Digital Empowerment of First Responders: A Post-print Study of Pediatric Health Emergencies Based on WeChat Group Consultations

Authors: Ji-Jia Kuang, Sun Xue, Sun Xue

Date: 2026-04-29T17:48:07+00:00

Abstract

Background: The quality of the initial response to sudden health events has a critical impact on disease prognosis. Particularly in pediatric emergencies, parents or other caregivers acting as "first responders" often face difficulties in judgment and emotional anxiety due to a lack of professional knowledge. Although current WeChat group consultation platforms possess the potential for empowerment, existing research focuses primarily on training and equipment configuration, lacking a systematic exploration of real-time response mechanisms. Objective: To investigate the empowerment mechanism of WeChat-group-based digital health platforms for first responders during pediatric sudden health events, and to analyze help-seeking characteristics, physician response strategies, and platform interaction structures, providing a basis for optimizing remote emergency support systems. Methods: Five pediatric WeChat consultation groups established by Chengdu Angel Children' s Hospital were selected. Chat records from 2024 were collected and de-identified to construct a corpus containing 347 independent consultation dialogues (totaling 5,546 messages). Support Vector Machine (SVM) was employed for the classification of dialogues related to sudden symptoms, combined with Latent Dirichlet Allocation (LDA) topic modeling to identify high-frequency health issue themes. Conversation analysis and pragmatic pattern analysis were used to perform stage labeling and node co-occurrence analysis on typical dialogues. Results: Six categories of sudden health themes were identified: nocturnal fever (32.6%), acute gastrointestinal reactions (21.4%), dyspnea (16.2%), abnormal consciousness (11.8%), trauma and bumps (9.3%), and accidental drug ingestion (6.5%). Parents, as first responders, exhibited significant anxiety (88.6% of dialogues contained urgent expressions) and vague symptom descriptions, requiring an average of (3.2$±$1.1) rounds of follow-up questions for clarification. Physician responses presented a four-stage pragmatic pattern: "emotional reassurance - structural guidance -

judgment advice - risk-based triage." Node co-occurrence analysis showed significant sequential correlations between stages, with a co-occurrence value of 0.82 between emotional reassurance and structural guidance, and 0.76 between structural guidance and judgment advice. Conclusion: WeChat group consultations have the potential for immediate response and decision support in pediatric sudden health events, but face issues such as low information transmission efficiency and reliance on manual responses. Future efforts should enhance platform empowerment efficiency through intelligent Q&A guidance, AI pre-screening, and structured data output, promoting its transformation into an intelligent and systematic remote emergency outpost.

Full Text

Digital Empowerment of First Witnesses: Pediatric Emergency Health Consultations Based on WeChat Group Inquiries

Abstract

In the field of pediatric emergency medicine, the "first witness" —often a parent or caregiver—plays a critical role in the initial assessment and management of sudden health events. This study explores the digital empowerment of these first witnesses through the utilization of WeChat groups for pediatric emergency health consultations. By leveraging the ubiquitous nature of mobile messaging platforms, we analyze how real-time digital communication can bridge the gap between home-based observation and professional medical intervention. Our findings suggest that structured digital inquiry platforms significantly improve the accuracy of initial symptom reporting and reduce caregiver anxiety during pediatric emergencies.

Introduction

Pediatric sudden health events often occur outside of clinical settings, placing the burden of initial response on "first witnesses" who may lack formal medical training. The rapid development of mobile health (mHealth) technologies has provided new avenues for supporting these individuals. In China, WeChat has emerged as a primary tool for health communication due to its high penetration rate and multifaceted functionality. This paper examines the efficacy of WeChat-based consultation groups in empowering caregivers to provide more accurate health data and receive timely guidance during pediatric emergencies.

1. The Role of the First Witness in Pediatric Emergencies

The "first witness" is defined as the individual present at the onset of a medical emergency who provides the first level of care or observation. In pediatrics, this role is almost exclusively filled by family members. The quality of the information provided by these witnesses is paramount for subsequent clinical decision-

making. However, emotional distress and a lack of clinical knowledge often lead to fragmented or inaccurate descriptions of symptoms. Digital empowerment aims to provide these witnesses with the tools and structured frameworks necessary to communicate effectively with healthcare professionals in real-time.

2. Methodology: WeChat-Based Inquiry Framework

This study utilizes a qualitative and quantitative analysis of pediatric consultation data collected from specialized WeChat groups. These groups are moderated by pediatricians and emergency medicine specialists.

2.1 Data Collection and Structure Five pediatric consultation WeChat groups established by Chengdu Angel Children' s Hospital were selected. Chat records from 2024 were collected and de-identified to construct a corpus containing 347 independent consultation dialogues, comprising a total of 5,546 messages (approximately 103,008 words). To ensure systematic analysis, we categorized the inquiries based on the following parameters: - Symptom onset and duration - Visual indicators (e.g., skin rashes, respiratory effort) - Vital signs (if measurable by the caregiver) - Previous medical history provided in the chat interface

2.2 Mathematical Modeling and Analysis To filter typical segments related to "sudden symptoms," this study combined supervised Support Vector Machine (SVM) text classification with unsupervised Latent Dirichlet Allocation (LDA) topic modeling. SVM was employed to classify dialogues as "relevant" or "irrelevant" to sudden health incidents. Feature extraction was performed using the `TfidfVectorizer` to calculate TF-IDF values for each word.

Subsequently, LDA topic modeling was utilized to conduct an unsupervised thematic analysis. The optimal number of topics was determined to be six based on the perplexity curve. Furthermore, conversation analysis (CA) and pragmatic pattern analysis were applied to perform stage labeling and node co-occurrence analysis on representative dialogues using NVivo 12.

3. Results

3.1 Emergency Health Themes Six distinct categories of emergency health themes were identified: nocturnal fever (32.6%), acute gastrointestinal reactions (21.4%), dyspnea (16.2%), abnormal consciousness (11.8%), trauma and collisions (9.3%), and accidental drug ingestion (6.5%).

3.2 Help-seeking Characteristics As first responders, parents exhibited significant anxiety, with 88.6% of dialogues containing expressions of urgency. Parental symptom descriptions tended to be vague and non-professional (e.g., "the child' s whole body went limp," "eyes rolling back"), requiring an average of (3.2 ± 1.1) rounds of follow-up questioning for clarification.

3.3 Physician Response Patterns The physicians'responses followed a four-stage pragmatic pattern: "emotional reassurance (EA) - structured guidance (SG) - diagnostic suggestion (JD) - risk-based triage (RG)." Node co-occurrence analysis revealed significant sequential correlations between these stages. Specifically, the co-occurrence value between emotional reassurance and structured guidance was 0.82, while the co-occurrence value between structured guidance and diagnostic suggestion was 0.76.

[Figure 1: see original paper]

4. Discussion

4.1 The Potential for Digital Empowerment WeChat group consultations possess significant potential for immediate response and decision support during pediatric emergency health incidents. They bridge the "last mile" of pre-hospital emergency care by providing "instant empowerment" to first witnesses during the "golden hour." However, current practices face challenges such as low information transmission efficiency and a heavy reliance on manual responses.

4.2 International Comparisons and Intelligent Transformation Compared to international systems like the UK's NHS Digital or the Healthily Smart Symptom Checker, domestic WeChat consultations lack front-end "structured symptom collection." Future developments should focus on: 1. **Intelligent Q&A Guidance:** Implementing AI-driven chatbots to provide immediate, automated guidance and categorize severity. 2. **Data Structuring:** Using templates and Natural Language Processing (NLP) to convert conversational input into standardized medical formats (e.g., JSON or FHIR standards). 3. **AI Pre-screening:** Utilizing algorithms to prioritize high-risk cases, thereby reducing the cognitive load on human responders.

4.3 Optimization of Public Emergency Systems The findings suggest three insights for the "First Witness Action System" : - **Capacity Compensation:** Embedding interactive emergency training modules into platforms. - **Systematic Referral:** Designing "one-click referral" mechanisms that link online consultations directly to hospital emergency departments. - **System Resilience:** Integrating high-frequency symptom data into regional health monitoring systems to support the optimized layout of emergency equipment like AEDs.

5. Conclusion

WeChat group consultations are a vital tool for pediatric emergency response, but they currently operate under a "high dependency, low structure" model. Future efforts should enhance platform empowerment efficiency through intelligent Q&A guidance, AI pre-screening, and structured data output. This will

facilitate the transformation of WeChat consultation groups into intelligent, systematic outposts for remote emergency medical services, moving from "human response" to "systemic intelligent response."

6. Research Limitations

This study is limited by its single-center retrospective design and reliance on unstructured text data. Future research should expand to multi-center samples and incorporate multimodal data (e.g., video, vital sign telemetry) and long-term health outcome tracking to further validate the efficacy of digital empowerment strategies.

Keywords: WeChat group consultation; First responder; Remote response mechanism; Emergency health incidents; Pediatrics

Note: Figure translations are in progress. See original paper for figures.