International Journal of Health Technology and Innovation
An Official Journal of **Kalam Institute of Health Technology** | ISSN - **2583-8547**
REVIEW ARTICLE

SHESHA: Standardization of Health Education for Sustainable Healthcare Activities

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Received: 10th May, 2025; Revised: 26th May , 2025; Accepted: 20th June, 2025; Available Online: 19th August, 2025

ABSTRACT

Introduction: The Standardization of Health Education for Sustainable Healthcare Activities (SHESHA) addresses the challenge of integrating wellness-focused interventions with diverse healthcare systems, including modern medicine and AYUSH (Ayurveda, Yoga, Unani, Siddha, Homeopathy), to enhance quality of life (QOL) and longevity. The research question is: "How can a digital platform standardize health education and wellness practices across diverse healthcare systems to improve QOL and longevity?"

Methods: SHESHA employs a blockchain-based digital platform for secure, anonymous data collection, focusing on milestone-based interventions across developmental stages (prenatal to late adulthood). The methodology includes stakeholder engagement (healthcare providers, educators, communities), user-friendly interface design (React/Flutter), scalable backend architecture (MongoDB, RESTful/GraphQL APIs), and pilot testing in urban and rural Indian settings. The platform aligns with India's National Education Policy (NEP) 2020 and the United Nations' Sustainable Development Goals (SDGs), integrating AYUSH and global wellness practices. AI-driven analytics enable personalized interventions, with data validation through interdisciplinary collaboration.

Results and Discussion: SHESHA is a white paper. As a conceptual framework, SHESHA is yet to be implemented. Preliminary case studies indicate that milestone-based interventions, such as infant visual stimulation, traditional lifestyle interventions, and geriatric yoga, improve developmental outcomes and mobility. The open-source data model and blockchain integration promise enhanced data privacy and interdisciplinary research coordination. SHESHA's strength lies in bridging traditional and modern healthcare systems through standardized milestones and community-sourced data, fostering sustainable practices. Challenges include data privacy, stakeholder resistance, and funding constraints. Blockchain ensures compliance with privacy regulations, while partnerships with government and innovation hubs support scalability. Alignment with NEP 2020 and SDGs enhances global relevance.

Conclusion: SHESHA offers a novel framework for standardizing health education and promoting sustainable healthcare. Future efforts will focus on prototype development, pilot studies, and stakeholder collaboration to assess its impact on QOL and longevity, with potential for global adoption.

Keywords: Health Education, Digital Health, AYUSH, Blockchain, Health Stack, Sustainable Healthcare, Milestone-Based Interventions, NEP 2020, SDGs, Quality of Life (QoL), Longevity, Interoperability, Data Privacy, Precision Medicine, Stakeholder Engagement, AI Analytics.

International Journal of Health Technology and Innovation (2025)

How to cite this article: Thimmaiah A. SHESHA: Standardization of Health Education for Sustainable Healthcare Activities. International Journal of Health Technology and Innovation. 2025;4(2):43-51.

Doi: 10.60142/ijhti.v4i02.08

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Healthcare systems globally face challenges in integrating wellness-focused interventions with disease-centric models, particularly in the context of increasing lifespans and diverse healthcare practices. In India, traditional systems like AYUSH (Ayurveda, Yoga, Unani, Siddha, and Homeopathy) offer holistic approaches to wellness, yet their integration with modern medicine remains limited (Ministry of AYUSH, 2022). The Standardization of Health Education for Sustainable Healthcare Activities (SHESHA) is a proposed digital platform to address this gap by standardizing health education and fostering sustainable healthcare practices through milestone-

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based interventions and open-source data sharing. This paper presents SHESHA as a framework for interdisciplinary research collaboration, aligning with India's National Education Policy (NEP) 2020 (Government of India, 2020) and the United Nations' Sustainable Development Goals (SDGs) (United Nations, 2015).

Our research question is, "How can a digital platform standardize health education and wellness practices across diverse healthcare systems to improve QOL and longevity?" This manuscript proposes SHESHA as a tool to collect anonymous, milestone-specific health data, enabling evidence-based interventions and policy decisions. SHESHA has the objective of integrating milestone-based health education and global wellness practices into a unified system.

Different Models

Prior work on digital health platforms emphasizes the role of technology in democratizing healthcare access. Open-source health data initiatives, like those discussed below, highlight the potential of shared data for precision medicine (van Panhuis *et al*., 2014). However, these efforts often focus on disease management rather than wellness. In India, AYUSH systems provide culturally relevant wellness practices, but their standardization is limited (Ministry of AYUSH, 2022).

Digital models to standardize healthcare focus on creating consistent, interoperable, and efficient systems for collecting, storing, sharing, and analyzing health data. These models aim to improve patient care, enhance interoperability, reduce costs, and ensure data quality and security (Wetterstrand, 2023). Below are some of the current popular digital models and frameworks being used to standardize healthcare:

OMOP Common Data Model (CDM)

Description

The Observational Medical Outcomes Partnership (OMOP) Common Data Model, developed by the Observational Health Data Sciences and Informatics (OHDSI) community, standardizes the structure and content of observational health data (OHDSI, 2022).

Purpose

Enables collaborative research, large-scale analytics, and the sharing of tools and methodologies by transforming disparate healthcare data (e.g., electronic health records [EHRs], claims data) into a common format.

Key Features

- Standardized vocabularies (e.g., SNOMED, LOINC, RxNorm) for medical terms, procedures, and medications.
- Supports data conversion (ETL: Extract, Transform, Load) from various sources.
- Facilitates studies in areas like population-level effect estimation and patient-level prediction.

Impact

Allows systematic analysis of observational databases, improving evidence generation for healthcare decisions (OHDSI, 2022).

Adoption

Widely used by research institutions, pharmaceutical companies, and healthcare providers globally.

FHIR (Fast Healthcare Interoperability Resources)

Description

Developed by HL7 (Health Level Seven International), FHIR is a standard for exchanging healthcare information electronically in a consistent, interoperable format (Health Level Seven International, 2021).

Purpose

Simplifies data sharing between systems (e.g., EHRs, mobile apps, and other health IT systems) to improve care coordination and accessibility.

Key Features

- Uses modern web standards (RESTful APIs, JSON, XML) for easy integration.
- Defines "resources" (e.g., Patient, Observation, Medication) as building blocks for data exchange.
- Supports the 21st Century Cures Act (2020) rules against information blocking, enhancing patient access to health records.

Impact

Promotes seamless connectivity, reduces mismatched or corrupted data, and enables real-time interoperability (Wetterstrand, 2023).

Adoption

Widely adopted by health systems, tech companies (e.g., Google, Apple), and initiatives like the U.S. CMS and ONC interoperability rules.

DICOM (Digital Imaging and Communications in Medicine)

Description

A standard for storing, transmitting, and viewing medical imaging data (e.g., X-rays, MRIs, CT scans) (HIMSS Global Knowledge Center, 2023).

Purpose

Ensures consistency in imaging data across systems, devices, and providers for better diagnosis and treatment.

Key Features

- Standardizes file formats and communication protocols for imaging equipment.
- Supports metadata for patient and study information.
- Enables integration with EHRs and other systems.

Impact

Reduces routing complications and delays in care due to unstandardized imaging data, improving radiologist efficiency

and quality initiatives (HIMSS Global Knowledge Center, 2023).

Adoption

Universal in radiology and imaging-heavy specialties worldwide.

SNOMED CT (Systematized Nomenclature of Medicine Clinical Terms)

Description

A comprehensive, multilingual clinical terminology system for standardizing clinical information (OHDSI, 2022).

Purpose

Provides a consistent way to code and represent diagnoses, procedures, and clinical findings across healthcare settings.

Key Features

- Covers clinical domains like diseases, symptoms, and interventions.
- Enables semantic interoperability (meaningful data exchange) between systems.
- Integrates with EHRs, decision support tools, and analytics.

Impact

Reduces variability in how concepts (e.g., blood glucose) are represented, supporting better analytics and care coordination (OHDSI, 2022).

Adoption

Used globally, mandated in some regions (e.g., by the NHS in the UK).

LOINC (Logical Observation Identifiers Names and Codes)

Description

A universal standard for identifying and coding laboratory and clinical observations (e.g., lab tests, vital signs) (OHDSI, 2022).

Purpose

Standardizes test results and measurements to enable data sharing and aggregation across healthcare organizations.

Key Features

- Provides unique codes for tests, measurements, and observations.
- Complements SNOMED CT for clinical data and FHIR for exchange.
- Supports quality reporting and research.

Impact

Improves data consistency, reduces errors in test interpretation, and enhances interoperability for analytics and public health (OHDSI, 2022).

Adoption

Widely used in labs, EHRs, and health information exchanges (HIEs).

Ayushman Bharat Digital Mission (ABDM) Framework

Description

India's national digital health initiative to create a unified digital ecosystem for healthcare (National Health Authority, 2023).

Purpose

Standardizes patient data, provider registries, and health records to improve access, quality, and affordability of care.

Key Features

- Includes a Unique Health ID for patients, digitized health records, and interoperable systems.
- Integrates public and private providers, telemedicine, and insurance (e.g., PMJAY scheme).
- Addresses data inaccuracies, exclusion, and poor interoperability for AI and analytics.

Impact

Aims to bridge gaps in care, though challenges like resource constraints and resistance from providers persist (Raman & Rajamohan, 2022).

Adoption

Rolled out across India, with growing participation from healthcare stakeholders.

Digital Health Maturity Models

Description

Frameworks to assess and guide healthcare organizations' digital transformation, measuring readiness and progress (Yakob *et al*., 2022).

Purpose

Standardizes the evaluation of digital capabilities to improve patient care, health outcomes, and equity.

Key Features

- Dimensions include business processes, data analytics, organizational characteristics, and technology use.
- Examples: HIMSS Maturity Model, Victorian Digital Health Maturity Model.
- Criteria assess context, feasibility, integrity, and actionability.

Impact

Helps organizations develop roadmaps for digital adoption, though evidence linking maturity to outcomes needs further research (Yakob *et al*., 2022).

Adoption

Used by health systems and districts to benchmark and plan digital strategies.

WHO Global Digital Health Certification Network

Description

A World Health Organization initiative to standardize digital health products and certification for global health threats (World Health Organization, 2023a).

Purpose

Develops a framework for digital health records, vaccination status, and other tools to protect populations.

Key Features

- Supports interoperable digital IDs and health status documentation.
- Launched with the EU Commission in 2023 to address pandemics and future challenges.

Impact

Enhances global data sharing, though criticized by some civil liberties groups for privacy concerns (World Health Organization, 2023a).

Adoption

Early adoption in regions like the EU, with potential for broader global use.

Methodology: Proposed Framework

SHESHA is a digital platform designed to standardize health education and promote sustainable healthcare practices. Its core components include

Milestone-Based Health Interventions

SHESHA categorizes human development into stages (prenatal, infancy, adolescence, adulthood, etc.), with specific wellness practices for each milestone (e.g., visual fixation in infants, cognitive training in middle childhood). These practices draw from modern medicine, AYUSH, ABA, and global traditional healthcare systems (Ministry of AYUSH, 2022).

Open-Source Data Sharing

Users can anonymously share health and wellness data, stored securely using blockchain technology compliant with India's Digital Data Protection Act (KMS Healthcare, 2023).

Interdisciplinary Collaboration

SHESHA integrates contributions from healthcare providers, educators, and communities to sieve best practices for age- and geography-specific milestones.

Alignment with Policy

SHESHA supports NEP 2020 by providing tools for parents and educators to address developmental delays and promotes SDGs through sustainable healthcare practices (Government of India, 2020; United Nations, 2015).

Ethical Considerations

Covering data privacy, informed consent, and regulatory compliance to be inculcated appropriately (KMS Healthcare, 2023).

Health Stack Building

Open access for knowledge integration models.

Interface and Backend Architecture for SHESHA

Step 1: Requirements gathering and stakeholder engagement

Action

Engage stakeholders (healthcare providers, AYUSH practitioners, mental health and ABA therapists, educators, policymakers, and community members) to define functional requirements, such as data input forms, milestone tracking, and wellness resource access.

Details

Conduct workshops to identify user needs (e.g., parents tracking infant milestones, elderly users accessing geriatric care practices). Ensure compliance with India's Digital Data Protection Act for data privacy (KMS Healthcare, 2023). The emphasis is on collaborative engagement across healthcare providers, educators, and communities, which must be strong to reflect an understanding of multi-stakeholder healthcare reform.

Outcome

A detailed requirements document specifying user roles, data types (e.g., anonymous health metrics), and integration with NEP 2020 and SDG goals (Government of India, 2020; United Nations, 2015).

Step 2: Interface Design

Action

Develop a user-friendly, intuitive interface for diverse demographics (e.g., parents, educators, healthcare professionals, elderly users).

Components

Web and mobile apps

Create responsive web and mobile applications using frameworks like React or Flutter for cross-platform compatibility (Health Level Seven International, 2021).

Features

Data input portal

Allow users to anonymously submit health and wellness data (e.g., milestone achievements, lifestyle practices) via forms or surveys.

Milestone dashboard

Display age-specific milestones (e.g., infant motor skills, adolescent cognitive development) with progress tracking.

Resource library

Provide access to evidence-based wellness practices from modern medicine, AYUSH, ABA (Applied Behavior Analytics), and global traditional systems (Ministry of AYUSH, 2022).

Community forum

Enable users to share experiences and best practices, moderated for quality and relevance.

Accessibility

Ensure multilingual support (e.g., Hindi, Tamil, English) and compliance with WCAG 2.1 for accessibility (e.g., for disabled users).

Outcome

A prototype interface was tested with focus groups to ensure

usability across urban and rural populations.
Step 3: Backend Architecture

Action

Design a scalable, secure backend to handle data storage, processing, and analytics.

Components

Blockchain integration

Use a blockchain platform (e.g., Ethereum or Hyperledger Fabric) for secure, anonymous data storage. Smart contracts can manage data access and ensure compliance with privacy regulations (KMS Healthcare, 2023).

Database

Implement a NoSQL database (e.g., MongoDB) for flexible storage of heterogeneous health data (e.g., milestone metrics, wellness practices).

API layer

Develop RESTful or GraphQL APIs to connect the frontend with the backend, enabling data submission and retrieval (Health Level Seven International, 2021).

AI and analytics

Integrate machine learning models (e.g., using Python with TensorFlow) to analyze health data and generate predictive insights for precision medicine. The health stack is available for doctors, patients, and researchers.

Cloud infrastructure

Use cloud services (e.g., AWS, Azure) for scalability and reliability, with encryption for data security.

Outcome

A secure, blockchain-based backend architecture capable of handling real-time data from millions of users.
Step 4: Pilot Testing and Iteration

Action

Deploy a pilot version of SHESHA in select regions (e.g., a rural panchayat and an urban center in India).

Details

Collect feedback on usability, data accuracy, and cultural relevance. Test blockchain performance for data security and scalability (KMS Healthcare, 2023).

Outcome

A refined platform ready for broader implementation, with documented user feedback and performance metrics.
Step 5: Integration with Policy and Funding

Action

Collaborate with the Ministry of Family Welfare, AYUSH Ministry, and educational institutions to align SHESHA with NEP 2020 and SDGs. Secure funding through government grants (e.g., India's innovation hubs) or venture capital (Government of India, 2020; United Nations, 2015).

Details

Prepare a detailed project report (DPR) outlining costs, timelines, and stakeholder roles. Explore tokenization models for data sharing to incentivize user participation.

Outcome

Formal partnerships and funding to support nationwide rollout.

Demographic Standardized Milestones from Birth to 21 Years of Age

SHESHA aims to map age-specific milestones across physical, cognitive, emotional, and social domains, integrating evidence-based practices from modern medicine, AYUSH, and global traditions (Ministry of AYUSH, 2022). Below is a framework for standardized milestones from birth to 21 years, based on the document's emphasis on developmental stages. These milestones are generalized and can be refined with stakeholder input and pilot data. The standard ABA, API, and WHO milestones are considered as models for the SHESHA frameworks.

Prenatal Stage (Conception to Birth)

Milestones

- *Physical*

Formation of major organs (8–12 weeks), fetal growth and brain development (20–38 weeks).

- *Cognitive*

Basic neural development for sensory responses.

- *Emotional/Social*

None (focus on maternal wellness).

SHESHA interventions

- Provide prenatal yoga and nutrition guidelines from AYUSH practices (Ministry of AYUSH, 2022) for expectant mothers.
- The ABA/CBT (Cognitive Behavior Therapy) interventions for behavioral interventions at home.
- Educate mothers on stress management and diet via the SHESHA app.
- Collect anonymous maternal health data to optimize prenatal care models.

Infancy (0–2 Years)

Milestones

- *Physical*

Lifts head (2–3 months), rolls over (4–6 months), sits (6–9 months), walks (12–18 months).

- *Cognitive*

Face recognition (2–3 months), object permanence (~8 months).

- *Emotional*

Attachment to caregivers, stranger anxiety (~8 months).

- *Social*

Social smiling, imitation (~12 months).

SHESHA interventions

- Share time-tested, rationalized practices like visual stimulation (e.g., colorful crib toys) to enhance eye fixation (2–6 months).
- Offer parenting tutorials on bonding techniques from Ayurveda (e.g., infant massage) (Ministry of AYUSH, 2022).
- Collect data on milestone achievement rates to identify delays and suggest interventions.

Early Childhood (2–6 Years)

Milestones

- *Physical*

Refined motor skills (e.g., running, drawing by 4–5 years).

- *Cognitive*

Language explosion (2–3 years), symbolic play, basic reasoning (4–6 years).

- *Emotional*

Expresses emotions (e.g., joy, anger), begins self-regulation (4–6 years).

- *Social*

Peer interaction, empathy, gender identity awareness (5–6 years).

SHESHA Interventions

- Provide resources for cognitive development (e.g., storytelling from across traditions, puzzles).
- Offer parenting workshops on emotional regulation (e.g., mindfulness practices from Yoga) (Ministry of AYUSH, 2022).
- Collect data on language development and peer interactions to support NEP 2020's early education goals (Government of India, 2020).

Middle Childhood (6–12 Years)

Milestones

- *Physical*

Steady growth, improved coordination (e.g., sports skills by 10–12 years).

- *Cognitive*

Logical thinking, problem-solving, academic learning (e.g., math, reading).

- *Emotional*

Developing self-esteem, complex self-concept (8–12 years).

- *Social*

Peer groups, team activities, collaboration skills.

SHESHA interventions

- Share teacher training modules for cognitive skill development (e.g., logic games, art integration).
- Provide AYUSH-based practices (e.g., meditation for focus) to enhance emotional resilience (Ministry of AYUSH, 2022).
- Collect data on academic performance and social skills to inform NEP 2020-aligned curricula (Government of India, 2020).

Adolescence (12–18 Years)

Milestones

- *Physical*

Puberty, sexual maturity (12–16 years).

- *Cognitive*

Abstract thinking, identity exploration (14–18 years).

- *Emotional*

Mood swings, seeking independence (13–17 years).

- *Social*

Peer pressure, romantic relationships, social roles.

SHESHA interventions

- Offer gender sensitivity training and coping strategies for ADHD or emotional challenges.
- Share Yoga-based stress management techniques and modern counseling resources (Ministry of AYUSH, 2022).
- Collect anonymous data on mental health and milestone achievement to develop predictive models.

Early Adulthood (18–21 Years)

Milestones

- *Physical*

Peak physical health, fitness maintenance.

- *Cognitive*

Advanced reasoning, career-focused thinking.

- *Emotional*

Emotional stability, intimacy vs. isolation (per Erikson's stages).

- *Social*

Relationship building, career development.

SHESHA interventions

- Provide resources on lifestyle practices (e.g., Ayurvedic diet for energy, exercise routines) (Ministry of AYUSH, 2022).
- Offer workshops on conflict resolution and relationship building from community-sourced data.
- Collect data on career stress and health practices to support precision wellness models.

Implementation Steps for Milestones

Data collection

Develop standardized forms within SHESHA for users to report milestone achievements (e.g., age of first steps, reading proficiency).

Validation

Collaborate with pediatricians, psychologists, and AYUSH practitioners to validate milestone benchmarks and

interventions (Ministry of AYUSH, 2022).

Personalization

Use AI to match user data to milestone benchmarks, suggesting tailored interventions (e.g., yoga for adolescent stress).

Community input

Encourage users to share traditional practices (e.g., regional infant care rituals) to enrich the milestone database.

Demographic Standardized Milestones from 21 Years - End of Life: Additional Considerations

Cultural relevance

Ensure milestones and interventions reflect India's socio-cultural diversity (e.g., dietary practices from different regions) (Ministry of AYUSH, 2022).

Scalability

Pilot milestone tracking in select demographics (e.g., rural infants, urban adolescents) before nationwide rollout.

Data privacy

Use blockchain to anonymize and secure milestone data, ensuring compliance with legal standards (KMS Healthcare, 2023).

METHODOLOGY

The broad development of SHESHA involves:

Platform Design

A blockchain-based architecture ensures secure, anonymous data storage. The platform will include user interfaces for data input, milestone tracking, and access to wellness resources (KMS Healthcare, 2023).

Data Collection

Pilot studies will collect anonymous health data from diverse populations in India, focusing on urban and rural settings. Initial focus will be on infancy to adulthood (Birth-21 years) and geriatric care (65+ years).

Validation

Case studies will evaluate SHESHA's impact on QOL and longevity, using metrics like user satisfaction, milestone achievement rates, and health insurance premium reductions.

Stakeholder Engagement

Collaboration with AYUSH Ministry, educational institutions, and healthcare providers will refine the platform's content and ensure policy alignment (Government of India, 2020; Ministry of AYUSH, 2022).

To advance SHESHA's implementation:

Prototype Development

Build a minimum viable product (MVP) with the described interface and backend features, focusing on infancy and adolescence milestones.

Pilot Studies

Test SHESHA in two regions (e.g., a panchayat and an urban center) to collect initial milestone data from schools, colleges, and old age homes.

Stakeholder Collaboration

Partner with AYUSH Ministry, schools, and health NGOs to refine content and secure funding (Ministry of AYUSH, 2022).

AI Integration

Develop machine learning models to analyze milestone data and predict health outcomes. AI can also help tailor best interventions for milestones in case of delay.

Long-Term Milestones

Integrate milestones until the age of the longest human alive and tailor best healthcare practices for age, gender, and other relevant demographics, with specific support for the geriatric population and those with chronic health conditions.

The preliminary structure of the data collection and presentation involves details on sampling strategies, study design for pilot implementation, data analysis methods, and evaluation metrics for quality of life and longevity outcomes that are necessary for rigorous research evolution. The following standard models are considered essential:

Socio-Ecological Model (SEM)

The Socio-Ecological Model is a framework used to understand the complex interplay of individual, interpersonal, community, and societal factors that influence health behaviors and outcomes (Yakob *et al*., 2022).

Key levels

Individual, interpersonal, community, institutional/ organizational and societal.

Applications

Used in public health to design multi-level interventions, such as obesity prevention programs targeting individual education, community resources, and policy changes.

Behavior change theories

Behavior Change Theories provide frameworks to understand and influence how individuals adopt or modify behaviors (Yakob *et al*., 2022).

- *Health belief model (HBM)*

Focuses on perceptions of health risks and benefits.

- *Theory of planned behavior (TPB)*

Suggests behavior is driven by intention.

- *Transtheoretical model (TTM)*

Describes behavior change as a process through stages.

- *Social cognitive theory (SCT)*

Emphasizes reciprocal interactions between personal factors, behavior, and environment.

- *Self-determination theory (SDT)*

Focuses on intrinsic and extrinsic motivation.

- *Applications*

These theories guide interventions, such as promoting physical

activity through tailored strategies.

Implementation science models

Implementation Science Models guide the translation of evidence-based interventions into real-world practice (Yakob *et al*., 2022).

- *RE-AIM framework*

Evaluates interventions based on Reach, Effectiveness, Adoption, Implementation, and Maintenance.

- *Consolidated framework for implementation research (CFIR)*

Organizes factors influencing implementation.

- *Diffusion of innovations theory*

Explains how innovations spread.

- *Ecological framework for implementation*

Considers multi-level influences on implementation success.

- *Knowledge-to-action (KTA) framework*

Describes knowledge creation and application.

- *Applications*

These models ensure SHESHA's feasibility, scalability, and sustainability in real-world settings.

RESULTS AND DISCUSSION

While SHESHA is in the conceptual stage, preliminary case studies suggest that milestone-based interventions can improve QOL and longevity. For example, traditional practices like visual stimulation for infants (e.g., colorful crib toys) enhance developmental outcomes (Ministry of AYUSH, 2022). In geriatric care, non-drug interventions, such as yoga, show promise in improving mobility and mental health (Ministry of AYUSH, 2022). SHESHA's open-source data model could reduce coordination barriers in interdisciplinary research, enabling real-time insights for precision medicine (van Panhuis *et al*., 2014). Challenges include ensuring data privacy, securing funding, and engaging diverse stakeholders (Raman & Rajamohan, 2022). Blockchain technology addresses privacy concerns, while partnerships with innovation hubs and government seed funding can support development (KMS Healthcare, 2023). SHESHA's alignment with NEP 2020 and SDGs positions it as a scalable solution for global health challenges (Government of India, 2020; United Nations, 2015).

Challenges to Standardization Processes in Healthcare

Data quality and consistency

Unstandardized or messy data leads to delays, inefficiencies, and missed opportunities for improvement (HIMSS Global Knowledge Center, 2023).

Interoperability

Lack of standardized data-sharing agreements and transactional standards hinders integration (World Health Organization, 2023a).

Privacy and security

Digitized health data raises concerns (e.g., HIPAA, GDPR compliance), with over 11.5 billion medical records breached since 2005 (KMS Healthcare, 2023).

Resistance

Healthcare professionals, overburdened with patients, resist new tools due to time constraints and lack of training (Raman & Rajamohan, 2022).

Resource constraints

Smaller providers struggle with the cost and effort of adopting digital standards (Raman & Rajamohan, 2022).

Potential solutions

- Clearly define research objectives and hypotheses, such as measurable outcomes for the pilot study.
- Outline a phased implementation plan for SHESHA, detailing specific stages, stakeholder roles, resource requirements, and scalability pathways.
- Acknowledge limitations and risks, such as technological adoption barriers, data accuracy concerns, and potential stakeholder resistance (Raman & Rajamohan, 2022).
- Suggest continuous dynamic research and implementation directions, including longitudinal studies, comparative analyses, and integration with AI for personalized health insights from the generated data (Yakob *et al*., 2022).

CONCLUSION

SHESHA offers a novel framework for standardizing health education and fostering sustainable healthcare practices through a digital platform. By integrating milestone-based interventions, open-source data sharing, and interdisciplinary collaboration, SHESHA has the potential to transform healthcare delivery. We invite researchers, policymakers, and technologists to collaborate on its development, particularly in designing pilot studies and arriving at a project cost estimate. Future work will focus on implementing SHESHA in diverse settings and evaluating its impact on QOL and longevity.

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