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Letter to Editor

Preparing the infrastructure for telenursing: An immediate priority for strengthening the resilience of the national health system during crises

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Military clashes and natural disaster crises have long posed significant threats to the stability of health systems, subjecting healthcare infrastructure to both direct destruction and indirect degradation (1). Under such circumstances, access to in-person healthcare is critically compromised, hospitals sustain damage, healthcare personnel are displaced, and patients' ability to reach essential, life-saving services is severely hindered (2).

Against this backdrop, telenursing, a branch of digital health that enables the delivery of nursing care remotely, has increasingly emerged as an effective and scalable solution in responding to crises and conflict situations (3). This approach not only facilitates screening, consultation, follow-up, and patient education but also plays a vital role in providing psychosocial support to affected communities (4). In addition to its tangible benefits for physical health, telenursing can ensure the continuity of care for patients with chronic conditions during crises. Individuals with heart failure, diabetes, hypertension, or chronic respiratory diseases face a heightened risk of care discontinuity during such crises (5). Through medication counseling, monitoring of vital signs, nutritional follow-up, pain management, and mental health screening, telenursing can significantly improve the quality of life for these patients and their family caregivers (6).

By employing telenursing, nurses, who serve as frontline actors in health systems, are able to maintain human connection with patients despite physical separation, conveying a sense of continuity and support that is essential for individual and community psychological recovery after a crisis (7,8). Telenursing can also address the needs of family caregivers, who often face considerable psychological and physical strain in caring for loved ones under high-stress conditions. By enhancing practical care skills, offering emotional reassurance, and providing psychosocial support, family caregivers receive crucial assistance. This support helps reduce stress and build resilience through education in care techniques and stress management, which are essential for maintaining healthcare delivery during crises. (9).

Evidence from conflict-affected regions such as Syria, Iraq, Palestine, and Ukraine indicates that telenursing can alleviate pressure on hospitals, enhance the quality of care, and even save lives, particularly in contexts where nursing resources are scarce (2,3,4). Furthermore, research suggests that telenursing has proven beneficial in improving chronic care and caregiver support during natural disasters and epidemics (6). Operationally, earthquake simulation projects in Iran have demonstrated that, in situations where physical access to services is cut off, telenursing is highly feasible, achieving an implementation feasibility score exceeding 77% (10). From a psychological perspective, structured telenursing interventions have been shown to significantly reduce caregiver anxiety among stroke and diabetic patients (7).

Despite these promising outcomes, numerous barriers hinder the effective

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implementation of telenursing in Iran. Structural analyses based on the World Health Organization's framework, such as the study by Mehrolhassani et al. (11), highlight severe deficiencies in digital health governance, technological infrastructure, particularly in underserved areas, recurrent power and internet outages, and disparities in digital literacy across age groups and geographic regions. Moreover, the absence of clear legislation for digital care, lack of crisis-specific protocols, and cultural resistance, particularly in the realm of mental health, remain significant structural and societal challenges (8,12).

The successful deployment of telenursing in crisis and wartime requires the design and implementation of a coherent, practical strategic model. Based on international experiences and available scientific evidence, five key components of such a model are as follows:

1. **A Legal and ethical framework for digital health**

Telenursing requires the establishment of robust digital health governance structures that clearly define legal, ethical, and data security standards. Global experiences, such as the study by Fatehi et al. (12), demonstrate that the absence of explicit laws and ethical protocols is a major obstacle to successful telenursing implementation. Therefore, it is essential to develop and enact comprehensive regulations that cover responsibilities, patient and nurse rights, privacy protection, and technology risk management. This component must be pursued through cross-sector collaboration between the Ministry of Health, the judiciary, cybersecurity agencies, and the academic community.

2. **Resilient technological infrastructure and a reliable, inclusive communication network**

In crises, telenursing depends on strong, reliable, and wide-reaching information and communication technology infrastructure, including high-speed broadband internet, stable electricity supply, secure servers, and data management systems. Field studies in Syria and Ukraine (2,6) underscore the importance of leveraging modern technologies such as satellite networks, 5G, and cloud platforms to maintain essential services when terrestrial communications are disrupted. In Iran, special attention must be given to underserved and vulnerable areas through the development of low-cost, resilient solutions (e.g., local wireless networks).

3. **Training and support models for nurses and family caregivers**

Nurses, central to telenursing delivery, must receive specialized training in digital health technologies, remote care provision, and crisis-specific communication skills. Additionally, the creation of psychological support and educational programs for family caregivers (9) is crucial in reducing their mental burden and enhancing their ability to manage complex care needs. Successful models such as *Project ECHO* (13), which provides ongoing remote training for healthcare professionals, can be adapted and localized.

4. **Crisis-specific clinical protocols and standardized procedures**

Developing and localizing standardized clinical protocols for telenursing services during various crises, including wars, earthquakes, and epidemics, is of critical importance. These protocols should address screening, triage, medication management, vital sign monitoring, and psychosocial support, while adapting to resource limitations and communication constraints (3,10). Protocol development must be grounded in scientific evidence, informed by successful international experiences, and shaped through ongoing engagement with healthcare providers and patients.

5. **Data-driven management systems for monitoring, evaluation, and continuous improvement**

Implementing advanced data management and analytics systems is essential for monitoring service quality, tracking patient health outcomes, evaluating performance, and identifying implementation barriers. The integration of artificial intelligence and machine learning can help predict patient needs and optimize resource allocation. This component

enables rapid feedback, protocol updates, and continuous service enhancement (4,5). Moreover, regular transparency and reporting to policymakers and the public will help build and maintain trust.

As a national health system strategy, priority should be given to developing a comprehensive, context-bound model based on these components, along with the operationalization of telenursing. This effort requires strong commitment and full support from the Ministry of Health, including the allocation of sufficient financial resources and infrastructure. The implementation should guarantee the continuity of nursing care while allowing for rapid, large-scale response to the dynamic demands of crises. By adopting this approach, the health system's resilience against complex and unforeseen emergencies will be strengthened, resource use will become more efficient, equitable access will be ensured, and public trust in the system will be enhanced during difficult times. Achieving this strategic goal depends on national determination, supportive legislation, and focused investment; without these, the valuable benefits of telenursing in crisis response risk being unrealized.

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Conflicts of interest

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