

# BMJ Open Integrated care for older people based on information and communication technology: a scoping review protocol

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## ABSTRACT

**Introduction** Integrated care is an effective means of coping with the increasingly complex healthcare needs of elderly and alleviating pressure on national pension services. WHO regards integrated care as a method of providing high-quality healthcare and advocates integrated care based on digital technology. Against the backdrop of the COVID-19 pandemic, information and communication technology (ICT) has become a facilitator for the successful implementation of integrated care by providing a platform for information sharing, team communication and resource integration. This scoping review aims to assess internationally published evidence concerning experiences and practice of ICT-based implementation of integrated care for older people.

**Methods and analysis** The study will follow the research framework developed by Arksey and O'Malley for scoping reviews. We will conduct a systematic search of the literature published from January 2000 to March 2022 via electronic databases, grey literature databases, websites of key organisations and project funding sources, key journals and reference lists included in selected papers, employ the Joanna Briggs Institute Literature Quality Assessment Tool to assess the quality of the included literature and apply thematic analysis to sort and summarise the content of the included studies. This study will begin in March 2022 and will be completed in December 2022.

**Ethics and dissemination** Ethical approval for this scoping review was granted by the Academic Committee of Zhengzhou University (ZZUIRB2021-155). This study will summarise the modes of operation and effects, barriers and facilitators of ICT-based implementation of integrated care for older people. We propose to recruit older people and integrated care service providers in rural primary healthcare centres and use a structured process of concept mapping to consult and discuss the results of our scoping review to construct an integrated care model and service pathway for older adults that is appropriate to the Chinese social context.

## BACKGROUND

Giving the rapid ageing of societies, the global population of individuals aged 60 years and older is expected to increase from 1 billion in 2019 to approximately 2.1 billion in 2050, and the population of individuals aged 80 years and over is expected to increase from

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study will be the first scoping review to provide a comprehensive synthesis of the effects, facilitators and challenges involved in the delivery of integrated care services based on information and communication technologies.
- ⇒ This study will search all literature sources, including peer-reviewed articles, grey literature, websites of key organisations and project funding sources, key journals and reference lists included in selected papers.
- ⇒ Quality appraisal of the included studies will be performed.
- ⇒ This study will use a concept mapping approach to conduct a scoping synthesis topic consultation to solicit input from a wide range of stakeholders, including older adults, caregivers and healthcare professionals.
- ⇒ The review will be restricted to articles published in English, which may limit the comprehensiveness of the findings.

143 million in 2019 to 426 million in 2050. Population ageing is accelerating, particularly in low-income and middle-income countries.<sup>1</sup> As the world's largest developing country, China's seventh national census data from 2021 show that the number of elderly people aged 60 years and above had reached 264 million and that the population aged 65 years and above had reached 191 million, accounting for 13.5% of the total population.<sup>2</sup> The number of older adults with chronic comorbidities, disability and dementia has increased dramatically, and the demand for and cost of long-term care have also risen rapidly, posing a tremendous challenge to the national supply of healthcare and social welfare services.<sup>3</sup> However, integrated care is seen as an effective means of responding to the increasingly complex healthcare needs of older adults and enhancing primary healthcare.<sup>4</sup> Primary healthcare is a whole-of-society approach to health that aims to achieve universal health coverage and sustainability by providing comprehensive and integrated

health services throughout the individual's life course (promotion, prevention, treatment, rehabilitation, palliation), encouraging intersectoral evidence-based policies and actions and empowering individuals, families and communities to act at all three levels.<sup>5</sup>

The concept of 'integrated care' first emerged in high-income European and American countries in the 1970s. Since the 1990s, WHO has proposed integrated care as an approach to quality medical services and healthcare for the future, which can strengthen primary healthcare and coordinate health and social health based on an integrated model. In August 2020, the 'Decade of Healthy Aging (2020–2030)' plan approved by the World Health Assembly specifically proposed a focus on integrated care.<sup>6</sup> Integrated care refers to the management and provision of services to provide people with continuous health promotion, disease prevention, diagnosis, treatment, disease management, rehabilitation guidance and palliative care throughout their lives and to coordinate care at different levels and locations both within and outside the health sector to improve accessibility, sustainability and quality of care.<sup>7</sup> Integrated care involves different levels and responsibilities, and the degree of integration varies greatly depending on the traditional culture, funding types and welfare pathways of the nation involved, this situation has gradually led to the development of various models of integrated care, all of which are based on the principles of 'person-centred, holistic and multidisciplinary' care, in which multidisciplinary teams of physicians, nurses, healthcare workers such as rehabilitation workers, social workers and caregivers are organised, with each discipline providing multidisciplinary care to address the specific needs of patients, or team members further reaching group decisions/consensus to provide interdisciplinary care. The initial practice of integrated care services/models has shown their ability to reduce nursing home<sup>8</sup> and emergency admissions,<sup>9</sup> to improve quality of life and quality of care and to be cost-effective.<sup>10</sup> However, integrated care is a service system involving multiple stakeholders, and its implementation is influenced by multiple factors, such as environmental factors at the macrolevel, institutional organisation at the mesolevel (funding, leadership, service structure and culture), intervention organisation at the mesolevel (identity, resources and credibility) and the microlevel (shared values, participation and communication),<sup>11</sup> where lack of physical and human resources, healthcare providers' communication and coordination barriers and difficulties in navigating and accessing information systems are common barriers to integrated care implementation.<sup>12 13</sup>

Information and communication technologies (ICT) refer to various technological tools and resources used to transmit, store, create, share or exchange information, with the advantage of allowing information to be shared across professional and organisational boundaries and have been identified as an important enabler of integrated care and coordinated primary healthcare.<sup>14 15</sup>

The WHO's Integrated Care for Older People (ICOPE) programme calls for digitally based integrated care to facilitate the Decade of Healthy Aging by enhancing integration, promoting functional capacity and reducing care dependency.<sup>16</sup> WHO has also particularly developed the ICOPE App and ICOPE Monitor applications to continuously evaluate and monitor the internal ability of elderly individuals and serve as guidelines for human-centred care plans.<sup>17</sup> In addition, during the recent COVID-19 pandemic, the use of digital health services such as telecare and telemonitoring based on ICT has increased and have developed into an effective means of providing holistic medical care to older people.<sup>18</sup> ICT provides a platform for resource integration, information sharing, team communication, consultation and feedback and decision support for the practice of integrated care, which enhances the practicability of integrated care. ICT can facilitate the reasonable use of limited resources to provide timely specialist care<sup>19</sup> and can address concerns related to COVID-19 and social isolation.<sup>20</sup>

Current systematic evaluations of integrated care have focused on patients with chronic diseases such as Parkinson's disease,<sup>21</sup> atrial fibrillation,<sup>22</sup> dementia<sup>23</sup> and chronic kidney disease<sup>24</sup> to provide a comprehensive overview of integrated care models, costs and effects. However, no studies have reviewed the current status of ICT-based implementation of integrated care for older people, and the models, barriers and facilitators related to such practice require further exploration. This study therefore proposes to fill this gap by synthesising and collecting evidence pertaining to ICT-based integrated care for older people using a scoping review approach. This scoping review aims to achieve the following three objectives: (1) to analyse and synthesise existing service models of ICT-enabled integrated care, (2) to identify potential barriers to and facilitators of ICT-based implementation of integrated care models and (3) to describe the context of each service model and suggest policy opportunities and lessons that can be applied to the Chinese context.

## METHODS AND ANALYSIS

This scoping review will follow the framework developed by Arksey and O'Malley<sup>25</sup> and further updated by Levac *et al*,<sup>26</sup> which consists of the following six steps: (1) identifying the research questions, (2) searching for relevant studies, (3) selecting studies, (4) data extraction, (5) collating, summarising and reporting results and (6) conducting consultation exercises. These steps will be iterated, and we will engage with each stage in a self-referential manner and repeat steps as necessary to ensure that the literature is fully covered. A research team consisting of a nursing specialist (YZ), an evidence-based nursing specialist (SW), a PhD student (YT, reviewer 1) and two master's students (QC, reviewer 2; LM, reviewer 3) has been assembled to ensure the smooth running of the review process. The research team has sufficient time,

human and financial resources to conduct this study. All three reviewers (YT, QC, LM) are full-time graduate students who have been systematically taught evidence-based nursing methods, such as database searching, literature screening and quality evaluation, and they have a full understanding of what integrated care entails. In addition, two nursing experts (YZ, SW) can provide guidance in terms of methodology and study reports, and the research team has obtained full access to the databases to be searched in this study. The team has also established partnerships with several primary healthcare centres located in rural that can serve as a channel for selecting patients and service providers to participate in this study.

We will report the results of the scoping review following the Joanna Briggs Institute (JBI) Evidence Synthesis Manual<sup>27</sup> and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) checklist.<sup>28</sup> The JBI guidelines indicate the methodology and recommendations for the scoping review, and the PRISMA-ScR checklist can be used to help the research team better understand the relevant terminology, core concepts and key items to be reported in the scoping review. In addition, to guide the review process, core concepts are defined as follows:

- ‘Integrated care’: the definition of ‘integrated care’ has not yet been standardised. Kodner and Spreeuwenberg define integrated care as ‘a coherent set of approaches and models on the financial, administrative, organisational, service delivery and clinical levels designed to create connectivity, alignment and collaboration within and between care and care sectors’.<sup>29</sup> Valentijn *et al*<sup>30</sup> define integrated care as ‘a network of multiple professionals and organisations across health and social care systems that provide accessible and comprehensive services to people in the community’. WHO defines integrated care as ‘a continuum services of health promotion, disease prevention, diagnosis, treatment, disease management, rehabilitation and palliative care throughout the life course through the management and delivery of services, coordinated between different levels and locations of care within and outside the health sector’.<sup>7</sup> Combining this definitional analysis and the key principles of integrated care, we propose the following core elements of the concept: (1) attention to problems and (care) needs in different domains of life, such as physical, cognitive, psychological, social and/or environmental needs; (2) involvement of health-care and social care personnel from multiple disciplines and/or sectors in the form of interdisciplinary teams aimed at providing a continuum of disease prevention, treatment, rehabilitation and/or palliative treatment across the life course and (3) active participation by older people and their informal carers in decision-making and planning for the care process centred on their abilities, needs and/or preferences.
- ‘ICT’ refers to the various technological tools and resources used to collect, store, retrieve, create, share

or transmit information, including computers, the internet (websites and email), live broadcast technology (television and radio), recorded broadcast technology (audio and video players as well as storage devices) and telephony (fixed or mobile telephones, visual/video conferencing, etc).<sup>31</sup> We will conduct research selection and data extraction based on 12 relevant ICT tools for integrated care support as defined by Mateo-Abad *et al*,<sup>32</sup> including electronic prescriptions, messaging between clinicians and patients, electronic health records, interconsultation, call centres, virtual conferences, personal health folders, nurse information systems, educational platforms, collaborative platforms, telemonitoring and multichannel centres.

### Step 1: identifying the research questions

The main aim of this scoping review is to summarise the available evidence concerning the service content, practice pathways, implementation effects, facilitators and barriers involved in the implementation of integrated care based on ICT. To connect these research aims with our research questions, we formulated a broad research question to guide the subsequent research selection and data extraction. The overarching question that guides this review is as follows: ‘What are the operational models of ICT-based integrated care for older people that have been documented in the published and grey literature?’ After an initial search of the PubMed database and assessment of the literature related to the research topic, the reviewer generated a list of potential subquestions, which were then discussed by the research team, with team members suggesting changes based on their own experiences and following the population, concept, context principles to further refine the research questions pertaining to research objects,<sup>33</sup> concepts and contexts as follows:

1. What is the health status of the older people in question? What service provision agencies and personnel are included?
2. What ICT are used, and what are their functions?
3. What are the components of ICT-based integrated care services? What are the relevant operational forms and practical effects?
4. What are the barriers to and facilitators of ICT-based practice of integrated care?
5. What lessons can the ICT-based model of integrated care for older people offer in the Chinese context?

We will be guided by the above research questions to establish an effective search strategy and select research parameters and to further refine our research questions based on the content of the literature retrieved during the process of data extraction, collection and summarisation. By answering the questions listed above, this study proposes to construct an ICT-based integrated care model and practice programme that is suitable for the Chinese social context and to explore its operational effects among elderly people with disabilities in rural areas.



**Table 1** Search terms/Keywords

Main headings	Entry terms
Information technology	Information and communication technology, ICT, digital, tele*, internet, mobile, cloud, eHealth, virtual care
Delivery of healthcare, integrated	Integrated care, integrated health system(s), coordinated care, comprehensive care, seamless care, transmurial care, multidisciplinary care, holistic care, joint care, person-centred care, interprofessional care, team-based care
Aged	Old people, senior citizen, elderly, elder, geriatric
ICT, information and communication technology.	

## Step 2: identifying the relevant studies

In this step, we will develop a search strategy, including an appropriate time span, terms/concepts, search sources and language for the search, while also ensuring the comprehensiveness of the coverage of the evidence and the feasibility of the scoping synthesis. We will conduct a systematic search of papers published from January 2000 to March 2022, with a preliminary intention to complete the search by the end of April 2022. The literature search will be conducted using a combination of main headings and entry terms, including 'information and communication technology', 'delivery of healthcare, integrated' and 'aged'. The specific terms/keywords that will be used are shown in [table 1](#). An initial search was performed in the PubMed database, and a detailed search strategy is described in the online supplemental material. We will continue to refine our search terms as the review progresses to perform a more sensitive literature search. Sources for literature searches included electronic databases, grey literature databases, websites of key organisations and project funding sources, key journals and reference lists included in selected papers. Given the multidisciplinary nature of this research project, we propose to search PubMed, Web of Science, EBSCO, Scopus, MEDLINE, EMBASE, PsycINFO, CINAHL and the Cochrane Library, that is, a total of nine databases. A draft search strategy for the PubMed database can be found in the online supplemental material. We will search for published and grey literature at Joanna Briggs, ProQuest Dissertations and Thesis, Google Scholar. We will also search the websites of key organisations such as WHO, the International Foundation for Integrated Care, the European Commission and the National Health Service as well as those of integrated care projects such as Beyond Solid, CARE WELL, Smartcare, CONNECARE and INTEGRATE. Team members will identify other websites and sources based on the search during the review process. In addition, three specialist journals, the International Journal of General Nursing, the Journal of Integrated Care and the International Journal of Care Coordination, will be systematically searched to ensure the comprehensiveness of the surveyed literature.

We will follow the three-step search strategy proposed by the JBI for systematic searches. First, we propose to conduct an initial, limited search of the three major databases, PubMed, Web of Science and EBSCO, to further revise the search and index terms used to describe the articles. A full search will then be conducted using all identified search terms and index terms, supplemented by a manual search of the reference lists of the proposed review papers. The literature retrieved from each database will be imported into EndNote X9 literature management software separately after the search is completed, and the search time for each database will be recorded. A preliminary check will be performed by the reviewer based on three major pieces of literature information (author, year and title), and duplicate literature will be removed.

## Step 3: study selection

The research team will meet and discuss the inclusion and exclusion criteria for studies, screen papers based on the titles and abstracts of the retrieved literature and review the full text to select studies.

Inclusion criteria:

- ▶ The intervention/target/service population is older people aged 60 years and above.
- ▶ The study describes and/or evaluates ICT-based models of integrated care, in which context the research must meet the definitions of integrated care and ICT as described above.
- ▶ The literature is suitable for use in any type of health-care setting, including primary healthcare, hospitals and emergency departments.
- ▶ Quantitative (intervention research, descriptive research, interpretation-prediction-correlation research), qualitative (phenomenology, grounded theory, content analysis) or mixed-method research designs are used.
- ▶ The language of the paper is English.

Exclusion criteria:

- ▶ Study of non-human subjects.
- ▶ Reviews, editorials and descriptive articles that do not provide relevant empirical evidence.
- ▶ Literature featuring no access to the full text or incomplete information.

Prior to the formal literature selection process, three reviewers (YT, QC, LM) will be trained in an identical manner by an evidence-based nursing expert (SW) to select articles based on the above criteria. Twenty-five papers will be randomly selected from the retrieved literature, and two reviewers (YT, QC) will independently read the titles/abstracts for initial screening based on inclusion criteria and definitions. The research team will meet to discuss screening discrepancies and to revise the inclusion criteria. Formal literature screening and coding will begin when the consistency between the two reviewers (YT, QC) reached 75%, and papers will be categorised as 'eligible/ineligible' according to their level of compliance with the inclusion criteria. Reviewers will organise meetings at the beginning, middle and end of the initial

## Box 1 Data extraction form

Country (where the project is implemented)  
 Author  
 Year  
 Publication name  
 Study title  
 Study design characteristics  
 Research questions/objectives  
 Participant characteristics/sample size (if applicable)  
 Model practice approach (model name, target group, integration agency, multidisciplinary team members, service content, information and communication technology, service process) (if applicable)  
 Model practice evaluation (initial effects, hindrances, facilitators) (if applicable)

literature screening process to discuss findings, progress, challenges and uncertainties related to study selection and to return to and refine the search strategy as necessary. Two reviewers (YT, QC) then will independently search and review the full text of all literature coded as 'eligible' to evaluate these texts for inclusion in the study. If two reviewers (YT, QC) do not agree on the inclusion of the study, a third reviewer (LM) will be consulted by the study team for a final decision. In addition, as the aim of this scoping review is to provide guidance concerning the construction and implementation of intelligence integrated care programmes, we propose the use of the appropriate JBI literature quality evaluation tool to evaluate the quality of the studies that are ultimately included. A study selection flow chart and a literature quality evaluation report form will be finalised.

### Step 4: charting the data

The research team will identify the variables to be extracted based on the research questions and the principles of person-centred, comprehensive and multidisciplinary nature of integrated care and work together to develop the data extraction checklist, which is shown in [box 1](#). Two reviewers (YT, QC) will independently process data from 5 to 10 pieces of literature using a data extraction form and then conduct a research team meeting in which team members will double-check the extracted data, evaluate the consistency of the information extracted by the two reviewers and the strength of the interpretation of the research questions in the included literature and further revise the data extraction checklist. The reviewers will use an iterative approach to extract data from the included studies and will continually update and refine the list format and content to further clarify the approaches to practice, barriers and facilitators involved in ICT-based integrated care for older people.

### Step 5: collating, summarising and reporting the results

In accordance with the design types of the included studies, we will use both quantitative (descriptive statistical analysis, frequency) and qualitative (descriptive content analysis) methods to analyse the underlying values of the scope, nature

and distribution of the reviewed studies. Two reviewers (YT, QC) will follow the approach to thematic analysis developed by Braun and Clarke to sort out and summarise the content of the included studies via the following process:

1. Reviewers record their understanding of the literature as developed through repeated readings.
2. Reviewers extract valid information from the literature and mark it with coloured pens to form a coding set.
3. Reviewers consolidate coding sets into potential themes by locating all codes within potential themes.
4. Reviewers review the full text and determine whether the extracted codes and coding sets are relevant to potential themes, forming a map of the relationships among potential themes.
5. Reviewers revisit potential themes in the context of the full text and describe it in a short sentence, formally naming it and identifying the existence of subthemes.
6. Reviewers report the results of the analysis, which should be concise, coherent and logical and should cite relevant supporting literature.

The entire process of analysis is not linear and can iterate between two adjacent steps in accordance with the reviewer's level of understanding of the literature to achieve optimal results with respect to condensing the themes. We will use NVivo software for data coding and analysis. Additionally, we will also use charts or tables to depict our findings and provide an overview of the concepts, theoretical underpinnings and types of evidence relevant to the topic of this scoping review, culminating in a model framework that can guide ICT-based practice in the context of integrating care.

### Step 6: consultation

This stage is intended to provide insights and opinions ranging beyond the literature by consulting the stakeholders involved in this study. However, this process is optional. To highlight the person-centred service principles of integrated care, a group of older people and service providers in a rural primary care centre will be recruited to consult on the preliminary findings and to brainstorm regarding the ICT-based model of integrated care delivery. We will then follow the structured conceptualisation process of concept mapping and conduct a multidimensional scaling analysis and hierarchical clustering analysis of the consultation results to further revise the model framework that will be developed.<sup>34</sup> In addition, to facilitate the wider dissemination of research knowledge, we will construct service protocols that incorporate the results of the scoping review and facilitate their application in the context of primary healthcare in rural areas, guided by this model framework.

### Patient and public involvement

Neither patients nor the public were involved in the development of this protocol.

## DISCUSSION

This scoping review aims to review the service components, operational effects, barriers and facilitators involved

ICT-based implementation of integrated care models for older people, which can further improve the content of integrated care service delivery systems and address the research gap resulting from the lack of systematic reviews targeting this area. In addition, the results of this review will help increase the knowledge of researchers, health-care providers and policy-makers regarding this service model and facilitate the implementation of ICT-based integrated care services for older adults and thus permit them to effectively respond to the global pandemic of COVID-19 pneumonia.

Our next step will be to recruit older people and integrated care service providers in rural primary healthcare centres, collect their views concerning the use of ICT to implement integrated care and employ a concept mapping approach based on a structured conceptualisation process of preparing, generating statements (brainstorming and scoping the results of thematic analysis), structuring statements, representing statements and explaining concept maps in order to construct a model framework and practice protocol for ICT-based implementation of integrated care for older people and to facilitate its application in the context of primary healthcare in rural areas. This approach will help the individuals involved to alleviate the current situation of poor home care, a lack of quality medical resources and a mismatch between supply and demand for elderly services in rural areas, thereby meeting the diverse and complex needs of elderly individuals and providing recommendations for policy-makers and practitioners. However, this study will only include literature written in English due to limited language translation resources, and the research team will only be able to retrieve some of the grey literature given limited access to databases and search engines, which may inhibit the comprehensiveness of the literature included in this study to some degree.

## ETHICS AND DISSEMINATION

This study obtained ethical approval from the Academic Committee of Zhengzhou University (ZZUIRB2021-155). The results of the scoping review will be published in peer-reviewed journals and shared at academic conferences and public forums for researchers to propagate understanding of the type of evidence published in the context of ICT-based implementation of integrated care for older people and to ascertain the value of conducting a systematic review. In addition, the findings of this scoping review will be disseminated among older people and stakeholders who are involved in the delivery of integrated care services in primary healthcare settings to inform and guide the next phase of developing an ICT-based integrated care intervention programme.

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