

Exploring Caregivers' Perception of Wearable Technology for Sepsis Management for Children Aged Under 5: A Scenario-based Qualitative Study in Dhaka, Bangladesh

Final Report of Summative Learning Project (SLP)

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ABSTRACT

Background: Sepsis is a condition when the body's extreme immunological reaction to an infection can harm organs, resulting in shock, organ failure, or even death if treatment is not received. People all across the world are affected by sepsis, although lower-middle-income nations (LMICs) have far higher incidence and fatality rates. Notably, neonatal sepsis is a major cause of death in these areas, accounting for 99% of infant deaths worldwide. Bangladesh continues to have a serious problem with pediatric sepsis mortality, especially in areas with low resources. Before a specific sepsis treatment management was implemented, the death rate for high-risk children with sepsis at Dhaka Hospital was startlingly high, approaching 60% which demonstrates the need for urgent standardized treatments for vulnerable pediatric populations.

Objective: This study aims to explore caregivers' perceptions of children under five about wearable technology for sepsis control.

Methods: An exploratory design using a qualitative method was followed to conduct this study. The study population was the caregivers of children under five hospitalized for any illness including sepsis from Sajida Foundation Hospital at Keraniganj in Dhaka. A purposive sampling technique was finalized to make the sample size. To find out how caregivers felt about the wearable device for sepsis management, 10 IDIs (In-depth Interviews) were done until the data was saturated. Data collection was done following the Theoretical Framework of acceptability. For analyzing data framework analysis was followed.

Results: This study observed the possibilities and difficulties of using a wearable device to monitor children's health in settings with limited resources. Its noninvasive, user-friendly design and efficient vital sign monitoring, capacity to lower hospital visits, and conformed to Islamic principles helped caregivers build confidence and trust to use the device in the future. Caregivers were concerned about the hospital stay due to their work, household chores, and caring for other children as well as the device's signal sound. Despite recognizing its benefits, some remained hesitant due to conservative views.

Conclusion: The wearable device's non-invasive, user-friendly design demonstrated potential in enhancing children's health monitoring; nevertheless, greater acceptance and implementation require addressing caregivers' concerns and practical challenges.

1. INTRODUCTION

Sepsis is a potentially fatal illness when the body's severe immune reaction to an infection harms one's tissues and organs, if treatment is delayed, it may result in multiple organ failure, shock, and death (Singer et al., 2016). Sepsis poses a significant risk to various populations, particularly young children, older people, pregnant mothers, and people with preexisting health conditions, including symptoms like fever, tachycardia, tachypnea, confusion, and bodily pain, which may progress to septic shock, organ dysfunction, and mortality (WHO, 2024). The systemic inflammatory reaction is the primary cause of sepsis and septic shock, which are clinical manifestations of a dysfunctional host reaction to an infection causing serious, multi-organ dysfunction (S.-H. et al., 2016; S. et al., 2016b, 2016a) conveying Acute Respiratory Distress Syndrome (ARDS) and cardiovascular (CV) failure (Goldstein et al., 2005). Sepsis or septic shock can happen with neonates and children. SiThere were an estimated 48.9 million cases of sepsis globally, leading to 11 million fatalities, which represents 20% of all deaths worldwide (Rudd et al., 2020). Approximately 50% of global sepsis cases, totaling 20 million, occur in children under the age of five, additionally, it is estimated that 15 out of every 1,000 inpatients experience sepsis as a complication of healthcare (WHO, 2024).

Sepsis can impact individuals globally, however, there are notable differences in incidence and mortality, particularly elevated in lower-middle-income countries (LMICs) where 99% of newborn fatalities worldwide are caused by neonatal sepsis, making it a major cause of death in LMICs (Milton et al., 2022; Rudd et al., 2020). The majority of sepsis deaths take place in environments with few resources, where management is typically made more difficult by HIV, malaria, TB, malnutrition, restricted access to treatment, and late presentation (Kortz et al., 2017). An estimated 8.96 million cases of sepsis and a 25–30% death rate are associated with the estimated 540–640 occurrences of sepsis per 100,000 people in India (Dedeepiya, 2024; Rudd et al., 2020). Low- and middle-income countries (LMICs) are particularly susceptible to the severe consequences of neonatal sepsis since early diagnosis and prompt treatment are difficult to come by, particularly when it comes to the prenatal care of women throughout birth (Mogollón et al., 2019; Rafi et al., 2020). Preterm birth and maternal illnesses are the two primary causes of newborn sepsis (Dong & Speer, 2015; MedlinePlus Medical Encyclopedia, 2023; Fedaa Noah et al., 2022; Fleischmann-Struzek et al., 2018; Satar et al., 2018).

Pediatric sepsis mortality is particularly high in Bangladesh; before the introduction of a sepsis protocol at Dhaka Hospital, rates for high-risk children approached 60% (Kortz et al., 2017).. In Bangladesh, sepsis contributes to 39% of deaths in children under five and 37% of newborn deaths (National Institute of Population Research and Training, 2013).

In Bangladesh, sepsis presents a significant challenge as the health resources are scarce and advanced diagnostic tools are largely inaccessible. This underscores the urgent need for practical solutions to effectively detect and manage this life-threatening condition (Fleischmann et al., 2016). The lack of timely identification delays appropriate antibiotic treatment and contributes to the high mortality rates associated with sepsis (Rhodes et al., 2017). Therefore, developing additional diagnostic tools to enable early detection and management of sepsis is critically important.

In 2017, the icddr, a specialized hospital in Bangladesh, has been conveying four key messages for sepsis control such as recognizing serious symptoms, providing a referral call-to the center, ensuring reliable transport, and informing families about local hospital upgrades (icddr, 2017). This year icddr is currently implementing a trial on sepsis management through a wearable device linked to a smartphone to collect continuous recordings of physiologic data for the duration of each patient's admission which gives early notification about sepsis. While icddr is conducting this trial within its own setting, it is crucial to assess whether it can be implemented in other resource-limited facilities where it is most needed. Additionally, understanding whether caregivers of children would accept this type of intervention is equally important.. the proposed research will explore the perception of caregivers of children under 5 about this wearable device implemented at ICDDR at Sajida Hospital, a community-based health care facility, and is located in a peri-urban area of Dhaka.

1.1 Research Question

What is the acceptability among caregivers of children under five about the wearable technology for sepsis control in Bangladesh?

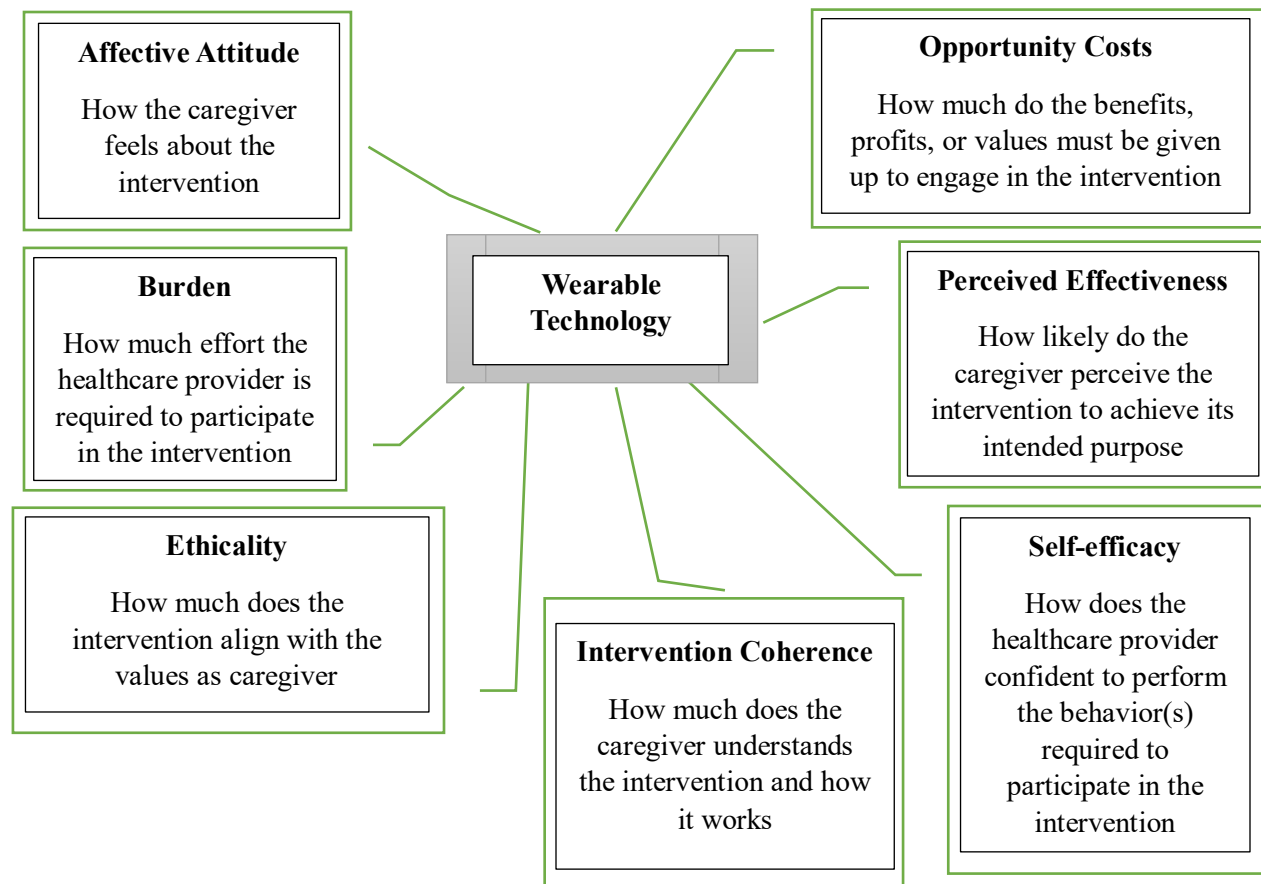
General objectives:

1. To explore caregivers' perceptions of children under five about wearable technology for sepsis control in Bangladesh.

Specific objectives:

1. To explore anticipated challenges and advantages perceived by the caregivers about the wearable device for sepsis control.

1.2 Framework



The Theoretical Framework of Acceptability

The Theoretical Framework of Acceptability (TFA) is adapted from a published paper by Mandeep Sekhon (Sekhon et al., 2017). This framework contains seven domains such as intervention coherence, affective attitude, perceived effectiveness, burden, self-efficacy, ethicality, and opportunity cost. This framework was used to understand caregivers' experiences of the children with wireless wearable technology for sepsis control. As the study is about the perspective of caregivers' experience with the wearable device, the domains named burden and self-efficacy are

not used. Because these two domains are meant to understand the healthcare provider's perspective. By applying this framework, the study aims to identify facilitators and barriers to adopting wearable technology, providing insights into caregivers' perspectives that could guide improvements and inform future scale-up efforts. The framework consists of the following domains:

Intervention coherence: Caregiver's level of knowledge and comprehension about the wearable device used for sepsis control.

Affective attitude: Caregiver's emotional response and personal attitudes toward using wearable technology to monitor their child's sepsis.

Perceived effectiveness: Caregivers' beliefs and confidence in the effectiveness of the wearable devices.

Ethicality: Explore whether the wearable device and its purpose resonate with the caregiver's personal beliefs, cultural norms, religious beliefs, and caregiving principles.

Opportunity cost: Explore the trade-offs and sacrifices the caregiver might need to make to use the wearable device.

2. METHODOLOGY

2.1 Study Design: The current study followed an exploratory design using the qualitative method.

2.2 Study Site: This study took place among the caregivers of children under five from Sajida Hospital at Keraniganj in Dhaka, which the Sajida Foundation runs. Given the limited time, the study site has been selected purposively for our convenience and easy access through personal contact.

2.3 Study Population:

- Inclusion criteria:
 - Caregivers of children aged under five hospitalized for any illness including sepsis.
- Exclusion criteria:
 - Caregivers who are unable or unwilling to participate.

2.4 Sampling Technique: For this study, a purposive sampling technique has been used to finalize the sample size and study population among patients admitted with sepsis.

2.5 Sample Size: Given the limited time and budget for data collection, 10 IDIs (In-depth Interviews) were conducted until the data saturation to understand caregivers' perspective with the wearable device for sepsis control.

2.6 Data Collection Tools: Following the Theoretical Framework of Acceptability (TFA), a semi-structured guideline was used to explore and understand the caregivers' perceptions of wireless wearable device for sepsis control in children under five.

2.7 Data Collection: The data collection occurred from 21st November to 11th December among children with sepsis or any illness from Sajida Foundation Hospital. A semi-structured guideline was used to conduct the in-depth interviews (IDIs). A well-organized semi-structured guideline including preset questions was used to allow participants the freedom to respond freely. In-person IDIs were conducted to find out how caregivers felt about wearable technology. Based on the participants' answers, subsequent probing questions were provided.

2.8 Description of the Device: A wireless wearable device has been used for this research. The wearable device, designed as a patch is applied to the left side of the patient's body. It sticks gently to the skin. This device shows some parameters such as ECG, Heart Rate (HR), Respiratory Rate (RR), Skin Temperature, and Daily Steps of the patient. The device is connected to the phone via Bluetooth, which transfers all the information provided to the phone. Then that information transfers to the monitor with internet connectivity so that the healthcare providers can see the current situation remotely. It allows for sepsis monitoring effectively. Before getting the septic shock, this device gives a signal having the real-time conditions of the patient over the phone and helps the healthcare provider understand and monitor appropriately. This year, International Centre for Diarrheal Disease Research, Bangladesh (ICDDR,B) is conducting on trial on sepsis management using this wireless wearable device for continuous physiologic data monitoring and early sepsis detection.



2.9 Data Analysis Process: The framework analysis method was followed after collecting data from Sajida Foundation Hospital that presented caregivers' perceptions. Data familiarization, which involved translating and transcribing the audio recordings into English, was the first step in the data analysis process. The interview's translation quality has been thoroughly assessed with the playback technique. After that, the translated document was coded using both inductive and a priori codes, initially based on the framework. Each code has been defined in the codebook, which was used throughout the analysis. A data display matrix was utilized to present the coded data, case by case, once it had been grouped and categorized. Certain patterns have been found within the classified coded data after the data has been analyzed to find similarities and differences. The detected patterns served as the basis for the themes, which were then interpreted and combined to conclude.

2.10 Ethical Consideration: Ethical approval was approved by the Institutional Review Board of BRAC James P Grant School of Public Health. A written informed consent was taken from each participant who was interviewed in person. The study participants were clearly explained about the study purpose, the voluntary nature of the participation and not receiving monetary benefits. They had the complete liberty of withdrawing themselves from the study at a point in time. Each interviewer received a unique ID to maintain anonymity. Data had been stored in a password-protected device.

3. FINDINGS

The sample distribution table demonstrates the details of the participants of this research. The study was conducted at Sajida Hospital in Keraniganj and involved ten in-depth interviews (IDIs) with

caregivers with pediatric patients under five. The caregivers included mothers, fathers, and aunts, ranging in age from 16 to 48 years. The patients' ages varied from 3 months to five years, and they were treated for different illnesses, including pneumonia, dengue, and diarrhea.

Regarding the participants, four mothers aged 22 to 32, caring for children between 3 months to 3 years and 2 months, were diagnosed with pneumonia, diarrhea, and dengue. Four fathers aged 33 to 48, cared for children aged 11 months to 3 years with dengue and diarrhea. Finally, two aunts aged 18 and 28, cared for children aged 9 months to 5 years all suffering from pneumonia.

3.1 Table 1: Sample Distribution

Study Area	Types of Interviews	Study Participants (Caregiver)	Participant's Age	Patient's Age and Sex	Patient's Disease
Sajida Hospital, Keraniganj	IDI1	Mother	22	4 months boy	Pneumonia
	IDI 2	Father	48	3 years boy	Dengue
	IDI 3	Father	33	11 months girl	Dengue
	IDI 4	Mother	32	3 months boy	Pneumonia
	IDI 5	Mother	32	14 months	Diarrhea
	IDI 6	Mother	28	3 years 2 months boy	Dengue
	IDI 7	Father	39	3 years girl	Dengue
	IDI 8	Aunt	18	5 years boy	Pneumonia
	IDI 9	Aunt	28	9 months girl	Pneumonia
	IDI 10	Father	38	3 years girl	Diarrhea

3.2 Key Findings

3.2.1 Intervention Coherence:

User-Friendly Tool

The findings of this research highlight several key advantages of the device that would be used in childhood sepsis monitoring. Some caregivers have understood the usefulness of the wearable device or technology. From their perception, the device seemed to reduce the need to move children between facilities for various diagnostic testing by combining all the test data into a single report. This feature would lessen the burden on caregivers while also simplifying the procedure. Similarly, it will reduce the hassles of healthcare professionals as they would receive a range of vital readings from the same device via the mobile phone.

It seems that it is very good for children. It is better if we understand a child before it goes into a serious condition. As I knew in advance that there would be damage, I was able to be careful, we can go to the doctor, and we can follow the doctor's advice - it is good for the child. And all parents want their children to be healthy. It is better for us if we know before they get sick (IDI 5).

It can be seen that we need to do an ECG. Apart from doing ECG, there are other tests like heart rate, heartbeat check, or ECO. We can get three or four reports in one screen (IDI 8).

They reported that the device would be also useful for monitoring child health because it is capable of measuring heartbeat and breathing rates.

The device is designed to assist children with breathing difficulties. It is particularly beneficial for children who develop pneumonia and experience respiratory distress (IDI 4).

They felt that they would feel no fear using this device due to its lack of adverse effects which improved its safety profile. Furthermore, its painless nature ensures children's and patients' comfort. By facilitating the early identification of possible health problems, the device makes it easier for medical professionals to intervene promptly, thereby increasing the likelihood of saving lives.

I don't fear using this though I didn't use this before. Why should I be afraid as it doesn't need to be inserted? The doctor will not bother my child. He will give this for good. Fear does not work (IDI 6).

It will help in every way. Children often cry. He cries when a needle is given, he cries when oxygen is needed. If this device is attached to the body, he will not cry anymore because he will not understand. The suffering will be less (IDI 1).

They reported that the device connects to a smartphone via Bluetooth, which would enable remote monitoring and understanding of children's health conditions through the phone. The healthcare professionals would be able to take a look at the patients' health status while staying away from the patient at any moments and make decisions for them.

Isn't it better to have all the information from the doctor? The doctor can see what the problem is. The doctor can be far away like 10 meters or 500 meters or in another room. He can't always come. Then it would be good if the doctor could see it [remotely] (IDI 7).

3.2.2 Affective Attitude:

Potential-Driven Device

Although some people thought there might be better solutions in the future, they understood that this digital device would be useful for monitoring children's well-being. They mentioned that its simplicity of usage modality facilitates prompt understanding of a child's condition by specialists, and it would provide faster reading than the currently available machines.

It's exactly what I need. So far so good. Now there can be a better option than this. I don't know that anymore (IDI 1).

It seems that it is very good for children. It is better if we understand a child before it goes into a serious condition. For example, knowing in advance that there will be harm, being careful, going to the doctor, following the doctor's advice - it is good for the child. And all parents want their child to be healthy and well. It is better for us if we know before we get sick (IDI 5).

People must now see, know, and understand the merits of technology. It is seen to provide faster results than comparable treatments, so people must take it positively (IDI 3).

While some individuals might initially feel apprehensive and hesitant due to the new and unfamiliar device, users were reassured by its painless and non-invasive design because of its non-injectable nature. Additionally, the device is visible and operates externally, providing a clear and comprehensive example of its functionality, that fosters trust and reassurance among caregivers.

No, there is nothing to fear. Why be afraid! It's not something that we have these days... when a person is taken to the operation theatre for a surgery, there are many things he needs to take. So, won't people do the operation for fear? Or won't do his work? My baby has a cannula inserted. This cannula is a pain for both adults and children (IDI 2).

I said that since it is being used outside, we can see it in front of our eyes and hold it with our hands so there is nothing to fear. Inside we cannot see it, what a fear. That's it (IDI 4).

Although the device is not meant for caregivers' usage at the household level, they shared about the device's modest sound transmission, which might be difficult for people outside a room to get notified, was a small worry. However, if it is utilized appropriately, it would help physicians diagnose several medical issues simultaneously.

No, it's perfect. Perfect in every way. But is it better if the alarm is a little louder? Because we often stayed away, leaving the baby alone in the room. If the alarm is a little loud, I could understand most of the time. Sometimes there are many people... I have two children. If I look at one, I pay less attention to the other. Then when the alarm went off, I realized that I needed to be aware of him. I think it's better to set the alarm loud (IDI 5).

No, it is small and doesn't need to be pierced. The cannula has to be pierced. There is nothing to do just put it on the chest. So, I think it is better than all (IDI 6).

3.2.3 Perceived Effectiveness:

Simplifying Child Healthcare

Caregiver reported that when children get ill, healthcare providers frequently prescribed several tests, necessitating caregivers to travel to several facilities. Because of integrating several parameters into one, this device seemed incredibly convenient to the caregiver.

If people get sick now, they will be tested. Running here and there for tests. And it's going directly to mobile. The problem is getting the signal which benefits us (IDI 1).

They were confident using this device in future because of the technological innovations like this device gave them hope. This tool seemed useful among the caregiver in detecting problems at an early and halting their progression with timely actions because children may not always be able to communicate their medical difficulties verbally.

At night the mothers were asleep or the nurses were not there, and the doctors were not there. If the device sends a signal to the mobile phone, the doctor can be notified that the child's condition becomes critical, you go quickly or arrange something or take him to the emergency room. In that case, it is good (IDI 4).

3.2.4 Ethicality:

Religious Compatibility

Having the religious belief the caregiver mentioned that since Allah ultimately controls life and death, this device was not incompatible with Islamic beliefs; it was merely a tool to aid with caring. Some people, particularly those with conservative opinions or strong religious convictions, might not trust it or see the need for it.

The subject of religion does not come into medicine. Muslims get the same treatment that Hindus get. In that case, illness does not discriminate against religion. In that case, I don't think there will be any effect (IDI 4).

No, it's because they believe that those who are conservative families can do it. I don't think a normal self-educated person would oppose it (IDI 3).

Ensure Credibility Through Public Use

The caregivers reported that the device should be used publicly under a doctor's prescription so that people can observe its use and advantages to foster confidence and understanding. Otherwise, people may find it more difficult to understand its efficacy and transparency if it is used privately. Although it was mentioned that this was just a medical tool which will be used openly at the health facility by the healthcare professionals to get hint of the sepsis by seeing the vitals through it.

No, as it is for diagnosing the diseases of the body, it is not used in life without a doctor's prescription. Then it doesn't make any sense to use it secretly. In public of course. If he uses it secretly, its good results and qualities, its actual quality will not reach the bottom, the public, or the common people. It should be well-presented and accessible to the public. If good results do not come, it gives negative results, people will refrain from using it later (IDI 3).

3.2.5 Opportunity Cost:

Sacrificed Activities

The caregiver understood the advantages of the devices and emphasized the willingness to do whatever it needed to ensure their children's healing and well-being. It was explained to the respondents that this device is only used by health professionals as this device measures several vital parameters during a patient's critical situation. So, this device ultimately needs a hospital stay

to get those vital readings read by the health professionals so that they can detect the septic turn of the disease. After considering the scenario, respondents perceived that they might have to stay at the hospital for a longer observation period due to the device's application on their children. It will ultimately cause an opportunity cost due to the sacrifice of regular household chores, taking off at work, or being not able to take care of other children.

If the child has a critical condition or needs to be admitted, then there is no question of thinking about household chores. We have to save our child first (IDI 4).

I have another baby. That child is not being cared for. Being in the hospital with one child means that you cannot feed or bathe another child properly. This is the problem. And I left the rest of the problem. The problem is not over. What happens to the people in the house if they are not in the house? Then there is cooking and various tasks. In that case, another big problem is that you have another child and you cannot take care of him. It's possible to take care of both of the children staying at home (IDI 4).

As we have a working life, we need to give instructions to our workplace. Though I want to know the condition, and reports of my child, continuing to take care of children at the hospital, visiting, and talking are hard for us (IDI 2).

4. DISCUSSION

This qualitative study found that caregivers' comprehension and trust in the wearable device's usefulness and performance varied. Regarding the device, the current research identified both challenges and facilitators showing an interest in the acceptability of this device for future implementation. They understood the wearable technology or device and they were confident to use this device in the future. Though they had their own religious belief, they also did trust that in this modern era, and that people were developing many things in their fields in various ways that encouraged them to use this device. Apart from these, they shared some concerns about using this device such as the modest sound of the alarm that could be a problem if the caregiver stayed outside the room for a reason. Though they perceived the benefits of the device for their children, staying at the hospital for any major health issues was difficult because of giving up their regular household chores, taking care of other children, and working schedules.

The current study indicated that caregivers understood this wearable device and that it makes real-time health monitoring of children's well-being possible by showing faster readings such as ECG, heart rate (HR), respiratory rate (RR), and skin temperature than existing other machines. Even if some of them admitted that better alternatives could come out in the future, they trusted the device because of its possible accuracy and user-friendliness. Similar finding was observed in another study about novel techniques for automated seizure registration that revealed that the majority of patients favored a discrete, automated seizure detection equipment due to its accuracy and user-friendliness; they were also prepared to pay for it and endure frequent charging and check-ups and selected permanent usage over restricted use (Hoppe et al., 2015). However, regarding this device for sepsis in the current research, a caregiver does not need to charge the device because this device will be operated by the healthcare provider at the hospital. A study by Choi and colleagues also found that utilizing a wireless monitoring device to continuously measure Heart Rate and Respiratory Rate allowed for the precise prediction of clinical deterioration and may shorten the time needed to anticipate septic shock in real-world clinical settings (Choi et al., 2022) which is similar to the sepsis device because of the real-time monitoring of patient's health conditions within short time.

Bluetooth connection to a smartphone increases accessibility and convenience. Because of its clear functionality and visibility, caregivers were more likely to trust the device. Though this study revealed a positive impact due to the visibility of the device, another study about novel techniques for automated seizure registration observed that since people were less at ease with exposed parts of the body like the head or face, the acceptability of patch electrode locations declines with public visibility (Hoppe et al., 2015).

Because of the simplicity of our wearable device doctors and caregivers can rapidly understand a child's health, especially in emergency cases where prompt diagnosis is essential. One study about vital sign monitoring using a wireless wearable device for predicting septic shock in febrile patients described similar findings that continuously measuring HR and RR allowed for the accurate prediction of clinical deterioration and may shorten the time needed to anticipate septic shock in the real-world clinical settings (Choi et al., 2022). Another study also found that regular vital sign monitoring can assist in the early detection of health issues, enabling medical professionals to act promptly and avert major consequences (Blike, 2010; Brown et al., 2014;

Cardona-Morrell et al., 2016; Garbern et al., 2019). An important benefit of the device is that it combines several tests into one, eliminating the requirement for caregivers to visit several medical institutions relieving caregivers of economic instability, saving time for taking care of other children, doing household chores, and balancing their working life. We identified similar findings from the evaluation of wearable devices with real-time disease monitoring study that the use of wearable technology in ongoing health monitoring is growing, especially among the elderly due to transforming healthcare having great performance and short durability, particularly regarding the treatment of chronic illnesses, also they said that future devices would be more compact, effective, and allow for ongoing remote monitoring, which would improve healthcare for the elderly, lower expenses, and provide individualized treatment (Guk et al., 2019).

Caregivers felt comfortable utilizing this equipment because of the continuous technological advancements for greater healthcare solutions. They believed that technology was quite helpful in assisting parents in giving their children the best care possible if it was made accessible and simple to use in various situations. One study about users' acceptability of a mobile application for persons with type 2 diabetes found that some users found the app difficult to use, while others thought it helped encourage healthy living and keep habits (Torbjørnsen et al., 2019).

The Caregiver's perspective regarding the non-invasive and lack of side effects nature made it more pleasant for children and comforting for parents resulting in consistency with their values. A scoping review on advancement in non-invasive wearable technology for heart failure management revealed similar findings that non-invasive wearable heart failure monitoring devices, such as bio-impedance sensors, ECG, PPG, and accelerometers, were attracting interest due to their potential to enhance patient care by monitoring critical parameters like heart rate and physical activity, providing an acceptable replacement for conventional monitoring techniques (Scholte et al., 2024).

We found that people with strong religious views were reassured by the device's compliance with Islamic beliefs since it was viewed as a tool to enhance care rather than interfere with divine will. Nonetheless, some people with more conservative opinions or strong religious convictions could continue to doubt the device's usefulness or reliability. One study about the effects of religious fatalism and concern about new variants on the acceptance of COVID-19 vaccines found that not

all religious communities are against vaccination, some people accept vaccinations as a way to maintain health because they believe they are a gift from God (Mamani-Benito et al., 2023).

Though the caregivers were confident using the device for their children's well-being, they shared it would be more helpful for them to understand the benefits properly if the device is used publicly with a prescription from a physician. This strategy would promote openness and confidence by enabling people to see its advantages for themselves. In contrast to our findings, a study about wearable device utilization observed that privacy concerns, social stigma, and the requirement for confidentiality made patients uncomfortable utilizing seizure registration devices in public which highlights the need for private, user-friendly designs that ensure privacy and prevent unwanted attention (Hoppe et al., 2015).

The report also emphasized the difficulties experienced by caregivers who had to take care of other children or have domestic duties or work lives that prevented them from staying at the hospital. This emphasizes how crucial it is for caregivers who manage a variety of duties to have a device that is not just efficient but also practical and easy to use. One study about the benefits of respite time use found that during respite, caregivers' activities were more constrained than those of unemployed people. Because they felt pushed for time to juggle caring, employment, and personal interests, employed caregivers frequently wanted a longer respite to relax, do home chores, and exercise (Utz et al., 2012).

One study by Elisa Bruno and other colleagues about wearable device in epilepsy suggested that the patients were concerned about false alarms and uncertainties about the accuracy of the data may be the cause of not having enough interest in issuing alarms (Bruno et al., 2018).

4.1 Strengths and Limitations

The significant strength of this is the caregiver's comprehension of the wearable technology or device and the way it monitors children under five suffering from sepsis, which gives them the confidence to use it in the future if necessary. They have confidence in the utilization process. Regarding the norms of society and religious beliefs, this device is not against them. It helps monitor sepsis conditions before they worsen, increasing the chance of saving lives. All the interviews were done in-depth, in person in the hospital if the patient wanted it. This was selected to gain insight into their present circumstances in the hospital.

It is important to recognize the limitations of this study. Only the opinions of ten caregivers of children under five were used to determine the results. All of the participants came from Sajida Hospital in Keraniganj. Since all participants stayed at the same location and were from the same hospital unit, selection bias was challenging to prevent.

4.2 Recommendations

Considering the limitations noted, future research should try to include a more varied sample of caregivers, taking into account a wider variety of age groups and socioeconomic backgrounds, especially because the participants in this study were caregivers of children under five. A larger, more representative sample would also be ensured by extending the study to include caregivers from other healthcare facilities and geographical areas. This would improve the findings' generalizability and offer a more profound, sophisticated comprehension of the dynamics of child care.

5. CONCLUSION

This qualitative study emphasizes the advantages and disadvantages of using wearable technology to track children's health, especially in environments with low resources. Caregivers had a favorable opinion of the device, praising its real-time health information, non-invasiveness, and ease of use. One major benefit of the device was its quick monitoring of vital indicators including skin temperature, ECG, respiration rate, and heart rate compared to other machines. Furthermore, its Bluetooth connectivity, exterior operation, and unambiguous functionality promoted user confidence and trust by making it simple for healthcare providers and caregivers to obtain and act upon vital health data. Future research could look into the feasibility of the device among caregivers of public hospitals. Implementers could consider the findings and use them to develop ideas to counsel caregivers if the device is implemented.

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