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Determining the Validity and Reliability of the Innovation Ecosystem with Emphasis on the Role of E-government in Hospitals in Yazd Province in 2023

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ABSTRACT

Background: Today's changes in health systems and the importance of health can be a basis for self-care, increasing the quality of services, patient satisfaction, achieving optimal levels of health in people, and finally using innovation to improve the quality of health services. Electronic measures in the health sector also include many benefits such as improving the quality of health services, reducing costs, and increasing efficiency. Therefore, this study aimed to design an ecosystem model of innovation with an emphasis on the role of e-government in Yazd hospitals.

Methods: This was a qualitative-quantitative study conducted in Yazd in 2023. In the qualitative phase, 7 people and in the quantitative phase, 70 senior and middle managers of government and non-government hospitals were selected and interviewed through convenience sampling. In this study, SMSRT-PLS 3.2.4 software was used to measure the reliability and validity of the questionnaire, considering the number of available samples (70 people) and the insensitivity to the normality of the data. Cronbach's alpha coefficient and composite reliability coefficient (CR) were used to examine reliability, and convergent validity was used to examine validity.

Results: Most of the participants were female (81/43%), between the ages of 36-54 (34/29%), and had a master's degree (30%). After using factor analysis, the questionnaire was designed into 4 dimensions: 1- Activation of policies and regulations, 2- Access to data and infrastructure, 3- Funding and validation opportunities, 4- Ease of adoption and dissemination of innovations The results showed that the reliability of these dimensions was 89% , 91%, 76% and 88%, respectively. Also, the validity results of Wager showed that its value for the studied dimensions was 51%, 71%, 63% and 79%, respectively.

Conclusion: According to the accepted validity and reliability, this questionnaire can be a valid, reliable and easy-to-use tool to improve the field of technology. Although the questionnaire is in Persian, it can be used in other languages as a basis to check the validity and reliability through the scientific process.

Keywords: Health, hospital, innovation, designing

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Introduction

The development of innovation topics in countries has led to the emergence of new concepts in this field (1) Some of these concepts include innovation systems such as national, sectoral, etc., innovation networks, commercialization, and innovation ecosystems (2). The biotechnology industry holds a special position and characteristics within the industrial sector (3). This industry has brought new scientific disciplines and perspectives, and its growth and development in practical fields over the past three decades is astonishing. The success and impact of this industry are a result of its wide-ranging capabilities and scope of action (4). Considering the impact area of technology and the emphasis of the country's national programs on it, as well as the key role of emerging technologies in wealth creation, power, and increasing social welfare, the focus of this research is on biotechnology, which is regarded as one of the seven strategic technologies of the country (2). In the higher-level documents, including the Iran 2024 Vision Document, the country's third and fourth economic-social development plans, and subsequently the fifth and sixth development plans, as well as the comprehensive scientific map of the country, it has also been addressed (5).

In summary, the innovation ecosystem is characterized by the dynamic nature of the development process, which includes co-evolution, self-organization, upstream and downstream activities, adaptation, and an entrepreneurial culture (3), differs from other concepts (6). The most important features of the innovation ecosystem are mutual evolution and dynamic internal interaction (7), self-organization, adaptation, self-control, entrepreneurial culture, micro and macro flows, knowledge flow, learning, historical context, customer demand, and dynamic communications (8).

In the broadest sense, innovation in the health system refers to the introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, expansion, prevention, and research; in line with the long-term goals of enhancing quality, safety, efficiency, achievements and cost reductions (9) "innovation in the health system can be directed towards one or more of the six main goals of health organizations, which are: 1. prevention, 2. diagnosis, 3. treatment, 4. education, 5. research, 6. expansion" (10), "We call the first three goals primary objectives and the second three goals secondary objectives. The primary objectives are those directly related to the health and wellness of individuals in the community, and the secondary objectives are those that provide the context and intermediary for the realization of the primary objectives in a more complete manner."(11). "In line with achieving the above objectives, there are criteria that provide a framework for comparing various processes, institutions, procedures, and products. These criteria are: 1- quality, 2- security, 3- efficiency, 4- results, 5- costs" (12).

In the study by Dabagh Afroz et al., 5 main categories of Mal Ali (government, financial capital), a central category (university and research institutions), strategies (establishing research-oriented universities and institutions, shortening the process of obtaining necessary permits, government support for research and development, material and spiritual incentives and increasing risk-taking investment), consequences (economic development and growth) and contextual factors (attractiveness of the location, banking services, intellectual property rights) intervention conditions (culture) were identified in designing a strategic model for the health innovation ecosystem" (13). In the study by Asadi-Fard et al., 4 components of types of collaborations, methods of institutionalization, activities, and characteristics of the main actor were identified as the main components" (14).

Questionnaires, as one of the main data collection tools, play a vital role in measuring the characteristics and performance of the innovation ecosystem. However, in order for the results of these questionnaires to be reliable and valid, it is necessary to examine their validity and reliability. Validity means the ability of a tool to measure what it is supposed to measure, and reliability means the stability and consistency of the results obtained

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from that tool at different times.

This article examines the validity and reliability of the innovation ecosystem questionnaire in hospitals. The main purpose of this study is to evaluate the reliability and validity of the questionnaire designed to measure different dimensions of the innovation ecosystem in hospitals. Given the importance of this issue, the results of this research can help managers and policymakers in the field of healthcare to make better decisions in order to strengthen innovation and improve healthcare services. Therefore, this study was conducted to design and validate an innovation ecosystem model with an emphasis on the role of E-government in the hospitals of Yazd city in the year 1402.

Methods

This study has two phases: qualitative (questionnaire design) and quantitative (descriptive) in Yazd in 2023. The target population for designing the tool consisted of senior and middle managers of public and private hospitals in Yazd province.

The qualitative phase of the study included:

Target group for questionnaire design

Initially, a qualitative study was conducted, using the grounded theory method as the research approach. The survey was conducted on 7 senior managers and deputies (the president of the university, the advisor to the president of the university, the vice president for technology and research, the head of the growth center, the vice president for treatment, the head of the science and industry department, and the vice president for health) of Shahid Sadoughi University of Medical Sciences in Yazd to develop and design the questionnaire.

Method of Data Collection

In this research, initially, a library study method was used, which included the use of books, articles, and the Internet to gather information on the theoretical foundations of the research and literature related to the topic (Table 1). In the field section, information about the managers and deputies of Shahid Sadoughi University of Medical Sciences in Yazd was collected. The method of data collection was specialized interviews.

Interview Method

The information began in Farvardin 1402 (March-April 2023) and, considering the busy schedules of the managers and academic experts, it lasted until the end of Aban (October-November 2023). An interview was conducted at their office, which took between 60 to 90 minutes. To this end, an interview protocol and framework were developed, which specified what topics should be questioned. It was determined that after introducing oneself and stating the reason for the interview, a general definition of the innovation ecosystem should be provided, followed by the questions outlined below:

A- In your opinion, what are the effective factors for achieving an innovation ecosystem in hospitals?

B- What are the most important features of the innovation ecosystem in hospitals?

C- Who are the key players in creating an innovation ecosystem in hospitals?

D- What are the necessary conditions and environment for achieving an innovation ecosystem in hospitals?

E- What are the barriers to creating an innovation ecosystem in hospitals?

During the interview, efforts were made to guide the interviewee to accurately express the characteristics of the innovation ecosystem in the hospital.

Data Analysis

Efforts were made to gain a proper understanding of the factors influencing servant organization through careful observation (line-by-line study) of their statements. Of course, readers also have the option to refer to the original interviews. The results obtained from coding and classifying the concepts were confirmed by academic elites and professors.

The process of coding: Open coding is an analytical process through which identified concepts and their characteristics and dimensions are discovered from the data. Based on qualitative data and the completion of the open coding stage, the connection between the research categories was identified.

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All interviews and related conversations were recorded from the beginning. After transcription, the content analysis method was applied to examine the conceptualization and categorization line by line. The results were derived from two categories of sources: the analysis of texts and interviews. In the next stage, events, occurrences, and information were considered as potential indicators of the phenomenon They receive based on a conceptual framework. In fact, primary codes were converted into secondary codes due to their high abundance. Several secondary codes form a conceptual code. In summary, the open codes that are identified may appear different on the surface, but they are placed together with a similar concept, creating meanings. The next stage is the construction of categories. Categories are more concrete compared to abstract concepts and represent a higher level. They are produced through an analytical process of making comparisons to highlight similarities and differences at lower levels for the generation of used concepts. Categories are the foundation for building theories. After determining the categories, the main classes of the theory are constructed.

Phase of quantitative study included

Data Collection Method

The data collection tool is in the quantitative section of the questionnaire. This section consisted of two parts. The first part includes general questions related to general information and demographics concerning the respondents, such as education level, work experience, gender, etc. The second part contained specialized questions related to the main variables of the research. The questionnaire used in this section was a researcher-made questionnaire. Which includes activating policies and regulations (5 questions), access to data and infrastructure (5 questions), opportunities for financing and validation (5 questions), and the ease of adoption and dissemination of innovations (5 questions).

Reliability and validity of the questionnaire

In this research, the reliability of the questionnaire was assessed in three ways: factor loadings, Cronbach's alpha, and composite reliability. Composite reliability, unlike Cronbach's alpha which implicitly assumes that each indicator or question has equal weight, relies on the true factor loadings (which indicate the strength of the relationship between the latent variable and the observed variable, with values ranging from zero to one) of each construct. Therefore, it provides a better criterion for reliability. Composite reliability should achieve a value greater than 0.7 to indicate the internal consistency of the construct.

Convergent validity: The second criterion used for fitting measurement models in the PLS method was convergent validity. To assess convergent validity, the AVE (Average Variance Extracted) criterion is used.

AVE indicates the correlation of a construct with its indicators, and the greater this correlation, the better the fit. The critical value for this criterion is considered to be a minimum of 0.5. This means that the latent variable in question accounts for at least 50 % of the variance of its observable indicators. Diagnostic or divergent validity measures a reflective measurement model's ability to differentiate the questions of its latent variable from other questions present in the model. Divergent validity is actually a complement to convergent validity. In PLS, two criteria have been proposed for measuring divergent validity. Another method for identifying divergent validity is the use of cross-loadings. If the factor loading of each observable variable on its corresponding latent variable is at least 0.1 greater than the factor loading of the same observable variable on other latent variables, the corresponding measurement model has diagnostic (discriminant) validity at the level of its constructs.

In Table 5, the row of the table represents the questions or observables, and the column of the table represents the latent variables of the model; the numbers inside the table indicate the factor loadings. In this study, to assess the reliability and validity of the questionnaire, considering the available sample size (70 individuals) and the lack of sensitivity to the normality of the data, the SMSRT-PLS 3.2.4 software was used.

Sample Size

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In the next phase, a quantitative study was conducted, which was a cross-sectional study involving 70 senior and middle managers (hospital director, hospital management, head nurse, financial management) from public and private hospitals in the city of Yazd. The sample size was calculated based on the following formula.

$$n = \frac{z^2_{1-\frac{\alpha}{2}} \times \delta^2}{d^2} = 70$$

At this stage, a survey was conducted in each hospital among all eligible individuals in that hospital.

The inclusion criteria for this study was residing in Yazd for more than 2 years and having at least 5 years of work experience.

The exclusion criterion was unwillingness to participate in the study.

Results

The results indicated that based on the literature review, 34 factors are important in strengthening the innovation ecosystem in the health sector (Table 1). A total of 37 codes from the interview results are included in Table 2. After reviewing the interview texts line by line and extracting concepts from them, these codes were categorized into concepts based on the similarities and semantic and conceptual affinity between the codes (Table 2).

Table 1. Concepts derived from the literature review

Important factors in strengthening the innovation ecosystem	
Removing cultural barriers	Cooperation between universities and organizations
Create an accelerator	- Increase in gross domestic product in the field of research
Making the Internet free	Increasing public participation compared to private one
Improving the performance of academic institutions	Science and technology park
Participation of research centers and business companies	Network expansion
6- Targeted research and development in the field of industry	- Rapid recruitment through communication and meeting
Participation of research centers and business companies	Sharing knowledge
Increase internet speed	Sharing knowledge
Developing a culture of participation	Creation of technology institutes
Improving the performance of academic communication	Increasing resources to start production
Promotion of national and international cooperation	Required space
Knowledge transfer	Changes in patent laws
Support for entrepreneurship	Recruitment and recruitment
Increasing cooperation between universities and industry	Improving the level of education
Creating a competitive environment	Collaboration between technologists and innovators and entrepreneurs
Transfer of technologies	Strong and wide communication network
	Cooperation with experts from other ecosystems

Table 2 shows the demographic characteristics of the participants in the quantitative phase. Most participants were female (81.43%), aged 36-54 (34.29%), and had a master's degree (45.37%).

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Table 2. Demographic characteristics of the participants in the study

Variable		Abundance (percentage).
Gender	Man	13 (18.57)
	Woman	57 (81.43)
Age (years)	30 to 35	6 (8.57)
	36 to 40	24 (34.29)
	41 to 45 years	21 (30)
	46 to 50	14 (27.14)
Education	Bachelor's degree	21 (30)
	Master's degree	32 (45.7)
	PhD	17 (24.29)

In interviews conducted with experts, four main factors were identified and categorized as effective on the role of E-government in the development of the innovation ecosystem in the health sector: 1- Activation of policies and regulations 2- Access to data and infrastructure 3- Opportunities for financing and credit assessment 4- Ease of adoption and dissemination of innovations.

All tax numbers of the variables are greater than 0.4, which indicates the appropriateness of this criterion. On the other hand, considering that the suitable value for Cronbach's alpha and composite reliability is 0.7, according to the findings, these criteria have adopted an appropriate value regarding the latent variables, confirming the adequacy of the reliability status of the research.

Considering that the appropriate amount for the average extracted variance is 0.5, and according to the findings in Table 3, this criterion is accepted for the latent variables, thus confirming the adequacy of the convergent validity of the research.

Based on the mentioned cases, the findings confirm the discriminant validity of the measurement model.

Table 3. Results of convergent validity of the latent variables of the research

Hidden variable	Average Variance Extracted (AVE)
Enable policies and regulations	0.51
Access to data and infrastructure	0.71
Funding and accreditation opportunities	0.63
Ease of adoption and dissemination of innovations	0.79

Table 4. Correlation of the construct with its indicators (discriminant validity)

Questions	Enable policies and regulations	Access to data and infrastructure	Financing and accreditation opportunities	Ease of adoption and dissemination of innovation
S1	0.54	0.15	0.22	0.11
S2	0.81	0.25	0.23	0.21
S3	0.74	0.21	0.16	0.22
S4	0.8	0.24	0.25	0.17
S5	0.75	0.2	0.3	0.19
S6	0.08	0.66	0.02	0.1
S7	0.16	0.69	0.07	0.22
S8	0.28	0.82	0.01	0.15
S9	0.26	0.79	0.01	0.19
S10	0.27	0.76	0.10	0.28
S11	0.3	0.02	0.89	0.01
S12	0.33	0.07	0.92	0.01
S13	0.24	0.003	0.7	0.21
S14	0.08	0.1	0.66	0.06
S15	0.16	0.1	0.74	0.1
S16	0.24	0.25	0.17	0.92

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Questions	Enable policies and regulations	Access to data and infrastructure	Financing and accreditation opportunities	Ease of adoption and dissemination of innovation
S17	0.15	0.21	0.27	0.71
S18	0.24	0.25	0.05	0.65
S19	0.19	0.25	0.01	0.74
S20	0.22	0.21	0.3	0.77

The logic of this method is based on the assumption that a latent variable interacts more with its indicators (questions) than with other dimensions (latent variables), so the latent variable in question has high divergent validity.

This criterion compares the square root of each latent variable's average variance extracted (AVE) with the correlation among other dimensions. The square root of the AVE of each latent variable (dimension) should be greater than the maximum correlation of that latent variable with other latent variables, or the average variance extracted from each latent variable should be greater than the square of the correlation of that latent variable with other latent variables.

Table 5. Divergent validity by Fornell-Larcker method

Variable	Enable policies and regulations	Access to data and infrastructure	Funding and accreditation opportunities	Ease of adoption and dissemination of innovation
Enable policies and regulations	0.69	-	-	-
Access to data and infrastructure	0.29	0.71	-	-
Funding and accreditation opportunities	0.35	0.02	0.84	-
Ease of adoption and dissemination of innovation	0.34	0.31	0.27	0.74

The results indicated that the constructs have a greater interaction with their own indicators, compared with other constructs, meaning that the divergent validity of the model is at an appropriate level.

Based on the mentioned content and the results obtained from the outputs of the SMSRT-PLS software, the researcher-made questionnaire has appropriate validity (convergent and discriminant) and reliability (standardized factor loading, composite reliability, and Cronbach's alpha) in the model.

Discussion

The main objective of this study is to evaluate the reliability and validity of a questionnaire designed to measure various dimensions of the innovation ecosystem in hospitals. Given the importance of this issue, the results of this study can help managers and policymakers in the field of healthcare to make better decisions in order to strengthen innovation and improve healthcare services.

In creating innovation ecosystems, policymakers must identify various constraints, and in the initial stages, they must ensure the active participation of local actors, which requires building or upgrading infrastructure facilities. The absence of one or more coordinating actors can hinder the development of an innovation ecosystem. On the one hand, the participation of local companies, organizations, and universities fosters the growth and strengthening of the technology ecosystem. Ultimately, the growth of these systems leads to the growth and development of a sustainable economy, creating a cycle. In this way, with the development of economic growth, the government gains more resources and can allocate a larger budget for research activities and investigations (13).

The results of this study showed that four main components—activating policies and regulations, access to data and infrastructure, funding opportunities and validation, and the ease of adopting and disseminating innovations—play a role in creating an innovation ecosystem. In the

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study by Dabagh Afroz et al., five components of causal factors (government, financial capital), the core category (university and research institutions), strategies (establishing universities and research-oriented institutions, shortening the process of obtaining necessary permits, government support for research and development, material and moral incentives, and increasing venture capital investment), outcomes (economic development and growth), and contextual factors (attractiveness of the location, banking services, intellectual property rights) were identified as intervening conditions (culture) (13).

In the study by Asadi Fard et al., the factors influencing the formation and development of a university-centered innovation ecosystem are classified into four main categories: types of collaborations, the manner of institutionalization, activities, and the characteristics of the main actor (14). In the questions related to Likert scale, care was taken to ensure that five options were available, allowing respondents to select a neutral answer (16). These procedures help enhance reliability.

Ultimately, various studies have suggested different and competing concepts regarding the innovation ecosystem (17). The world is transitioning from a business ecosystem to an innovation ecosystem (18). Moreover, the government plays a key role in creating an innovation ecosystem through policy-making. The strategy to develop and strengthen the innovation ecosystem leads to economic growth and job creation. According to a study (15) conducted in Europe in 2015, the government and its policies play a fundamental role in establishing an innovation ecosystem. Additionally, another study showed that economic growth aligns with the growth of the innovation ecosystem (19, 20). These trends encourage us to provide opportunities for further research to strengthen the concept of the innovation ecosystem (21).

Although this tool has good reliability and validity, some aspects have been overlooked, for example, measuring content validity (by using the questionnaire at two different times for two different groups of people), which may impact the study's results. This study did not examine demographic characteristics, which could have affected the results if these characteristics were not uniform among individuals. Additionally, this questionnaire provides reliability and validity features that define its context, thus increasing its effectiveness; the questionnaire only uses closed-ended questions. Open-ended questions allow respondents to include more information and dimensions about the topic, but this abundance of information can lead to excessive breadth and may prevent a deeper understanding of the subject, despite the high validity of open-ended questions. Therefore, open-ended questions were excluded from the present study (22).

Despite the appropriate validation process and the reliability observed, this study had limitations. The exclusive use of Iranian participants did not allow for generalization of the results worldwide. The validity of the questionnaire was not assessed in this study. Furthermore, this was a Persian-language questionnaire, and using it in other languages without appropriate validity and reliability in different populations is not possible.

Conclusion

The results showed that to promote technology in health sector, attention must be paid to four essential aspects (activating policies and regulations, access to data and infrastructure, financing opportunities and credibility, and facilitating the adoption and dissemination of innovations). Given that this questionnaire has acceptable validity and reliability, it can be used as a reliable and user-friendly tool for developing and enhancing technology and innovation in the health sector. Additionally, the findings of this research can be utilized by various organizations, including those overseeing knowledge-based companies.

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Conflicts of interest

The authors declared no conflict of interests.

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Ethical considerations

This study was approved by the Ethics Committee of Kerman Azad University.

Code of ethics

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Authors' contributions

Z. M, engaged in the study design, data collection, analysis, and wrote the article; S. S, was involved in study design, analysis, and article review; H. M, did the study design and article review; A. BN, was also involved in study design, data collection, analysis, and article review. All authors read and approved the final version.

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Data extracted from the interview

ردیف	کدهای اولیه استخراجی
۱	رهبری و چشم‌انداز قوی از سوی مقامات دولتی برای حمایت از سلامت دیجیتال
۲	ایجاد یک استراتژی ملی سلامت دیجیتال با نظرات ذینفعان
۳	جعبه‌های شنی نظارتی برای آزمایش نوآوری‌ها در یک محیط کنترل شده
۴	مشوق‌های مالیاتی برای سرمایه‌گذاری در استارتاپ‌های سلامت دیجیتال و تحقیق و توسعه
۵	سیاست‌های تدارکات ساده شده برای آزمایش راه‌حل‌های سلامت دیجیتال
۶	شناسه‌های جهانی بیمار و سیستم‌های EHR قابل همکاری
۷	APIها و معماری‌ها برای تشویق نوآوری‌های شخص ثالث
۸	زیرساخت ابری امن برای ذخیره و تجزیه و تحلیل داده‌های سلامت
۹	برنامه‌های آموزشی نیروی کار در زمینه سواد دیجیتال و فناوری‌های جدید
۱۰	مشارکت عمومی و خصوصی برای به اشتراک گذاشتن خطرات و منافع
۱۱	مسابقات و جوایز برای شناسایی نوآوری‌های امیدوار کننده
۱۲	چارچوب‌های مسئولیت و استانداردهای امنیت سایبری برای سلامت دیجیتال
۱۳	قوانین بهداشت از راه دور که مدل‌های مراقبت مجازی و نظارت از راه دور را قادر می‌سازد
۱۴	پشتیبانی از همکاری بین‌المللی و به اشتراک‌گذاری دانش
۱۵	بودجه برای ارزیابی اثربخشی و مقرون به صرفه بودن مکانیسم‌هایی برای ترکیب بازخورد کاربر در فرآیندهای طراحی
۱۶	استانداردسازی فرمت‌های داده‌ها، اصطلاحات و پروتکل‌ها
۱۷	مقررات مربوط به هوش مصنوعی، حریم خصوصی داده‌ها و حاکمیت اطلاعات
۱۸	قابلیت همکاری بین سیستم‌های سلامت الکترونیک قدیمی و جدید
۱۹	پشتیبانی مدیریت تغییر در طول انتقال سازمانی
۲۰	کمک فنی برای پیاده‌سازی و یکپارچه‌سازی سیستم‌ها
۲۱	آموزش نیروی کار در مورد مهارت‌های دیجیتال و مدل‌های مراقبت جدید
۲۲	مشوق‌هایی برای اتخاذ و استفاده معنادار از ابزارهای سلامت دیجیتال
۲۳	حمایت از مصرف‌کننده در برابر آسیب‌های بالقوه سلامت دیجیتال
۲۴	برنامه‌های آزمایشی برای نشان دادن اثربخشی به سیاست‌گذاران
۲۵	مراکز نوآوری و بسترهای آزمایشی برای آزمایش با فناوری‌های نوظهور
۲۶	الزامات امنیت سایبری برای فروشندگان سلامت دیجیتال
۲۷	بازپرداخت برای مداخلات سلامت دیجیتال
۲۸	قابلیت حمل داده‌های سلامت بین ارائه‌دهندگان و برنامه‌ها
۲۹	همراستایی اولویت‌های دیجیتال در بین سازمانهای بهداشتی دولتی
۳۰	فرآیندهای نظارت برای نظارت و ممیزی عملکردهای داده
۳۱	پشتیبانی از مقیاس‌بندی آزمایش‌کنندگان موفق سلامت دیجیتال در سطح ملی
۳۲	هدایت بینش هوش مصنوعی به تصمیم‌گیری در مورد سلامت عمومی
۳۳	محافظت در برابر تعصب الگوریتمی و اثرات تبعیض‌آمیز
۳۴	طرح‌های اضطراری برای خرابی یا قطعی فناوری
۳۵	تعامل با مسائل اخلاقی، قانونی و اجتماعی پیرامون سلامت دیجیتال
۳۶	تعهد به کاهش نابرابری در دسترسی و سواد دیجیتال همکاری در بخش‌ها و رشته‌ها
۳۷	ارزیابی موفقیت‌ها و شکست‌ها برای بهبود تکرارهای بعدی

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