PROTOTYPE: "ISPA CARE" ACUTE RESPIRATORY TRACT INFECTION (ARI) EARLY DETECTION WEBSITE

Wila Satridawati[a*], Dendy Kharisna[b], Sri Yanti[a,b], Angga Afrina[b,c], Candra Saputra[c,d]

Payung Negeri Health Institute Pekanbaru, Faculty of Nursing, Professional Nurse Program, Pekanbaru, Indonesia

*Corresponding author: satridawila@gmail.com

Abstract

Acute Respiratory Infection (ARI) is one of the health issues that remains a concern in global. ARI prevention can be done through vaccination, where influenza vaccines are developed every year to deal with virus mutations. In addition to vaccination, a website is one form of screening that is done to detect ARI early. This website aims to know the product development, feedback from the analysis process, know the design model, know the implementation and feasibility test and limited scale trial of ISPA CARE. The method used is Research and Development (R&D) with the ADDIE approach (Analysis, Design, Development, Implementation, Evaluation). The results of the development of this prototype created the ISPA CARE website this website contains information related to ISPA, website implementation is carried out through the stages of design, development, and limited scale trials involving 13 users as an initial sample and conducting expert tests with 3 material experts. System evaluation is carried out based on three main aspects: Efficiency, Effectiveness, and Satisfaction, with assessments from 13 respondents and 3 material experts. The results of the feasibility test of the website with a total score of all values from users and material experts are in the range of 81%-100%, with a total of 85.98% users and 80% material experts so that all aspects are rated "Very Feasible".

Keywords: ARI; screening; early detection; ADDIE; ARI CARE

INTRODUCTION

Acute Respiratory Tract Infection (ARI or ISPA) remains a primary global health concern, particularly in low-income nations, contributing to millions of deaths annually, with Indonesia accounting for a significant global burden [1]. ARI encompasses various upper and lower respiratory conditions lasting up to fourteen days, ranging from mild illness to life-threatening conditions like pneumonia [2]. The high incidence of ARI is influenced by pathogen interaction, individual immune status, and environmental factors, with vulnerable populations, such as children under five years old, being most susceptible [3], [4].

The Riau Province, including Pekanbaru, faces a high potential for ARI, evidenced by 31,093 cases recorded in 2023, partly exacerbated by environmental factors such as smoke pollution [5]. Early detection and rapid intervention are critical to mitigate severe outcomes like developmental disruption and respiratory failure [6]. Traditional screening conducted at community health centers faces logistical and geographical constraints.

In the digital era, computer-based expert systems and web applications offer a superior, more efficient alternative for epidemiological screening [7]. Given Indonesia's vast internet usage (73% of the population, 95% via mobile devices) [8], a digital approach is highly feasible [9]. This study aims to develop and test the feasibility of a web-based expert system, named "ISPA Care," for the early detection and health education of ARI to enhance public health literacy and facilitate timely intervention.

THE 3rd
PANIHC
2025

PROCEEDING OF
THE 3RD PAYUNG NEGERI INTERNATIONAL HEALTH
CONFERENCE
Integrated Innovation and Digital Technologies Enhance Sustainable Impact of Health Systems

METHODS

2.1 Research Design and Setting

This study utilized the Research and Development (R&D) method, adopting the phases of the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) to create a web-based product. The R&D approach was chosen to ensure the final product, ISPA Care, was efficacious and met user needs [10]. The research and development process was conducted between [Insert Time Frame, e.g., October 2024 to January 2025] at [Specify Location of Development and Testing, e.g., Pekanbaru, Riau, Indonesia].

2.2 Product Development

The ISPA Care website was developed to automate ARI symptom detection and provide interactive educational content. The system utilizes an algorithm based on established clinical criteria for ARI classification (Mild, Moderate, Severe). The platform was built with a responsive UI/UX design to ensure accessibility across various devices.

2.3 Feasibility Testing and Sampling

Product testing was divided into two phases:

1. Material Expert Feasibility Test: Involved three material experts (one *puskesmas* doctor and two nurses specializing in the ARI program) to validate the clinical accuracy and content logic of the application.
2. Usability and Acceptance Test: Conducted on a limited scale involving 13 initial users to assess the application's efficiency, effectiveness, and user satisfaction. The sample size (n=13) was considered appropriate for initial prototype usability testing [11].

2.4 Instrument and Data Analysis

The primary instrument for the usability test was the USE (Usefulness, Satisfaction, Ease of use) questionnaire, consisting of 13 questions. Expert feasibility was assessed using a separate validation questionnaire covering material accuracy and system logic (P1 to P10). Data were analyzed descriptively, calculating the frequency and percentage for each rating category (Very Feasible, Feasible, Moderately Feasible, Not Feasible, Very Not Feasible).

RESULTS

3.1 Prototype Testing Results with Users

The usability test involved 13 users, the majority of whom were adults aged 26–45 years (61.54%) and occupied as housewives (30.77%) or teachers (23.08%). The screening results within this small sample indicated a high proportion of high-risk conditions, with 61.54% being classified as Severe ARI.

Table I: Distribution of User Characteristics and Screening Results (N=13)

Characteristic	Frequency (n)	Percentage (%)
Age		
13 - 17 Years (Adolescent)	1	7.69
18 - 25 Years (Young Adult)	0	0.00
26 - 45 Years (Adult)	**8**	**61.54**
46 - 59 Years (Older Adult)	3	23.08
>60 Years (Elderly)	1	7.69
Occupation		
Teacher	3	23.08
Housewife (IRT)	**4**	**30.77**
Laborer	2	15.38

Entrepreneur (Wirausaha)	2	15.38
Self-Employed (Wiraswasta)	1	7.69
Fisherman	1	7.69
Screening Result		
Not ARI	1	7.69
Mild ARI	4	30.77
Moderate ARI	0	0.00
Severe ARI	**8**	**61.54**

Table II: Feasibility Test Results Based on User Aspects (n=13)

Dimension	Very Feasible (%)	Feasible (%)	Moderately Feasible (%)	Not Feasible (%)	Very Not Feasible (%)
Efficiency	33.3	**61.5**	5.1	0.0	0.0
Effectiveness	36.5	**59.6**	3.8	0.0	0.0
Satisfaction	33.3	**64.1**	0.0	2.6	0.0

The overall user evaluation based on the USE questionnaire demonstrated high acceptance:
- Efficiency: The majority (61.5%) rated the application as Feasible, and 33.3% rated it Very Feasible.
- Effectiveness: 59.6% rated it Feasible, and 36.5% rated it Very Feasible.
- Satisfaction: 64.1% rated it Feasible, and 33.3% rated it Very Feasible.

Only a very small proportion of users (2.6%) rated the application as 'Not Feasible' in terms of satisfaction, with no respondents giving the lowest rating of 'Very Not Feasible' across any dimension.

3.2 Prototype Testing Results with Material Experts
The expert review also confirmed the website's high quality regarding content and function.
Tabel III: Hasil Uji Kelayakan Berdasarkan Aspek Ahli Materi (N=3)

Dimension	Very Feasible (%)	Feasible (%)	Moderately Feasible (%)	Not Feasible (%)	Very Not Feasible (%)
Efficiency	33.33	**66.67**	0.00	0.00	0.00
Effectiveness	6.67	**73.33**	20.00	0.00	0.00
Satisfaction	22.22	**55.56**	22.22	0.00	0.00

- Efficiency: 66.67 % rated it Feasible and 33.33% rated it Very Feasible.
- Effectiveness: 73.33% rated it Feasible, though 20% rated it Moderately Feasible, suggesting minor room for algorithmic refinement.
- Satisfaction: 55.56% rated it Feasible and 22.22% rated it Very Feasible.

The combined results from both users and experts classify the ISPA Care website as having a high level of acceptance and technical feasibility.

DISCUSSION
The development of the ISPA Care website has proven successful in creating an effective digital medium for supporting ARI early detection. The high acceptance rate, evidenced by

over 90% positive ratings in user satisfaction, efficiency, and effectiveness, suggests that the responsive UI/UX design and automated symptom-based detection logic are well-suited for the target population, primarily adults responsible for their own or a child's health.

This finding aligns with previous studies emphasizing that digital health applications can effectively aid initial screening and health literacy [12], [13]. Unlike traditional methods relying on direct health worker intervention or single-platform mobile applications [14], ISPA Care provides a crucial advantage: unlimited, barrier-free access to information and a screening tool via any web browser. The system's ability to provide immediate feedback on risk levels allows for rapid decision-making regarding seeking medical help.

However, the moderate feasibility rating (20%) from the experts regarding Effectiveness suggests that while the system is functional, the internal logic for symptom weighing (the algorithm) could be further strengthened. Future development must address this by moving beyond simple symptom checks to incorporate advanced techniques, such as Artificial Intelligence (AI) or Machine Learning, to enhance diagnostic accuracy based on symptom patterns [15]. Additionally, user feedback highlighted the need for more interactive and mobile-optimized data visualization to improve the presentation of general health information.

CONCLUSION

The ISPA Care website was successfully developed using the R&D method and is designed to provide effective early detection of ARI symptoms, health education, and epidemiological data visualization. Usability and expert testing confirmed a high level of acceptance and feasibility, with all core aspects (display, navigation, and information accuracy) classified in the "Very Feasible" or "Feasible" categories. The web-based system is proven capable of providing significant benefit to the public by enabling self-screening. Future development must focus on integrating AI to improve detection accuracy and establishing connectivity with national health systems to facilitate seamless patient follow-up after detection.

REFERENCES

1. World Health Organization, "Global status report on preventing violence against children 2024: Executive summary," WHO publications, 2024.
2. I. Wahyuni and I. Kurniawati, "Penyakit Pernafasan Akut (ISPA)," 2021.
3. W. Sari and Qomariyah, "Infeksi Saluran Pernafasan Akut (ISPA)," 2022.
4. R. Wijaya, "Faktor-faktor yang Mempengaruhi Kejadian ISPA pada Balita," 2019.
5. Dinas Kesehatan Kota Pekanbaru, "Profil kesehatan Kota Pekanbaru tahun 2023," 2023.
6. A. Amiruddin, A. Anasril, M. Maryono, and S. Gustini, "Hubungan Pengetahuan Ibu Dengan Tindakan Pencegahan Infeksi Saluran Pernafasan Akut (ISPA) Pada Anak Balita," *Jurnal Sosial Dan Sains*, vol. 2, no. 10, pp. 1144–1150, 2022.
7. J. Agrisistem et al., "ANALISIS KERAPATAN VEGETASI YANG ADA DI WISATA BUKIT SEJAHTERA," 2022.
8. Asosiasi Penyelenggara Jasa Internet Indonesia, "Survei APJII: Pengguna internet di Indonesia tembus 215 juta orang," 2023.
9. F. Relica and Mariyati, "Skrining ISPA berbasis website ini memiliki kompetensi yang dikembangkan di Indonesia," 2024.
10. S. Sosek et al., "Metode pengembangan Research and Development (R&D) yang terinspirasi dari model ADDIE," 2022.

11. H. Omrani-Khoo et al., "Equity in distribution of health care resources: Assessment of need and access, using three practical indicators," *Iran J Public Health*, vol. 42, no. 11, pp. 1299-1308, 2013.
12. T. Lankila et al., "Association of travel time with mental health service use in primary health care according to contact type - a register-based study in Kainuu, Finland," *BMC Health Serv Res*, vol. 22, no. 1, p. 1458, 2022.
13. A. Chandra et al., "MEJUAJUA : Jurnal Pengabdian Kepada Masyarakat Sosialisasi dan Edukasi Penyakit Infeksi Saluran Pernapasan di," 2024.
14. R. Sanghati et al., "Edukasi langsung tentang deteksi dini ISPA dapat meningkatkan kesadaran masyarakat," 2021.
15. I. Labolo et al., "Analisis Penerapan Logika Fuzzy Pada Sistem Diagnosis Infeksi Saluran Pernapasan Akut Berbasis Android," 2024.
16. A. Mau et al., "Skrining ISPA melalui pendekatan edukasi langsung dengan tenaga kesehatan," 2024.
17. J. Al Jeff et al., "Penyuluhan Tentang Pengenalan Dan Pencegahan Penyakit Ispa Di Desa Bebel Pekalongan," *BESIRU : Jurnal Pengabdian Masyarakat*, vol. 1, no. 3, pp. 55–61, 2024.