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RESEARCH

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Determining the required data elements to develop the information management system for Iranian traditional medicine

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Abstract

Background Currently, there is no agreed-upon data collection tool for comprehensively structured documentation of Iranian traditional medicine (ITM) from the information management perspective. As ITM practice varies significantly from current medicine in diagnosis and treatment approaches, it is not appropriate to use data platforms or information systems developed for current medicine. Consequently, the collected data are non-comparable, reducing the verdicts' generalization. Therefore, this research aims to create a minimum data set (MDS) for unified reporting of ITM diseases and interventions.

Methods This multi-phased method study was performed from December 30, 2022 to March 20, 2023. The first phase involved a literature review, the second phase utilized the Delphi technique, and the third phase focused on validating the MDS-ITM. A list of potential data items was prepared after searching scientific databases, and grey literature, as well as reviewing existing information systems, forms, and websites related to ITM. A modified Delphi technique, including a two-round survey, was then employed. A panel of 34 individuals with clinical and research experience in ITM, was selected via purposeful sampling to rate the importance of candidate data items for inclusion in the ITM-MDS using a 5-point Likert scale. Items with an agreement level of 80% or more were deemed acceptable for inclusion in the final ITM-MDS. Finally, the content validity of the developed MDS was assessed using the content validity ratio (CVR) and content validity index (CVI) criteria.

Results Consensus was reached on an ITM-MDS containing 291 items grouped into seven categories: Patient admission, past medical history, six principles of health preservation, objective signs, subjective symptoms, examination of body systems, and care plans.

Conclusions The development of this MDS will enable ITM care settings to exchange information and share resources more easily. It also provides an inclusive dataset and structured documentation of medical records. This MDS can contribute to delivering high-quality care and improving clinical decision-making.

Keywords Traditional medicine, Iranian traditional medicine, Minimum data set, Information management

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Introduction

The World Health Organization (WHO) defines traditional medicine (TM) as a health practice encompassing a wide range of healthcare procedures, approaches, and products rooted in the knowledge, skills, and techniques of various native cultures. These practices include nature-based medicines, mystical therapies, exercise, and manual therapies. TM methods can be used individually or in combination for health maintenance and the prevention, diagnosis, improvement, or treatment of physical and mental illnesses [1, 2]. This discipline typically takes a holistic approach to balance the functioning of the entire human body for health maintenance. TM emphasizes maximizing the body's healing capacity and addresses the physical, mental, and spiritual aspects of disease while highlighting prevention and well-being. Allopathic or modern medicine, on the other hand, often focuses on the diseased area, suppressing adverse symptoms for immediate results [3, 4]. TM has gained global recognition due to its distinctive approach and effectiveness. Key factors contributing to the progress and popularity of TM include diversity, flexibility, easy access, cost-effectiveness, social and religious acceptability, and relatively few side effects [5–7].

Iranian traditional medicine (ITM), also known as Persian medicine (PM) or Unani medicine, is one of the oldest schools of medicine, spanning 10,000 years. Prominent Muslim ITM physicians include Avicenna, Rhazes, Jorjani, and Aghili [8, 9]. ITM adopts an individualized and holistic perspective on health preservation and treatment, considering environmental and patient-specific risk factors, signs, and symptoms when diagnosing and treating diseases. ITM views the human body as an integrated system, emphasizing the interrelationships among its organs. Practitioners focus not only on the illness but also on the patient, aiming to preserve or restore balance in the body through various treatment methods. These methods include lifestyle adjustments, medications, and manipulations (such as massage and bloodletting) [10]. In ITM, maintaining health takes precedence over treatment. Lifestyle modifications are tailored to each individual and presented in the form of Osul-e-hefz-al-sehheh (preventive health measures), including Sete-ye-Zaroorie, or "the six essential principles". As Avicenna states in the *Canon of Medicine*, ITM is a science that recognizes the human body's conditions concerning health and illness. This knowledge is applied to maintain existing health or restore it after loss [11–13]. To treat disease, ITM first modifies the person's lifestyle, particularly their nutritional status. The next step involves drug treatment and manual therapies (e.g., massage). Drug therapy is approached with caution, unlike many practitioners in the field. In this regard, Razes recommends avoiding drugs unless necessary and suggests not using multiple medications when simple drugs can effectively treat the patient [14]. Today, there is growing interest in traditional and complementary medicine services worldwide. Additionally, various segments of society are inclined to adopt ITM due to its strong historical and cultural foundation. Thus, integrating ITM with modern medicine appears to be a viable solution for improving societal health [10].

The WHO has paid special attention to TM for about four decades to achieve the goal of "health for all by the year 2000". The policies outlined regarding the development of TM and its use by the WHO emphasize implementing nationwide plans and standards to integrate TM with modern medicine, ensuring access to safe and quality TM services [15]. The WHO has urged countries to incorporate TM into their health systems based on their national capacities, priorities, relevant laws and conditions, and evidence of safety, effectiveness, and quality [16]. Information plays a vital role in promoting TM. TM data are obtained in an open environment, focusing on exchanging and communicating among humans, nature, and society. TM encompasses a combination of objective and subjective information, represented by four distinct characteristics: general, phenomenon, time, and cognitive information [17]. ITM physicians have not yet adopted health information technology or provided appropriate health records for ITM services. Consequently, there is a lack of continuity in ITM care services for patients, making it disconnected from modern medicine. Because this information is sourced from various channels and takes different forms, understanding, documenting, and displaying disease diagnosis patterns are critical issues [18]. To achieve data exchange, sharing, and interoperability, we need to clarify, formalize, and specify the concepts. The primary aim of ITM data standardization is to develop an infrastructure for expressing, organizing, and aligning data that facilitates the understanding, comparison, and integration of TM concepts [19].

TM experts report interventions and treatments in medical records in various ways, with no consensus on standard reporting. Most TM information consists of semi-structured and unstructured data, which cannot be directly used for analysis. Sorting and processing this data is time-consuming, significantly hindering data analysis. Therefore, it is essential to structure the data in a unified format. This paper proposes a minimum data set (MDS) for ITM to address this issue. MDS provides a uniform and coherent set of data items that are necessary and sufficient for collection [20, 21]. MDS development is considered the initial stage of designing any health information system, during which the data items are

scientifically determined [22, 23]. The present research aims to develop an MDS for ITM.

Methods

Study design and setting

This study applied a multi-phased method to determine the ITM-MDS parameters. The first phase involved a literature review, the second phase employed the Delphi technique, and the third phase focused on validating the ITM-MDS. The literature review aimed to retrieve potential data items from scientific and grey literature (e.g., government health department reports). Next, we conducted a modified Delphi study consisting of a two-round survey to gather expert opinions, followed by two supplementary surveys to calculate the content validity ratio (CVR) and content validity index (CVI) of the final ITM-MDS.

The modified Delphi technique is a method for reaching a consensus among a panel of experts. Unlike the traditional Delphi technique, which uses open-ended questionnaires that can be time-consuming and often yield low response rates, the modified Delphi technique gathers expert opinions through structured questionnaires developed from a comprehensive literature review or focus group interviews. This technique is suitable when basic information related to the target topic is available [24, 25]. First, we assembled a team of experts, including one ITM physician and two health information management (HIM) professionals, to ensure a clear grasp of the research objectives. The ITM-MDS was designed in three steps as outlined below:

Extracting potential data items

A literature review was conducted in scientific databases to retrieve relevant data sources and collection projects related to ITM. An initial list of potential data items was extracted from published documents in the Persian databases of MagIran, the scientific information database (SID), and Irandoc, as well as from English databases including Scopus, PubMed, Web of Science, and Google Scholar. To this end, we used a combination of keywords such as "traditional medicine," "herbal medicine," "Persian medicine," "Iranian medicine," "complementary and alternative medicine," "information system," "registry system," "data management," "minimum data set," "minimum dataset," "required data set," and "core data items," employing AND and OR operators. These search terms were entered into the relevant databases separately, and all related articles were extracted without restrictions on publication date. Our study did not conduct a systematic literature review, rather it was a formative review aimed at retrieving possible data items. Additionally, grey literature, such as ITM websites and records of patients receiving ITM services, was searched until data saturation occurred, defined as the point at which no new data items emerged.

Finally, a checklist with a five-point Likert scale was created using the data items extracted during the literature review, consisting of five columns: very low importance = 1, low importance = 2, medium importance = 3, high importance = 4, and very high importance = 5. The checklist was used to rate the importance of all items based on the expert panel's professional views. An open-ended question ("Are there any items you would like to include? ") was included at the end of each section to allow for the addition of new data items and categories that were missed in the initial list but deemed important by the experts for further evaluation.

Delphi phase

A two-round modified Delphi study was conducted to evaluate the validity of MDS-ITM content extracted through a literature review:

Expert selection

An expert is an individual with knowledge and skills in a specific area [26]. In the Delphi technique, selecting appropriate participants is essential, as it directly affects the quality of the produced results. However, there is no established criterion for determining expertise. Choosing an expert group from diverse geographical areas and fields is likely to yield better results than selecting from a single field [27–29]. In this study, we considered variations in expertise and location by recruiting experts from different disciplines and provinces of Iran using a purposive and criterion-based sampling method [30, 31]. Typically, Delphi surveys include 15 to 20 panel members. However, we selected a sample of 34 individuals based on the available experts to reduce the error rate [32]. In our study, experts had more than three years of relevant professional experience, appropriate educational qualifications, and ITM-related scientific publications and work experience. The consistent engagement of common experts in both the Delphi survey and validation phase ensured coherence throughout the study. A total of 34 participants were involved by purposive sampling. Eligibility criteria required participants to have a minimum of three years of work experience in traditional medicine and, if possible, to have authored an article or book in this field.

Delphi survey rounds

A two-round Delphi study was conducted to identify the most important items from the primary extracted items. A two-week interval was considered between the rounds. In the meantime, the data collection tool was

refined based on feedback from the experts. The panel members in the second round were the same individuals who participated in the first round. A 5-point Likert scale was used to evaluate responses in both rounds. Although there is no specific rule for determining an agreement threshold in Delphi studies, an agreement level of ≥70% has been proposed as acceptable in some studies [28, 33, 34]. In this study, an agreement level of 80% of experts scored ≥4 for an item on a 5-point scale set for inclusion in the ITM-MDS. Consequently, data items with an agreement level of less than 50% and a mean score of <3.5 were excluded. Those with an agreement level between 50% and 79% and a mean score ranging from 3.5 to <4, along with additional items suggested by the expert panel were included in the second round for further evaluation. Additionally, items with an agreement threshold of 80% or more were accepted in the first round [35, 36]. In the second round of the Delphi technique, the comments and feedback provided by the experts in the first stage regarding the initial items were integrated. The criteria for accepting data items remained the same as in the first round. Finally, the collected data were analyzed using SPSS 22 (SPSS Inc., Chicago, IL) with statistical significance set at a p-value < 0.05.

Assessing quantitative content validity of the developed ITM-MDS

Important items were selected, and inconsequential items were removed during the Delphi study. After identifying the key items, the quantitative validation of the MDS was conducted. The panel of experts for this phase consisted of the same participants in the Delphi phase, as described in the selection process.

Calculation of CVR

The CVR indicates the necessity of each item in the instrument. In this study, to compute CVR, the ITM-MDS derived from the previous phases was sent to the panel of experts to rate each item on a 3-point Likert scale. A score of 1 indicates "Not necessary", 2 is "Useful, but not essential", and 3 is "Essential". CVR was calculated using the formula CVR = (Ne - N/2) / (N/2). According to the Lawshe Table and considering the number of experts in the panel, items with a CVR higher than 0.51 were retained [37]. Participants had seven days to return their feedback.

Calculation of the CVI

CVI can be measured for each item individually (I-CVI) and for the total set of items (S-CVI) in an instrument to ensure its construct content validity. It quantitatively assesses the level of agreement among the judges regarding content relevance. This index uses a 4-point Likert scale:1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. For each item, I-CVI is computed as the number of experts rating either 3 or 4, divided by the total number of experts, representing the proportion in agreement on relevance. A threshold CVI of 0.78 was previously deemed acceptable [38–41]. In our study, CVI was calculated by sending the ITM-MDS developed after the Delphi phase to the same panel of experts. Experts were asked to rate each item on a 4-point Likert scale. The acceptable CVI score should exceed 0.8. Participants were given seven days to submit their feedback.

Ethical considerations

Ethical approval for this study was obtained from the Ethics Committee of the Abadan University of Medical Science (IR.ABADANUMS.REC.1401.126). Panel members were informed that their participation in this Delphi study was voluntary. All invited participants in the expert panel were required to sign a consent form. In our study, panel members remained anonymous and were unaware of each other's opinions.

Results

1) Extracting the potential data items

After a comprehensive search, a primary list of items was compiled under the supervision of one ITM and two HIM experts. The items were organized into a checklist and sent for the Delphi survey and validation.

2) Expert Panel

This Delphi survey lasted from December 30, 2022 to March 20, 2023. A consensus on the items was reached after two rounds of the survey. Initially, we identified 36 potential experts, of whom 34 (94%) agreed to participate in the modified Delphi survey. All 34 experts were invited to Round 2, and all (100%) responded. Table 1 shows the characteristics of the participants in this study. Approximately 47.06% of them were female. Their mean age and work experience were 35.6 ± 5.2 years and 6.2 ± 10.32 years, respectively.

After a two-round modified Delphi survey, the content validity of the developed ITM-MDS was evaluated through two subsequent Delphi stages to calculate CVR and CVI, respectively. CVR ranged from 0 to 1, while CVI ranged from 0.85 to 1.0. Agreement was reached on all items for ITM-MDS, and the Delphi expert survey was completed after two rounds.

Finally, the ITM-MDS consisting of 291 items, was classified into seven sections: admission, past medical

Table 1 Characteristics of the participants

Variables	Number	Percentage
Gender		
Female	18	52.9%
Male	16	47.1%
Expert fields		
Epidemiology	4	11.8%
GP	5	14.7%
ITM	18	52.9%
HIM	7	20.6%
Age		
30–40	17	50%
40–50	10	29.4%
> 50	7	20.6%
Work experience		
< 10	4	11.8%
10–15	16	47.1%
15–20	8	23.5%
20–25	3	8.8%
> 25	3	8.8%
Total	34	100
	Mean	SD
Age	35.6	± 5.2
Work experience	10.32	± 6.2

GP General phycisian, *ITM* Iranian traditional medicine, *HIM* Health information management

Table 2 Admission

Data item	Content definition
Date of admission	
Gender	Male
	Female
Birthdate	
Marital status	Married
	Single
	Divorced
	Widow
	Other, unspecified
Occupation	
Residence	Urban
	Rural
Education level	Illiterate
	Elementary
	High school
	University
Racial status	Lor
	Kurd
	Turkish
	Fars
	Other
Blood group	A^+
	A^-
	B^+
	B^-
	O^+
	O^-
	AB^+
	AB^-
Chief complaint	Reason for admission
	Disease recurrence
	Start time
Pulse rate	
Respiratory rate	
Blood pressure (mmHg)	
Body temperature	

history, six principles of health preservation, objective signs, subjective symptoms, examination of body systems, and care plan. Tables 2, 3, 4, 5, 6, 7 and 8 present the classes and items of the final MDS.

Discussion

This study aimed to develop an MDS for standardized data collection for educational, clinical, research, and quality assurance purposes in the ITM context. Through performing a literature review and a modified Delphi survey, the ITM-MDS was classified into seven sections with 291 items (Tables 2, 3, 4, 5, 6, 7 and 8). The data items were chosen from the perspectives of ITM physicians and researchers to fully describe ITM care and processes. Variables were selected based on demographic information and outcomes typically important in clinical research. Additionally, selected variables were informed by outcome measures that matter most to patients [42, 43].

Since TM practitioners rely on traditional treatment methods, examining patients can be time-consuming. Due to the intensive nature of clinical practice in daily ITM encounters, it remains difficult to collect data from ITM clinics for secondary analysis. Furthermore, the varying approaches to treatment and cultural influences in the influence of the culture of different communities have generated diverse data. Currently, TM practitioners in Iran often use paper-based medical records that only support free text data entry. In other words, the main components of the medical record (e.g., chief complaints, medical history, progress notes, and medications) are presented in natural language and free text format [44]. Designing such a dataset allows for structured documentation for ITM reporting,

Table 3 Past medical history

Data item	Content definition
Smoking status	Past smoker
	Current smoker
	Never smoker
Tobacco use	
Addiction	
Origin of the disease	Genetic
	Hereditary
	Childhood
	Adulthood
Previous hospitalization	Yes
	No
	Unknown
Previous surgery	Yes
	No
	Unknown
History of drug consumption	Yes
	No
	Unknown
History of injuries, poisoning and other outcomes of external causes	Yes
	No
	Unknown
Family history	
Vaccination status	Complete
	Incomplete
	Unknown
Blood transfusion	Yes
	No
	Unknown
Previous traditional medicine manuals therapies	Curative practices of wet cupping
	Venesection
	Leech therapy
	Balloon
	Massage therapy
	Phlebotomy
	Unknown
Hypertension	
Congestion of heart vessels	
Heart attack	
Other heart diseases	
Diabetes	None
	Type 1
	Type 2
	Gestational
Hyperlipidemia	
Fatty liver	
Stroke	
Disk and sciatica	
Thyroid disease	
Gastric ulcer	
Asthma	
Seizures	
Epilepsy	
Arthrodesis	
Renal stones	
Renal cyst	
Renal failure	
Other renal diseases	
Infectious diseases	
Depression	
Neoplasm	

thereby saving time, and providing quality data for secondary analytical purposes [45].

Currently, the implementation of Iranian electronic health records (EHRs) in Persian, abbreviated as SEPAS, is a basic electronic health (E-Health) project of the Ministry of Health of Iran [46]. In this context, the traditional medicine information system (TMIS) serves as one of the EHR modules to integrate TM care into modern medicine. The developed MDS in our study can be used as a consistent data set for developing TMIS. Additionally, since considering that TM services are provided in various locations such as homes, TM centers, health centers, and facilities, data integration, and interoperability standards are necessary to deliver patient-centered care across different platforms, thereby enhancing access to lifetime health records [4, 47]. Therefore, this study aims to develop an MDS to facilitate data interoperability in this area. The developed MDS can support the standardization of TM data and enable data sharing among multiple healthcare providers and settings. An agreed MDS can be integrated into computerized health systems, allowing for automatic data recording and the creation of patients' medical records. This capability enables healthcare providers to retrospectively analyze trends in patients' health conditions with less effort [48].

Establishing ITM-MDS will also promote a more harmonized and reliable approach to collecting patient data. In this regard, Leung et al. [49] argue that traditional chine medicine (TCM) information standardization lays the foundation for the reliable and effective electronic exchange of TCM data. Ikram et al. [50] introduced a conceptual model called MyPostnatal to integrate health information systems for postnatal care in traditional Malay medicine. Their proposed model is designed along three axes: people, process, and technology. Human and organizational factors are crucial for the successful implementation of technology and processes. The

Table 4 Six principles of health preservation

Category	Data item	Content definition
Climate change	The climate of the residence place	Cold
		Tropical
		Humid
		Dry
		Mountainous
		Living in a city or polluted air
	Residential house type	Villa
		Apartment
	House space lightening	Contact with the sunlight
		No contact with sunlight
	Presence of allergens in the place of residence	Fig and walnut trees
		Flowers
		Animals
		Birds
	Condition of workplace	Open work environment
		Close work environment
		With chemical gas pollution
		With suspended particle pollution
Sleep and wakefulness	Bedtime at night	
	Wake up time	
	Night sleep quality	Superficial
		Deep
		Interrupted
	Reason for waking up at night	Going to the toilet
		Thirst
		Jumping out of sleep
		Other reasons
	Number of times wake up during the night after sleeping	
	Struggling to fall asleep	
	Length of time to fall asleep	
	Type of dreaming	Bad
		Incomprehensible
		Flying
		Falling from a height
		Fight
		Nightmare or misfortune
	Sleeping during the day	
	Daily bedtime	Morning
		Before noon
		Afternoon
		Near sunset
	The time interval between sleep and eating	
	Condition of waking up after sleeping during the day	Refreshed
		Tired
	State of waking up after night's sleep	Refreshed
		Tired

Table 4 (continued)

Category	Data item	Content definition
Eating and drinking	Regular meals	No
		Yes
		Sometimes
	Eating breakfast	Full
		Medium
		Little
	Eating launch	Full
		Medium
		Little
	Eating dinner	Full
		Medium
		Little
	Eating food speed	Under 5 min
		5 to 10 min
		10 to 15 min
		15 to 20 min
		over 20 min
		Unspecified
	Number of bites	Below 5 times
		5–10 times
		10–20 times
		above 20 times
		Unspecified
	Full-threshold eating	Yes
		No
		Sometimes
	Consumption of snacks between meals	Yes
		No
		Sometimes
	Drinking water and other drinks immediately before meals	Yes
		No
		Sometimes
	Drinking water and other drinks during meals	Yes
		No
		Sometimes
	Drinking water and other drinks after meals	Yes
		No
		Sometimes
	Consumption of salad with food	
	Consumption of pickles with food	
	Drinking soft drinks with food	
	Consumption of leftover food	
	Consumption of ready-made and canned food	
	Consumption of fast food	
	Number of fast-food consumptions	Once a week
		More than once a week
		Once a month
		More than once a month
	Consumption of spices	Onions
		Leeks
		Chives
		Garlic
	Eating fried foods	

Table 4 (continued)

Category	Data item	Content definition
	Meat consumption	Once a week
		Every day of the week
		More than once a week
		Not at all
	Water consumption during the day	
	Drinking water fasting	
	Drink per day	Tea
		Coffee
		Herbal tea
		Other/s
	Number of drinks consumed per day	One cup
		Two cups
		More than two cups
	Consumption of sweets	
	Consumption of snacks/cocoa per day	
Retention and evacuation	Urine volume per day	Low
		Medium
		High
	Urine frequency per day	Once
		Twice
		Three times
		More than three times
	Defecation frequency	Once a day
		More than once a day
		Every two days
		others
	Stool consistency	Soft
		Hard
		Swollen and scattered with stool
		Presence of undigested food in the stool
	Sweating	Low
		Medium
		High
	Sweating time	At night
		In sleep
		At all times
	Sweat color	Yellow
		Dark and cloudy
	Sweat smell	Odorless
		Pungent and smelly
	Menstruation	Regular
		Irregular with a difference of a few days
	Reduction or cessation of menstruation	
	Heavy menstrual bleeding	
	Sexual desire status (lack of orgasm)	
	Erectile dysfunction	
	Premature ejaculation	
Movement and rest	Type of work and daily activity	Intellectual work without movement
		Physical and dynamic work
	Exercise	Regular
		Irregular
		Professional athlete
		Don't exercise at all

Table 4 (continued)

Category	Data item	Content definition
	Exercise type	Aerobics
		Heavy
		Yoga
		Others
	Number of hours of exercise per week	Once a week
		Twice a week
		Three times a week
		Others
Phycological and mental reactions	Compulsions	Washing
		Checking things
	Obsessions	Unreasonable sadness
		Recent sadness
		Disappointment
		Fear
		Shame
		Joy
		Anger
	Anxiety (stress)	Yes
		No
		Sometimes
	A lot of worry	Yes
		No
		Sometimes
	Anger	Gets angry early
		Gets angry late
	Calmness after anger	Calm down quickly
		Calm down slowly
	Stress origin	In family
		At work
	Suspicion towards people and events or the outcome of things	Yes
		No
		Sometimes
	Hating others	Yes
		No
		Sometimes

Table 5 Physical examination (objective sign)

Category	Data item	Content definition
Physiognomy	Height (cm)	
	Weight (kg)	
	Fat condition	Low
		Medium
		High
	Physical strength	Weak
		Strong
	Big hands	
	Big feet	
Accumulation of the Ventus in an organ	Body tissue	Loose
		Tight
Hair	Hair color	Black
		Brown
		White
		Golden
	Hair consistency	Thin
		Brittle
		Thick
	Trichoptilosis	
	Alopecia	
	Place of alopecia	Frontal and meddle of head
		Temporal
		Total of the head
Face	Grimor gloomy of face expression	Darkness
		Swarthiness
	Face color	Red and white on the face
		Red and white on the hands
		White
		Pale
	Thick eyebrow	
	Degree of swelling	High
		Medium
		Low
	Swelling place	Face
		Under the eyelids
		Lower limbs
	The amount of facial obesity	High
		Medium
		Low
	Under eye wrinkles	

Table 5 (continued)

Category	Data item	Content definition
Skin	Skin of scalp	Dry
		Normal
		Greasy
	Skin of body	Dry
		Normal
		Oily
	Hyperpigmentation	Bruise
		Redness
		Itchy spot
	Lesions and rashes	
	Pruritus	
	Hirsutism	
	Freckles	
	Nail surface	Serrated
		Smooth
	Nail lunula	
Pulse	Pulse length	Short
		Medium
		Long
	Pulse width	Wide
		Medium
		Narrow
	Pulse depth	Prominent
		Moderate
		Low
	Pulse strength	Strong
		Medium
		Weak
	Pulse palpation	Warm
		Moderate
		Cold
	Upward vs. downward pulse rate	Faster
		Equal
		Slower
	Frequency of pulses	Frequent
		Different
	Equator (identical) and variable of pluses	Regular variation
		Irregular variation
		Balanced
		Non-balanced

Table 5 (continued)

Category	Data item	Content definition
Tongue	Tip of the tongue	Wide
		Medium
		Sharp
	Around and on the side of the tongue	Thin
		Medium
		Thick
	Tongue size	Small
		Medium
		Big
	Longitudinal slit on the tongue	
	Transverse slit on the tongue	
	Tooth impression on the side of the tongue	
	Tongue coating (post-nasal discharge)	
	The thickness of the tongue coating	
Eyes	Sclera color	Red
		Yellow
		White
		Blue
		Dark
		Light
		Others
	Visible veins and blood vessels of the eye	
	Eye freckle (Nevus)	
	Eye discharge	
Nose	Nose shape	Wide and round
		Medium
		Narrow and pointed
Ear	Ear pain	
	Tinnitus	
	Heaviness and deafness	
	Infection	
Lips	Lip color	White
		Normal
		Dark
	Lip appearance	Dry and cracked
		Dry without cracks
		Moist
		Smooth
Throat and mouth	Swelling of the throat and tongue	
	Bad smell in nose and mouth	
Tooth	Toothache	
	Tooth decay	
Respiratory status	Fast	
	Slow	
	Shortness of breath	
	Asthma attacks	

Table 5 (continued)

Category	Data item	Content definition
Abdomen, chest and other organs	Abdominal appearance	Thin
		Medium
		Fatty
	Surgical scars	
	Abdominal bloating	
	Sub sternum pain	
	Contraction of the muscles around the umbilicus in the finger rotation examination	Low
		Medium
		High
	Liver palpation	
	Gastric palpation	Cold
		Hot
	Ovary palpation	Painful
		Normal
	Wrist palpation	Cold
		Hot
	Pelvis shape	Curvature
		Deviation
		Displacement
	Spinal anatomy	Curative
		Deviation
		Displacement

technology axis focuses on the integration and accessibility of electronic records and the design of TM datasets. The process axis emphasizes workflow integration in TM through EHR. This approach allows for access to objective information from the modern medicine module to facilitate TM care. Treatment plans and options are also standardized to ensure that individuals seeking care are appropriately referred. In line with the second axis of the MyPostnatal model, the MDS developed in this study aligns with the workflow and processes associated with the patient visit and history-taking. by TM practitioners. Consequently, it will ultimately lead to an integration of TM services with modern medicine.

Although a uniform dataset has not yet been designed in ITM, efforts have been made in other areas of TM information management. Shojaee-Mend et al. [51] developed an ontology for ITM that provides specialists and researchers with consistent, reusable, and sustainable descriptions of disease terms. In another study, Shojaee-Mend et al. [7] created an ontology for gastric dystemperament in Persian medicine. Safdari et al. [15] developed a classification system for ITM studying global disease classification systems and measures during TM in the analysis phase. This research identified the axes necessary for classification systems and their structural, content, and technical characteristics, with results validated by an expert panel. Ghazisaeedi et al. [16] developed an electronic record of infertility using a TM approach. This study was conducted in three stages: first, the data elements of the electronic record were determined, then, the prototype of the infertility electronic record was designed, and finally, data from 20 infertility cases were entered into the system to evaluate its performance. A notable similarity point between their research and the present study is the focus on identifying and determining the dataset of TM. However, while their research specifically targeted infertility data, the present study also addresses the dataset of other diseases.

Table 6 Physical examination (subjective symptoms)

Data item	Content definition
Sense of temperature	Hot
	Cold
	Moderate
Deafness	Yes
	No
	Sometimes
Hearing loss	Yes
	No
	Sometimes
Tinnitus	Yes
	No
	Sometimes
Smell disorder	Yes
	No
	Sometimes
Taste disorder	Yes
	No
	Sometimes
Myopia	Yes
	No
	Sometimes
Blurred vision	Yes
	No
	Sometimes
Presbyopia	Yes
	No
	Sometimes
Hyperopia	Yes
	No
	Sometimes
Numbness and tingling in limbs	Yes
	No
	Sometimes
Heart palpitation	Yes
	No
	Sometimes
Chest pain	Yes
	No
	Sometimes
Shoulder and hand pain	Yes
	No
	Sometimes

Study strengths and limitations

The present study applies an evidence-based method and shared insights from specialists in defining the ITM-MDS. We reviewed published and grey literature and data collection forms from ITM programs to ensure our primary list of items was comprehensive. In this study, we used the modified Delphi technique, as it yields more effective results than the original version and saves time [52, 53]. Our panel of experts comprises a multi-specialty team with ITM expertise from various geographical regions across the country, selected to elicit a wide range of opinions. This representative panel can provide better feedback than a homogenous group from the same field [27, 54]. Typically, the number of panel members in Delphi studies ranges from 15 to 20. However, we invited a larger panel to ensure diverse perspectives on the issue. The response rate among panel experts in this study was 94%, exceeding the recommended rate of 70% for each round in Delphi studies [28]. We also received constructive comments and suggestions from panel members, reflecting their interest and enthusiasm. The acceptable agreement levels in Delphi studies vary, with some suggesting 66% [55], 75% [56], and below 78% [57]. In our study, however, we considered an agreement level of 80% acceptable, aligning with similar studies involving expert panels [35, 36, 58]. The content validity of the developed MDS is strong with the I-CVI of each item ranging from 0.85 to 1.00, which surpasses the recommended threshold of 0.78 and indicates excellent content quality for each ITM-MDS item [48]. The MDS developed in our study serves as a scientific and evidence-based tool for uniform data collection on ITM, facilitating integration into information systems related to TM and enhancing interoperability in the field. The calibration and integration of ITM data in this study represent a significant step toward implementing plans for E-health services in this domain. We hope this effort will advance coherence and deepen scientific research related to ITM. However, our method has limitations that need to be addressed. First, further external validation may be necessary due to the relatively recent establishment of TM in Iran in an academic context. Therefore, conducting a pilot study with a broader literature review and a larger group of experts could strengthen the MDS. While this Delphi technique has proven suitable for information systems requirements analysis, some perspectives may be overlooked.

Conclusions

This research is the first effort to develop and evaluate an MDS for consistent ITM data collection with seven categories and 291 items. The MDS can integrate data collection from various ITM clinics and settings for clinical, research, and policymaking purposes. Besides, this ITM-MDS can provide standardized validated data set for information systems designers and health data managers

Table 7 Examinations of body systems

Category	Data item	Content definition
Nervous system	Headache	Migraine
		Nervous headache
		Others
	Time of onset of headache	
	Duration of headache	
	Location of headache	Frontal lobe
		Temporal lobe
		Occipital lobe
		Total head
		On the right side
		On the left side
		Around the eyes
	Type of headache	Pulsatile
		None pulsatile
	Factors change headache intensity	Cold
		Heat
		Dry
		Moist
		Food
		Menstruation
		Coital
		Others
	Heaviness	In the head
		In the body
	Vertigo	Periodic
		With headache
		Without headache
	Wake-up dizziness	
	Nightmare	Dream of the dead
		Dream of black animals
		Dream of war
	Convulsion	
	Epilepsy	
	Epileptic attacks or convulsions number per month	
	An involuntary jerking movement of muscles that commences and resolves rapidly	In the face
		Other organs of the body
	Tremor	In hands
		In legs

Table 7 (continued)

Category	Data item	Content definition
	Disturbed sleep	
	Unreasonable sadness	Broken soul
		Desire to be alone
	Negative thoughts and imaginations, self-harm	
	Sleeping late at night	
	Difficulty waking up	
	Napping	
	Yawning and stretching	
	Distraction and lack of concentration	
Respiratory system	Post-nasal discharge	
	Sore throat and phlegm	
	Pain (burning) and nasal humor	
	Cough	Productive
		Nonproductive
	Coughing time	Nocturnal
		Daily
	Dyspnea	Resting
		Walking
		Climbing less than 10 steps
		Climbing more than 10 steps
	Common cold	
	Nasal catarrh	
	Heaviness in the frontal head	
	Allergy	Seasonal
		Food and eating substances
		Odor stimulants
		Accompanied by itching
		Runny nose
		Shortness of breath
		Sore throat
		Redness
		Sensitivity at night
Digestive system	Spilling of saliva	
	Oral taste	Bitter
		Salty
		Spicy
		Sweet
		Sour
		Tasteless
	Oral taste change condition	Morning
		Permanent
		Eating food
	Thirsty	
	Desire to drink water	Cold
		Warm
	Stomachache	
	Heartburn	

Table 7 (continued)

Category	Data item	Content definition
	Stomachache and heartburn associated with	Food
		Stress
		Others
	Eructation or sour belching	Burning in the back of the throat with food
		Burning under the sternum
		Nocturnal cough
	Flatulence	Immediately after food
		After flatulent foods
		After any kind of food
		Always
	Stomach heaviness	After food
		At any time
	Spasmodic pain in the bowels- colic - cramp	
	Borborygmi	Sound of the bowels
		Gastric gas passing
		Intestinal gas passing
	Abdominal pain intensity	Low
		Moderate
		High
	Location of abdominal pain	Right upper quadrant
		Right lower quadrant
		left upper quadrant
		Left lower quadrant
		Periumbilical
		Total
		Others
	Hemorrhoid history	Hemorrhagic
		Non-hemorrhagic
	Anal fissure	
Obstetrics and Gynecology	Age of menopause onset	
	The regularity of menstrual habits	
	Amount of vaginal bleeding	Low
		Moderate
		High
	Spotting	
	Number of deliveries	
	Delivery method	Normal vaginal delivery (NVD)
		Cesarian section (CS)
		Others
	Abortion	
	Number of abortions	
	How many weeks of pregnancy did the abortion happen?	
	History of infertility	
	History of Myoma	
	History of Fibroma	
	History of ovarian cyst	
	Menopause	
Urinary tract	Dysuria	
	Odor of urine	

Table 7 (continued)

Category	Data item	Content definition
	Hematuria	
	Urine color	Colourless
		Pale yellow
		Rich yellow
		Orange
		Red
		Others
	Urinary incontinence	In a normal state
		When coughing
		In a state of anxiety
		When sneezing
	Frequent urination	
	Narrowing of the urine	
	The feeling of incomplete emptying after passing urine	
	History of kidney stones	
	History of prostate problems	
Joints	Joint pain with swelling	
	Joint pain with stiffness	
	Joint pain with limited movement	
	Joint pain duration	

Table 8 Care plan

Category	Data item	Content definition
Screening	Periodic checkup	
Treatment	Determination of temperament	
	Improvement of six essential principles of a healthy lifestyle	
	Drug treatment	
	Manual therapies	Curative practices of wet cupping
		Venesection
		Leech therapy
		Balloon
		Massage therapy
		Phlebotomy

to develop various systems such as registries, EHRs, personal health records (PHRs), and other ITM-related information systems. For future research, it is recommended to focus on the technical aspects of interoperability in this area.

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Authors' contributions
HKA, RM: Conceptualization; Data curation; Formal analysis; Investigation; Software; Roles/Writing - original draft. HKA: Conceptualization; Formal analysis; Investigation; Roles/Writing - original draft; Funding acquisition; Methodology; Project administration; Resources; Supervision; Writing – review & editing. HKA, RM, AB: Conceptualization; Investigation; Methodology; Validation; Writing – review & editing.

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Data availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This article is extracted from a research project supported by the Abadan University of Medical Sciences (IR.ABADANUMS.REC.1401.126). The study was approved by the ethical committee of the Abadan University of Medical Sciences. All methods of the present study were performed in accordance with the relevant guidelines and regulations. Informed consent was obtained from all subjects and/or their legal guardian(s). Participation was voluntary, the consent was verbal, but all participants responded via email or text message to approve their participation. Participants had the right to withdraw from the study at any time without prejudice. All participants were required to sign a privacy agreement and study participation consent form before joining the expert panel. They were cognizant of the objectives of the study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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