., Amaya, A. B., & Balabanova, D. (2017). Drivers of health system strengthening: Learning from implementation of maternal and child health programmes in Mozambique,

- Nepal and Rwanda. *Health Policy and Planning*, 32(7), 1015–1031. Retrieved from <https://doi.org/10.1093/heapol/czx037>
- Tuyisenge, L., Kyamanya, P., van Steirteghem, S., Becker, M., English, M., & Lissauer, T. (2014). Knowledge and skills retention following emergency triage, assessment and treatment plus admission course for final year medical students in Rwanda: A longitudinal cohort study. *Archives of Disease in Childhood*, 99(11), 993–997. Retrieved from <https://doi.org/10.1136/archdischild-2014-306078>
- Tuyishime, A. G., & Rosa, W. (2017). The holistic leadership model and the nurse unit manager: assessing requisite leadership competencies in the Rwandan context. *Rwanda Journal*, 4(1), 17. Retrieved from <https://doi.org/10.4314/rj.v4i1.2f>
- Twagirayezu, I., Busisiwe, B., & Umutoni Cishahayo, E. (2021). Knowledge and Skills on Triage among Nurses Working in Emergency Departments in Referral Hospitals in Rwanda. *Rwanda Journal of Medicine and Health Sciences*, 4(3), 398–405. Retrieved from <https://doi.org/10.4314/rjmhs.v4i3.9>
- UNICEF. (2020). *Health-Budget-Brief-2019-2020*.
- UNICEF. (2022). Rwanda (RWA) - Demographics, Health & Infant Mortality - UNICEF DATA. Retrieved April 11, 2022, from <https://data.unicef.org/country/rwa/>
- UNITED NATIONS. (2022). Sustainable Development Goals (SDG 3) | United Nations Western Europe. Retrieved April 11, 2022, from <https://unric.org/en/sdg-3/>
- Uwisanze, S., Ngabonzima, A., Bazirete, O., Hategeka, C., Kenyon, C., Asingizwe, D., ... Cechetto, D. (2021). Mentors' perspectives on strengths and weaknesses of a novel clinical mentorship programme in Rwanda: A qualitative study. *BMJ Open*, 11(3). Retrieved from <https://doi.org/10.1136/bmjopen-2020-042523>
- Wong, G., Greenhalgh, T., Westhorp, G., Buckingham, J., & Pawson, R. (2013). RAMESES publication standards: Realist syntheses. *BMC Medicine*, 11(1). Retrieved from <https://doi.org/10.1186/1741-7015-11-21>
- World Health Organization. Department of Child and Adolescent Health and Development. (2005). *Emergency triage assessment and treatment (ETAT): facilitator guide*. World Health Organization, Dept. of Child and Adolescent Health and Development.

Appendix 1: Search strategy

Data source	Search string	Number of hits	Date of last search
<u>Scientific journals</u>			
Pubmed	((((((((((((pediatric triage) OR (paediatric triage)) OR (emergency care for children)) OR (triage))) OR (triage worker)) OR (triage nurse))) OR (emergency triage))) OR (child emergency)) OR (infant emergency)) AND (Rwanda)	220	04/03/22
AJOL	Pediatric triage Rwanda nurse	6 12	04/03/22
Web of science	((((((((((((ALL=(pediatric)) OR ALL=(paediatric)) OR ALL=(infant)) OR ALL=(children)) OR ALL=(neonatal)) AND ALL=(triage)) OR ALL=(triage worker))) OR ALL=(emergency care)) OR ALL=(child emergency)) OR ALL=(triage nurse)) OR ALL=(infant emergency)) AND ALL=(Rwanda)	349	
<u>Non-scientific literature</u>			
Google, who, unicef,	Pediatric triage Rwanda	7	05/03/22
Rwandan MOH	Pediatric related SOP's & manuals	30	05/03/22
Social media	None found		
<u>Snowballing</u>			
Literature found during the process	https://www.connectedpapers.com/main/164b0cf5d636c4d8f50bc4dd6e26deb1385ab5fa/Implementing-the-Emergency-Triage%2C-Assessment-and-Treatment-plus-admission-care-(ETAT%2B)-clinical-practice-guidelines-to-improve-quality-of-hospital-care-in-Rwandan-district-hospitals%3A-healthcare-workers%E2%80%99-perspectives-on-relevance-and-challenges/graph	2	11/03/22

Appendix 2: The initial program theory (IPT)

The development of an initial program theory (IPT) is fundamental for this realist inspired literature review. It provides a framework that helps to further investigate evidence that is related to the topic of interest. The development of this IPT was based on bundling contextual factors with processes and actions that were related to a fixed outcome, more specifically the PTW's performance. The latter is defined here as: the capacity of a PTW to generate a timely referral towards an adequate care pathway, whilst appropriately informing the patient (or their guardian) in a compassionate way.

The literature was superficially investigated based on prior knowledge and experience to identify relevant contextual factors, processes and actions. In addition to that, expert opinions were taken into account. The extracted information was then bundled to form theoretical propositions and merged into an IPT that preliminarily explained the performance of PTWs (Rycroft-Malone et al., 2012).

Theoretical propositions

The theoretical propositions are the following:

- 1. A Health care environment that takes organization, administration and adequate logistics in mind will lead to a good performance of the triage workers operating in this environment due to a well-organized triage system structure that supports their work and provides adequate access to necessary triage equipment.**

In the development of this specific IPT, the article of Hategeka et al. 2017 had an important role. In their research they spread surveys to different Rwandan district hospitals to develop a broader understanding of the human resources and hospital services that were present during emergency triage. The results of the survey clearly stated that only some hospitals were adequately equipped in terms of essential medicines and infrastructure that are necessary for emergency triage. In addition to that, the hospital showed non-functional triage systems due to gaps in organization (Hategeka, Shoveller, et al., 2017). Similar gaps in infrastructure and organization were seen during a study that analyzed obstetric triages in Iran (Rashidi Fakari & Simbar, 2020). A realist evaluation that analyzed the management in a Ghanaian hospital saw similar gaps concerning organization. Although, their conclusions more specifically showed the influence of human resource management on a good organizational structure (Marchal et al., 2010). This lack of human resources was also something that came forward during a talk with an expert on the topic, Prof. Dr. Hugo Devlieger, who worked for years in Rwanda as a pediatrician. He stressed the problem of understaffing in these hospitals and the consequent long working shifts.

- 2. A PTW that is motivated to acquire relevant competences through triage specific basic and additional education will have learned the necessary skills and knowledge to adequately respond to a patients needs and handle the patient correctly**

Education is a very important aspect when it comes to a good triage outcome. On the one hand, PTWs need to have an adequate medical background to be able to understand the different pathological challenges during the triage process. And on the other hand, they need to be willing to keep on learning more about the triage process. Studies showed that there is currently a deficit in specific triage knowledge among professionals working in the triage process. Specifically for paediatric triage, additional training is very important to reduce early child mortality (Duke, 2016). Continuous education has the capability to enhance the knowledge and skills of PTWs which is most likely to result in a better triage outcome (Hategeka, Mwai, et al., 2017; Twagirayezu et al., 2021). The WHO also saw the need for such an education in developing countries and provided the ETAT + course to help PTWs grow skills in resource poor settings (Duke, 2016). In addition to that, a good PTW is motivated to strive for a good outcome (Nancarrow et al., 2013).

Clear and compassionate communication is also something that needs to be in the skillset of a paediatric PTW. It optimizes the experience of the patient and its guardian(s) says, Prof. Dr. Hugo Devlieger.

3. A PTW operating in a medical team that is sufficiently supervised and lead by skilled people managers will allow them to rely on their team and supervisory support to avoid a bad triage outcome.

Triage is often performed by healthcare providers that only have basic professional training. Mostly they take care of the triage process without supervision (Hategeka, Shoveller, et al., 2017). Such a lack of supervision is often described as a challenge for the success of putting theory into practice (Hategeka, Mwai, et al., 2017; Marchal et al., 2010; Tuyisenge et al., 2014).

Additionally, supervision is often seen as a part of visionary leadership, and therefore a people manager that provides support for its team is a valuable asset to avoid bad outcomes (Nancarrow et al., 2013). A good leader also creates a vision in which teamwork stands central, this makes sure that the different team members are motivated to support each other when challenges appear (Nancarrow et al., 2013). Belrhiti and al. 2020 found similar influences of leadership on the performance of health workers. Their research showed that substandard leadership may lead to health workers that perform below expectations and a corresponding lower quality of care (Belrhiti et al., 2020). They therefore argue that leadership has to be adapted to the nature of the task and the specific individual to guarantee a better outcome.

Initial program theory

The theoretical propositions were then merged into a logical model that visualizes the IPT, like seen in figure 2.

Bibliography

- Belrhiti, Z., van Damme, W., Belalia, A., & Marchal, B. (2020). Unravelling the role of leadership in motivation of health workers in a Moroccan public hospital: A realist evaluation. *BMJ Open*, *10*(1), 1–17. <https://doi.org/10.1136/bmjopen-2019-031160>
- Duke, T. (2016). New WHO guidelines on emergency triage assessment and treatment. *The Lancet*, *387*(10020), 721–724. [https://doi.org/10.1016/S0140-6736\(16\)00148-3](https://doi.org/10.1016/S0140-6736(16)00148-3)
- Hategeka, C., Mwai, L., & Tuyisenge, L. (2017). Implementing the Emergency Triage, Assessment and Treatment plus admission care (ETAT+) clinical practice guidelines to improve quality of hospital care in Rwandan district hospitals: healthcare workers' perspectives on relevance and challenges. *BMC Health Services Research*, *17*(1), 1–12. <https://doi.org/10.1186/s12913-017-2193-4>
- Hategeka, C., Shoveller, J., Tuyisenge, L., Kenyon, C., Cechetto, D. F., & Lynd, L. D. (2017). Pediatric emergency care capacity in a low-resource setting: An assessment of district hospitals in Rwanda. *PLoS ONE*, *12*(3), 1–13. <https://doi.org/10.1371/journal.pone.0173233>
- Marchal, B., Dedzo, M., & Kegels, G. (2010). A realist evaluation of the management of a well-performing regional hospital in Ghana. *BMC Health Services Research*, *10*. <https://doi.org/10.1186/1472-6963-10-24>
- Nancarrow, S. A., Booth, A., Ariss, S., Smith, T., Enderby, P., & Roots, A. (2013). Ten principles of good interdisciplinary team work. *Human Resources for Health*, *11*(1), 1–11. <https://doi.org/10.1186/1478-4491-11-19>
- Rashidi Fakari, F., & Simbar, M. (2020). Explaining challenges of obstetric triage structure: A qualitative study. *Nursing Open*, *7*(4), 1074–1080. <https://doi.org/10.1002/nop2.478>

- Rycroft-Malone, J., McCormack, B., Hutchinson, A. M., DeCorby, K., Bucknall, T. K., Kent, B., Schultz, A., Snelgrove-Clarke, E., Stetler, C. B., Titler, M., Wallin, L., & Wilson, V. (2012). Realist synthesis: illustrating the method for implementation research. *Implementation Science*, 7(1). <https://doi.org/10.1186/1748-5908-7-33>
- Tuyisenge, L., Kyamanya, P., van Steirteghem, S., Becker, M., English, M., & Lissauer, T. (2014). Knowledge and skills retention following emergency triage, assessment and treatment plus admission course for final year medical students in Rwanda: A longitudinal cohort study. *Archives of Disease in Childhood*, 99(11), 993–997. <https://doi.org/10.1136/archdischild-2014-306078>
- Twagirayezu, I., Busisiwe, B., & Umutoni Cishahayo, E. (2021). Knowledge and Skills on Triage among Nurses Working in Emergency Departments in Referral Hospitals in Rwanda. *Rwanda Journal of Medicine and Health Sciences*, 4(3), 398–405. <https://doi.org/10.4314/rjmhs.v4i3.9>