

Shanghai Smart Health Station Research Application in Fusion of Sports and Medicine Community Health Service [†]

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[†] Presented at the IEEE 5th Eurasia Conference on Biomedical Engineering, Healthcare and Sustainability, Tainan, Taiwan, 2–4 June 2023.

Abstract: The “fusion of sports and medicine (FSM)” is the key to promoting national fitness and health in deep fusion. However, there are disadvantages such as isolation of information networks and separation of health data in the progress of FSM. A smart health station (SHS) is a new health service mode of FSM to provide a place for community residents for health self-assessment and self-management. SHS forms an integrated health information management system based on the Internet of Things, mobile internet, and big data. It integrates community health services, community physical fitness surveillance, and other resources. In order to put forward health management and improve people’s ability to manage their health, Shanghai has promoted the construction of SHS. The construction of SHS in Shanghai provides strong support and guarantees disease prevention and treatment in the community. “Early prevention, early diagnosis, and early treatment” are also achieved to eliminate the disease. In this study, we introduce the background, service, character, and management of SHS construction in Shanghai, and the application of health service data in health education, chronic disease management, and intervention guidance.

Keywords: health station; health service; fusion of sports and medicine



Citation: Tu, S.-J.; Jin, C.; Wang, X.-H.; Wang, B.-Y. Shanghai Smart Health Station Research Application in Fusion of Sports and Medicine Community Health Service. *Eng. Proc.* **2023**, *55*, 8. <https://doi.org/10.3390/engproc2023055008>

Academic Editors: Teen-Hang Meen, Kuei-Shu Hsu and Cheng-Fu Yang

Published: 27 November 2023



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1. Introduction

To promote the development of a “fusion of sports and medicine (FSM)” and the deep integration of public fitness and public health, and better meet the diverse needs of people for fitness and health, the Shanghai Smart Health Station (SHS), an intelligent service mode with Shanghai regional characteristics, was launched [1]. As a practical project of the Shanghai government, the first 85 SHSs in Shanghai opened to the public in 2019, and 219 SHSs were built and used in every community and sub-districts by 2020. SHS (also previously named the health hut) has become an important place for residents to obtain health management resources, and plays an extremely important role in chronic disease management services. With communities and sub-districts as the main body and the support of the Shanghai “Healthcare Cloud” application, SHS realizes the self-examination, self-assessment, and self-management of residents’ health and provides community residents with fitness testing, basic health testing, scientific fitness guidance, chronic disease sports intervention, sports rehabilitation training, health knowledge popularization, and other “one-stop” sports healthcare services [2]. Residents can set up a personal health account in “Healthcare Cloud” to master their health conditions in real time.

2. Function of SHS

The highlight of SHS includes a unique identity by integrating health indicators and shared health data (within health facilities). The health data are fully used to increase

the residents' self-perception and experience of health management. With population characteristics, disease characteristics, behavior patterns, and other dimensions as the core, SHS monitors residents' health behavior, early disease, and risk factors through self-examination and self-evaluation using the internet information method, and integrates physical examination. Under the guidance of family-doctor teams or professionally trained volunteers, the risk factors affecting health status are assessed, and residents in need are guided for a timely connection with family doctors, specialist doctors, and social sports instructors. This improves the identification, filing, management, and control rates of key diseases through the development of individual exercise programs and the physical quality of chronic diseases.

2.1. Self-Examination and Self-Evaluation

SHS contains various health data collection devices for residents to perform health self-examination and self-assessment by wearable devices, sports equipment, and self-rating scales for basic physical conditions, physical monitoring, and lifestyle. By docking with the "Healthcare Cloud" application, residents' health data are uploaded and analyzed in real time. Health records can be dynamically updated to form a health database of Shanghai and establish a public health management system integrated with health management and medical treatment. Through the self-examination and evaluation function, SHS managed to realize the primary screening of residents' health conditions, promote the risk warning of key diseases, and move forward the community health management threshold.

2.2. Risk Self-Assessment

SHS plays an extremely important role in the analysis of health risk factors and the initial screening of diseases. According to the characteristics of residents such as gender, age, health status, and lifestyle, and under the guidance of professional medical staff, targeted health scales including TCM healthcare and chronic disease risk are selected for evaluation in SHS. It mainly evaluates their health status, factors affecting health hazards, and physical functions such as TCM constitution identification, normal constitution or biased constitution, and the degree of cognitive impairment of the elderly. Through self-assessment, SHS helps residents scientifically understand health risk factors, correctly accept health intervention measures, and actively participate in health self-management. This is a "sports + medical" characteristic health service.

2.3. Health Guidance

The corresponding health assessment report is issued after receiving the health assessment at the SHS. If the unhealthy lifestyle causes changes in health status and does not develop into early stages of diseases, SHS distributes health education materials such as health education prescriptions on exercise, diet, psychology, and traditional Chinese medicine. Residents need to follow the advice from SHS to establish a healthy lifestyle, change unhealthy habits harmful to health, and reduce the harm of health risk factors and the occurrence of diseases. In case of abnormal health conditions and early symptoms of the disease during initial screening, SHS guides residents to professional institutions for disease screening or treatment and provides community health service information.

2.4. Service Process

Residents only need to present their ID cards or social security cards to complete the intelligent identification, automatically create or call the residents' health account, and can independently choose to obtain 22 self-help health and physical fitness tests and 15 health scale self-assessment services, and can directly share the test data to the residents' health files in real time through the "Health Cloud" app to achieve family doctor contracting, chronic disease management, appointment registration, and many other "through train" services. Based on the combination of online and offline methods, the Smart Health Station provides health prescriptions and exercise advice for different groups of people based on

self-help physical tests, links medical resources with residents' health needs, and provides targeted health guidance and advice, while guiding residents to refer to family doctors and contracting services or other professional institutions based on the results of health self-examinations and self-assessments. This will strengthen community residents' active participation in their own health management, enrich ways for community residents to carry out self-management and gradually improve their health literacy. The service flow of the Smart Health Station is outlined in Figure 1.

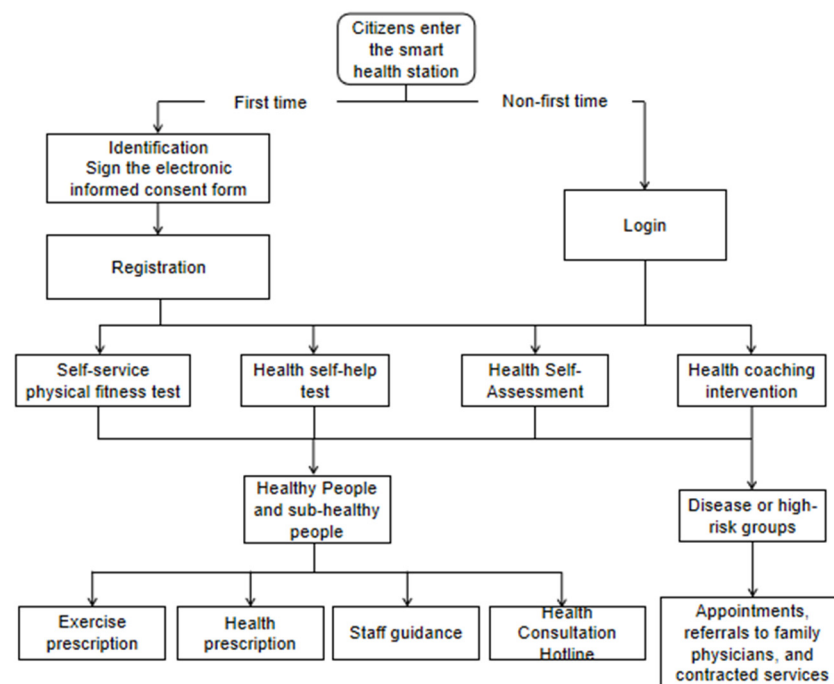


Figure 1. The service flow of the Smart Health Station.

3. Data Application

Supported by the “healthcare cloud” information system, personal health information is uploaded to the health accounts in the healthcare cloud account after SHS service [3]. The changing trend of health information such as blood pressure and blood sugar levels of patients with chronic disease is recorded and analyzed in the information system. With the updated information, family doctors can adjust health management programs, daily monitoring and management, health consultation, follow-up, and other services. Social sports instructors can improve residents' fitness programs according to changes in exercise prescriptions from family doctors.

3.1. Health Monitoring

In combination with their health requirements, residents visit the nearest SHS, perform smart identity identification with their ID card or social security card, automatically create or connect to their health accounts, and independently choose 11 items of the self-service health testing, 11 items of the self-service physical testing, and 15 items of the health scale self-evaluation services. The intelligent equipment of the SHS provides residents with a health self-examination service, completing the update of personal electronic health data information and long-term and continuous health condition indicator monitoring. Under the prompt of intelligent analysis of big data in the information system, it initially screens out high-risk groups such as chronic diseases and common diseases. The SHS effectively helps patients achieve the self-management of chronic diseases and provides diabetes monitoring and management services, including diagnosis reports, examination reports, follow-up reports, blood glucose monitoring records, and closed-loop management of diabetes.

3.2. Health Analysis

Relying on SHS to collect residents' health information, the normal range, different ages, gender, and health index to the health of the residents are provided through long-term, continuous monitoring and data analysis. Scientific monitoring achieves long-term continuous personal health indicators to monitor and analysis of risk factors that affect health. It also screens for the beginning of early disease symptoms and gives the family doctor the role of an "assistant". High blood pressure, diabetes, chronic diseases, and common diseases of high-risk groups are updated with the information of the health records. The family doctor signs for the residents' health files after finding residents' health abnormalities for timely medical treatment to reduce the disease damage to health.

3.3. Personalized Intervention

Residents choose different health self-test programs and scale assessment services. Compared with the normal range, a preliminary assessment of personal health is performed to understand the health index or disease risk score threshold of obesity, blood pressure, blood sugar, and cognitive impairment. The self-test system issues specific scientific health prescriptions for dietary nutrition and emotional nursing to help residents manage their health under the guidance of medical staff or community volunteers. If a resident's health index or disease risk score reaches the risk value and is listed as a high-risk group, the family doctor team of the health service center of the community or sub-district provides professional help and guidance to timely regulate the diagnosis and treatment in medical institutions to slow down the malignant development of the disease and the occurrence of complications. If diagnosed with chronic diseases such as hypertension and diabetes, they are brought to standardized management by family doctors to take comprehensive prevention and treatment measures provided by health management services. Such a "family doctor + social sports instructor + exercise and fitness guidance" mode provides residents with "chronic disease treatment, preventive treatment of disease" health guidance services.

Author Contributions: Conceptualization, S.-J.T. and B.-Y.W.; writing—review and editing, C.J.; supervision, X.-H.W. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Basic Scientific Research Competence Improvement Project of Young and Middle-Aged Teachers at Guangxi universities (2023KY0279), and the Youth Fund Project of the Guangxi University of Chinese Medicine (2022QN001).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data are contained within the article.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Tu, S.J.; Jin, C.; Chen, B.T.; Xu, A.Y.; Luo, C.; Wang, X.H. Study on the Fusion of Sports and Medicine in China from 2012 to 2021: A Bibliometric Analysis via CiteSpace. *Front. Public Health* **2022**, *10*, 939557. [\[CrossRef\]](#) [\[PubMed\]](#)
2. Chen, C.; Gong, X.; Wang, X.; Cao, C.; Sun, X.; Zhang, Y.; Jing, L.; Chen, N.; Liu, Q.; Wang, H.; et al. Evaluation of the implementation and effect of the healthcare cloud information platform for diabetes self-management: A case study in Shanghai. *Int. J. Health Plan. Manag.* **2019**, *34*, 986–997. [\[CrossRef\]](#) [\[PubMed\]](#)
3. Poorejbari, S.; Mansoor, W. Smart healthcare systems on improving the efficiency of healthcare services. In Proceedings of the 2019 2nd International Conference on Signal Processing and Information Security (ICSPIS), Dubai, United Arab Emirates, 30–31 October 2019; pp. 1–4.

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