Revolutionizing Saudi Healthcare: A Delphi Study on Identifying Competencies in Virtual Healthcare for Healthcare Professionals

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Article

Revolutionizing Saudi Healthcare: A Delphi Study on Identifying Competencies in Virtual Healthcare for Healthcare Professionals

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Abstract: Background: Virtual care adoption accelerated during the COVID-19 pandemic, highlighting the need for healthcare professionals to develop relevant competencies. However, limited evidence exists on the core competencies required for quality virtual care delivery. **Objective:** This study aimed to identify the critical competencies physicians, nurses, and other health professionals need for adequate virtual care provision in Saudi Arabia using a Delphi method. **Methods:** A 3-round Delphi technique was applied with a panel of 42 experts, including policymakers, healthcare professionals, academicians, and telehealth specialists. In round 1, an open-ended questionnaire elicited competencies needed for virtual care. Competencies were distilled and rated for importance in rounds 2 and 3 until consensus was achieved. **Results:** Consensus emerged on 151 competencies across 33 domains. The most prominent domains were communication (15 competencies), professionalism (13), leadership (12), health informatics (5), digital literacy (5) and clinical expertise (11).

Keywords: virtual care; competence; competencies; education; framework; delphi; health care professionals; Saudi Arabia

Introduction

Background

Virtual health has become one of the most essential approaches in the healthcare sector to assist in effective and timely healthcare service delivery. The COVID-19 pandemic presented an unprecedented challenge to healthcare professionals and patients globally. They faced safety issues since the disease could be passed from one person to another through contact (Alharbi et al., 2021). Consequently, the adoption of virtual care was accelerated. Virtual care refers to the remote delivery of healthcare services like telemedicine, mHealth, remote patient monitoring, and others using information and communication technologies. While virtual care improves access and reduces costs, delivering quality healthcare virtually requires healthcare professionals to have specific competencies beyond traditional in-person care (Webster, 2020). Leveraging virtual healthcare is especially relevant in Saudi Arabia, which faces a shortage of healthcare professionals and increasing rates of chronic conditions.

According to Alahmari et al. (2022), virtual care is a relatively new concept in many countries, including Saudi Arabia. In the country, virtual healthcare is offered in virtual clinics, which have been introduced recently. Their quality differs based on different settings. Nevertheless, many people view them as the future of healthcare. In their study, Alahmari et al. (2022) found that 87% of Saudi patients who received virtual healthcare in Saudi virtual clinics agreed to some extent that virtual clinics could replace conventional clinics. While most patients involved in the study (86%) were satisfied with the services they received through the virtual clinics, concerns persist over the quality of virtual healthcare (Alahmai et al., 2022). Most of these concerns are associated with healthcare professionals' ability to transition from conventional face-to-face healthcare to virtual healthcare,

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often without sufficient training, as was experienced during the COVID-19 pandemic (Alharb et al., 2021).

Literature has continuously proven the increasing number of facilities incorporating virtual health into their system. This aligns with the implications that virtual health will emanate when the health practitioners are well-skilled and equipped with competency-based practices. Health practitioners need these skills and experiences to provide high-quality treatment, effectively use communication equipment to communicate and analyze patients' data, and understand the requirements of virtual healthcare delivery. “Competencies extend to the administrative aspects of virtual care delivery and the cultivation of positive relationships with patients and their families” (United States, 2022).

Moreover, there is a dearth of research on the core competencies healthcare professionals need for effective virtual care delivery. Identifying these competencies can inform the development of training programs and guidelines to equip healthcare professionals with the skills required for high-quality virtual healthcare delivery (Harrison & Manias, 2022). It can also help Saudi Arabia and other governments worldwide when integrating virtual healthcare as part of their strategies to expand healthcare to their citizens.

Saudi Arabia is one of the countries that have embraced digital health. The Saudi Arabian government currently supports the mainstreaming of digital health. The government of Saudi Arabia has been using technology extensively to promote healthcare service delivery. For instance, after the outbreak of COVID-19, the government of Saudi Arabia started supporting public health precautions to control its spread (Jonasdottir et al., 2022). Some of the digital health systems that the government has used are Tabaud, Seha, and Tetamman to track COVID-19 patients. "This network was formed to use virtual healthcare and telehealth solutions healthcare facilities to connect with primary healthcare centres and hospitals operating in remote locations" (Jonasdottir et al., 2022). These applications have helped in linking healthcare practitioners with patients and, in addition, reduce the need for patients to visit healthcare facilities. According to MOH records, Saudi Arabia has more than two million virtual healthcare service users as of 2022 (Fronczek & Rouhana, 2018).

Saudi Arabia has launched the world's largest virtual hospital of its kind. SEHA Virtual Hospital (SVH) is the first in the Middle East and North Africa as virtual hospital and the first hospital worldwide to obtain Canadian accreditation. It offers more than 23 specialties and 52 subspecialties (Ministry of Health, 2023). It is connected to a network of over 170 hospitals across all regions in Saudi Arabia. In these hospitals, patients can attend real-time video sessions with the country's top specialists who provide their required care. They share their vital signs while tests and x-rays are shared with the network of specialists who offer their assessments and healthcare recommendations. The hospital's specialists provide multiple healthcare services, including emergence and critical advice (such as virtual strokes and electroencephalography), specialized clinics (such as blood diseases, psychiatry, and heart diseases), home care services, and medical support services (including virtual pharmacy services and virtual pathology) (Ministry of Health, 2023).

In addition, to enhance remote patient contact, the Saudi Commission for Health Specialties (SCFHS) introduced the telemedicine training program. "The government has also supported digitizing Healthcare, especially promoting virtual healthcare adoption and continued use" (Jonasdottir et al., 2022). According to Fronczek and Rouhana (2018), the Ministry of Health in Saudi Arabia developed a strategy to improve the quality and efficiency of healthcare services.

1.1. Aim of the Study

This study's objective is to close the research gap on healthcare professionals' competencies in virtual health. It seeks to answer the following research question:

RQ: What competencies (knowledge, skills, and attitudes) are required for healthcare professionals to provide quality virtual healthcare to patients?

Its specific objectives are:

1. To identify the core competencies required by physicians, nurses, and allied healthcare professionals in Saudi Arabia to deliver quality virtual care effectively.
2. To understand Saudi healthcare professionals' challenges in adopting virtual care and applying related competencies.

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3. To recommend how training programs and licensing requirements could be enhanced to develop virtual care competencies amongst Saudi healthcare professionals.
4. To suggest organizational and technological supports to enable Saudi healthcare professionals to integrate virtual care competencies into routine practice.

Materials and Methods

Research Design

The Delphi method was used for this study which combined both quantitative and qualitative elements, which helped obtain consensus from the experts that was reliable enough to create a comprehensive framework. This method is structured iteratively to gather expert opinions and reach a consensus on a complex problem or issue. It involves a series of rounds of data collection and analysis.

1.1. Study Setting and Participants selection

The study was conducted at SEHA Virtual Hospital in Saudi Arabia. A purposeful sampling technique was used to choose experts based on their quality, knowledge, experience regarding virtual health, and clinical and academic credentials. The study involved 42 participants. These participants were all staff members of the SEHA hospital. The inclusion criterion was having some experience providing virtual healthcare services. Selected participants were requested to complete each round of the Delphi survey within 2 - 3 weeks of receiving the email for each round. A reminder email was sent to non-responders three days before the deadline to prompt their survey completion. Communication between the researchers and the panelists was via email only so that no expert could exert an undue influence over the opinions of others. Participants were known to the researcher but were not known to the other participants to maintain anonymity among the participants.

1.1. Data Collection and Materials

The participants' responses were collected from online questionnaires. They responded to the questionnaire online. The questionnaires prompted the participants to provide qualitative and quantitative data.

1.1. Procedure

The Delphi method was used to collect participants' responses. It involved three rounds. The first questionnaire prompted participants to provide qualitative data. Participants were asked open-ended questions that required them to showcase their knowledge, skills, and attitudes regarding virtual health. They were asked to identify up to ten competencies they believe healthcare professionals need. Participants were also required to provide their demographic data.

In the first round, a questionnaire is anonymously sent to a panel of experts seeking their views on the issue. Then, the researcher summarizes the responses and returns them to the experts for a second round. The scholars could make changes in every round of the experiment (Shariff, 2021), rating and ranking the items using the changes made in each round. This procedure of iterations persisted until a pact was reached. Different justifications prompted choosing this methodology for it in research. For instance, it simplified expert opinion collection from a very diverse group of respondents located in other geographic areas with the aid of a questionnaire and thereby reduced the need for face-to-face gathering.

Besides, the respondents remained anonymous during the entire study and, therefore freely spoke about what they believed were matters on issues of the study. Thus, the Delphi technique allowed several rounds for fine-tuning and responding to the group results; experts appeared ready and then reacted in a conducive fashion, resulting in consensus. This method was also focused on anonymity and allowed experts to share their true viewpoints not subjected the influence of any external factors or in corresponding pressure from co–panelists (Shariff, 2021). Box found it also included structured feedback conjointly multiple rounds of experts to refine their opinions based on social results, thus developing an agreement.

Therefore, the study procedure has produced reliable and realizable findings. Last, given the promulgated method, had followed a structured path, it gave an audit trail indicating how

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conclusions were attained. Consequently, a study could be audited to ensure its findings were credible and applicable.

Results

This study was conducted to determine the competency requirements for healthcare professionals who work in virtual health care settings. Experts were part of a panel through three rounds of discussion to arrive at an agreement on key items.

1.1. Sociodemographic and professional characteristics of the expert panel

Forty-two panelists participated in all three rounds. The panelists included nurses, physicians, pharmacists, radiologists, and social workers. Most panelists (42.5%) had a Master's degree, while 21.4% had a Bachelor's degree. Most panelists (66.7%) had 10-19 years of clinical experience. However, only 4.8% had over ten years of experience in virtual care, with most of them (64.3%) having 1-4 years of experience. Table 1 provides an overview of the sociodemographic and professional characteristics of the Delphi expert panel.

Table 1. Sociodemographic and professional characteristics of the expert panel.

Characteristic	Round 1 N (%)	Round 2 N (%)	Round 3 N (%)
Gender			
• Male	21 (50%)	21 (50%)	21 (50%)
• Female	21(50%)	21(50%)	21(50%)
Profession			
• Nurse	19 (45.2%)	19 (45.2%)	19 (45.2%)
• Physician	14 (33.3%)	14 (33.3%)	14 (33.3%)
• Pharmacist	3 (7.1%)	3 (7.1%)	3 (7.1%)
• Radiology	3 (7.1%)	3 (7.1%)	3 (7.1%)
• Social Worker	3 (7.1%)	3 (7.1%)	3 (7.1%)
Nationality			
• Saudi	40 (95.2%)	40 (95.2%)	40 (95.2%)
• Non-Saudi	2 (4.8%)	2 (4.8%)	2 (4.8%)
Current position			
• Manager/Supervisor	24 (57.1%)	24 (57.1%)	24 (57.1%)
• Educator	9 (21.4%)	9 (21.4%)	9 (21.4%)
• Researcher	3 (7.1%)	3 (7.1%)	3 (7.1%)
• Staff	6 (14.3%)	6 (14.3%)	6 (14.3%)
Qualification			
• Bachelor Degree	9 (21.4%)	9 (21.4%)	9 (21.4%)
• Master Degree	19 (45.2%)	19 (45.2%)	19 (45.2%)
• Doctoral Degree	7 (16.7%)	7 (16.7%)	7 (16.7%)
• Fellowship	5 (11.9%)	5 (11.9%)	5 (11.9%)
• Board Certificate	2 (4.8%)	2 (4.8%)	2 (4.8%)
Clinical Experience			
• 10-14 Years	15 (35.7%)	15 (35.7%)	15 (35.7%)
• 15-19 Years	13 (31%)	13 (31%)	13 (31%)
• 20-24 Years	12 (28.6%)	12 (28.6%)	12 (28.6%)
• 5-9 Years	2 (4.8%)	2 (4.8%)	2 (4.8%)
Virtual Health Experience			
• 1-4 Years	27 (64.3%)	27 (64.3%)	27 (64.3%)
• 5-9 Years	13 (31%)	13 (31%)	13 (31%)

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• 10-14 Years	2 (4.8%)	2 (4.8%)	2 (4.8%)

1.1. Delphi round 1

The first round Delphi technique questionnaire was qualitative in nature and consisted of open-ended question requesting panel members to identify knowledge, skills and attitudes for virtual health. This round was essential for the research to help initiate an initial understanding of the three aspects of competence needed by every health professional in the healthcare setting. Participants were asked to identify up to 10 competencies that healthcare professionals must have to work in virtual health. Responding to the open-ended prompt questions in Round 1, participants identified 227 types of knowledge and 121 skills that healthcare professionals should have. They also showed 72 different types of attitudes regarding virtual healthcare. After Qualitative Content Analysis, 33 domains and 157 items were generated from the panelists after reviews from research supervisor and an international experts in the field.

The response statements generated in Round 1 have been excluded from this manuscript in order to focus on the competency findings

1.1. Delphi round 2

The domains and items derived from the initial questionnaire were utilized in formulating the second round Delphi questionnaire. Panel members were required to express their level of agreement or disagreement using a five-point Likert Scale for each item. Moreover, experts were asked to add items that they believed to be important for Healthcare Professionals to be competent in Virtual Health but had yet to be included in the list. The experts demonstrated strong agreement with all 33 domains items. They agreed on 157 items with a mean ≥ 4.40 and S.D. ≤ 1.02. Moreover, 14 new , non-duplicated items emerging from the open ended data were identified which is C8, C11, C14, C53, C66, C67, C68, C69, C83, C90, C128, C129, C131, C164 (Table 2). Therefore, a list of 165 items in 33 domains was sent to 42 experts for the third survey in round 3.

1.1. Delphi round 3

In round 3, all (165) competency items reached consensus after Round 3, defined as ≥95% agreement on importance. The agreement increased from Round 2 to 3 on almost all items, indicating the Delphi process helped build consensus. For example, item C2 went from a mean of 4.29 (SD 1.02) in Round 2 to 4.93 (SD 0.26) in Round 3, with agreement increasing from 83% to 99%. Certain domains like Technology Proficiency, Professionalism, Clinical Expertise, Communication, and Teamwork had high levels of consensus (95-100% agreement) on most competencies. Other domains like Health Equity, Public Health, and Billing had more variation, with some items not reaching 95% agreement.

Table 2. Round 2 and 3 results.

Domain	Items	Round 2		Round 3		
		Mean	SD	Mean	SD	Agreement (%)
Domain1. Digital technology Proficiency	C1	4.48	0.59	4.95	0.22	99.05
	C2	4.29	1.02	4.93	0.26	98.57
	C3	4.88	0.45	4.93	0.26	98.57
	C4	4.81	0.40	4.86	0.35	97.14
	C5	4.79	0.42	4.93	0.26	98.57
Domain2. Professionalism in Provision of Virtual Care	C6	5.00	0.00	4.98	0.15	99.52
	C7	4.40	0.59	4.95	0.22	99.05
	C8	-	-	4.93	0.26	98.57
	C9	5.00	0.00	4.95	0.22	99.05
	C10	4.81	0.40	4.95	0.22	99.05
	C11	-	-	4.98	0.15	99.52

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	C12	4.50	0.63	4.95	0.22	99.05
	C13	4.64	0.48	4.98	0.15	99.52
	C14	-	-	4.95	0.22	99.05
Domain3. Clinical Expertise and decision making	C15	5.00	0.00	4.95	0.22	99.05
	C16	5.00	0.00	5.00	0.00	100.00
	C17	4.83	0.38	4.95	0.22	99.05
	C18	4.93	0.34	4.95	0.22	99.05
	C19	4.90	0.37	4.98	0.15	99.52
	C20	4.86	0.42	4.95	0.22	99.05
	C21	4.50	0.63	4.98	0.15	99.52
Domain4. Health Equity in Virtual Care	C22	4.48	0.59	4.71	0.64	94.29
	C23	5.00	0.00	4.71	0.60	94.29
	C24	5.00	0.00	4.83	0.44	96.67
	C25	4.50	0.63	4.81	0.55	96.19
Domain5. Virtual Health Leadership and Management	C26	4.88	0.45	5.00	0.00	100.00
	C27	5.00	0.00	4.90	0.30	98.10
	C28	4.36	0.66	4.98	0.15	99.52
	C29	4.79	0.42	5.00	0.00	100.00
	C30	4.79	0.42	4.95	0.22	99.05
	C31	5.00	0.00	4.93	0.26	98.57
	C32	4.38	0.66	4.98	0.15	99.52
	C33	5.00	0.00	4.98	0.15	99.52
	C34	4.52	0.71	5.00	0.00	100.00
Domain6. Legal and Ethical Considerations in Virtual Health	C35	4.81	0.40	4.98	0.15	99.52
	C36	4.76	0.43	4.98	0.15	99.52
	C37	5.00	0.00	4.98	0.15	99.52
	C38	4.52	0.71	4.98	0.15	99.52
	C39	4.64	0.48	4.98	0.15	99.52
	C40	4.52	0.71	4.98	0.15	99.52
Domain7. Teamwork and Collaboration in virtual healthcare	C41	4.90	0.37	4.98	0.15	99.52
	C42	4.93	0.34	4.98	0.15	99.52
	C43	4.86	0.35	4.98	0.15	99.52
	C44	5.00	0.00	4.95	0.22	99.05
	C45	4.98	0.15	4.98	0.15	99.52
	C46	4.50	0.71	4.98	0.15	99.52
Domain8. Care Coordination and Integration of virtual healthcare	C47	5.00	0.00	4.98	0.15	99.52
	C48	4.29	1.02	4.95	0.22	99.05
	C49	4.88	0.45	4.98	0.15	99.52
	C50	5.00	0.00	5.00	0.00	100.00
	C51	4.40	0.66	4.93	0.26	98.57
	C52	4.50	0.63	5.00	0.00	100.00
	C53	-	-	4.95	0.22	99.05

Table 2. Round 2 and 3 results, , *continued*

Domain	Items	Round 2		Round 3		
		Mean	SD	Mean	SD	Agreement (%)
Domain9. Cultural competency in virtual healthcare	C54	5.00	0.00	4.98	0.15	99.52
	C55	4.43	0.63	4.95	0.22	99.05
	C56	4.55	0.67	4.93	0.26	98.57
	C57	4.71	0.46	4.98	0.15	99.52
Domain10.	C58	4.83	0.44	4.95	0.22	99.05

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Data Analytics and Interpretation in virtual healthcare	C59	4.76	0.43	4.93	0.26	98.57
	C60	5.00	0.00	4.98	0.15	99.52
	C61	4.50	0.63	4.93	0.26	98.57
	C62	4.79	0.42	4.98	0.15	99.52
Domain11. Disease - Specific Management in virtual healthcare	C63	4.64	0.48	4.98	0.15	99.52
	C64	4.95	0.22	5.00	0.00	100.00
	C65	4.95	0.22	4.95	0.22	99.05
	C66	-	-	4.98	0.15	99.52
	C67	-	-	4.98	0.15	99.52
	C68	-	-	4.98	0.15	99.52
	C69	-	-	4.95	0.22	99.05
Domain12. Recordkeeping and Documentation in virtual healthcare	C70	4.88	0.33	4.98	0.15	99.52
	C71	4.98	0.15	4.95	0.22	99.05
	C72	4.74	0.45	5.00	0.00	100.00
	C73	5.00	0.00	4.98	0.15	99.52
	C74	4.48	0.59	4.95	0.22	99.05
Domain13. Effective Communication in virtual healthcare	C75	4.29	1.02	4.98	0.15	99.52
	C76	5.00	0.00	4.93	0.26	98.57
	C77	5.00	0.00	4.98	0.15	99.52
	C78	4.81	0.40	4.93	0.26	98.57
	C79	4.50	0.63	4.98	0.15	99.52
	C80	5.00	0.00	4.98	0.15	99.52
Domain14. Emergency response and crisis management in virtual healthcare	C81	4.98	0.15	4.98	0.15	99.52
	C82	4.12	0.86	4.98	0.15	99.52
	C83	-	-	4.88	0.33	97.62
	C84	4.76	0.43	4.98	0.15	99.52
	C85	4.79	0.42	4.93	0.26	98.57
	C86	4.50	0.63	4.98	0.15	99.52
	C87	4.64	0.48	4.98	0.15	99.52
Domain15. Research development and Evidence-Based Practice Utilization in virtual healthcare	C88	4.98	0.15	5.00	0.00	100.00
	C89	4.86	0.35	4.95	0.22	99.05
	C90	-	-	4.95	0.22	99.05
	C91	4.90	0.37	4.95	0.22	99.05
Domain16. Governance, risk and quality management in virtual healthcare	C92	4.76	0.43	4.98	0.15	99.52
	C93	5.00	0.00	4.98	0.15	99.52
	C94	5.00	0.00	4.95	0.22	99.05
	C95	4.50	0.63	5.00	0.00	100.00
	C96	4.79	0.52	4.95	0.22	99.05
Domain17. Health Information Management in virtual healthcare	C97	4.81	0.40	4.95	0.22	99.05
	C98	5.00	0.00	5.00	0.00	100.00
	C99	4.36	0.88	4.93	0.26	98.57
	C100	5.00	0.00	4.95	0.22	99.05
	C101	4.50	0.63	4.95	0.22	99.05
	C102	5.00	0.00	4.95	0.22	99.05
Domain18. Data security and privacy in virtual healthcare	C103	4.81	0.40	5.00	0.00	100.00
	C104	4.79	0.42	4.95	0.22	99.05
	C105	4.74	0.50	4.98	0.15	99.52
	C106	4.50	0.63	5.00	0.00	100.00
	C107	4.40	0.59	5.00	0.00	100.00
Domain19.	C108	4.12	0.86	4.98	0.15	99.52

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Professional Development in virtual healthcare	C109	4.81	0.40	4.98	0.15	99.52
	C110	4.76	0.43	5.00	0.00	100.00
	C111	5.00	0.00	4.95	0.22	99.05
	C112	4.52	0.71	4.98	0.15	99.52
	C113	4.52	0.71	4.98	0.15	99.52
	C114	4.50	0.63	5.00	0.00	100.00

Table 2. Round 2 and 3 results, , *continued*

Domain	Items	Round 2		Round 3		
		Mean	SD	Mean	SD	Agreement (%)
Domain20. Patient Assessment and Diagnosis in virtual healthcare	C115	5.00	0.00	4.98	0.15	99.52
	C116	5.00	0.00	4.95	0.22	99.05
	C117	4.50	0.63	4.95	0.22	99.05
	C118	4.86	0.35	4.98	0.15	99.52
Domain21. Patient education and engagement in virtual healthcare	C119	4.50	0.63	5.00	0.00	100.00
	C120	4.90	0.37	5.00	0.00	100.00
Domain22. Patient Safety in virtual healthcare	C121	4.76	0.43	5.00	0.00	100.00
	C122	4.50	0.63	4.95	0.22	99.05
	C123	5.00	0.00	4.98	0.15	99.52
Domain23. Patient Centered Care in virtual healthcare	C124	5.00	0.00	5.00	0.00	100.00
	C125	4.40	0.66	4.98	0.15	99.52
	C126	4.79	0.42	4.90	0.30	98.10
	C127	4.79	0.42	4.95	0.22	99.05
	C128	-	-	4.98	0.15	99.52
Domain24. Remote Medication Management	C129	-	-	5.00	0.00	100.00
	C130	4.81	0.40	5.00	0.00	100.00
	C131	-	-	5.00	0.00	100.00
	C132	4.50	0.63	4.98	0.15	99.52
	C133	5.00	0.00	5.00	0.00	100.00
Domain25. Remote Patient Monitoring	C134	4.79	0.42	4.98	0.15	99.52
	C135	4.50	0.63	4.98	0.15	99.52
	C136	4.67	0.48	4.93	0.26	98.57
	C137	4.50	0.63	4.95	0.22	99.05
	C138	4.86	0.35	4.98	0.15	99.52
Domain26. Public and community Health in virtual healthcare	C139	4.74	0.50	5.00	0.00	100.00
	C140	4.40	0.59	4.98	0.15	99.52
	C141	4.38	0.66	4.95	0.22	99.05
	C142	5.00	0.00	4.95	0.22	99.05
	C143	4.50	0.63	5.00	0.00	100.00
	C144	4.71	0.46	4.98	0.15	99.52
Domain27. The Use of Artificial Intelligence	C145	4.50	0.63	5.00	0.00	100.00
	C146	4.76	0.43	4.98	0.15	99.52
Domain28. Innovation and Creativity in virtual healthcare	C147	4.52	0.71	5.00	0.00	100.00
	C148	4.50	0.63	5.00	0.00	100.00
	C149	5.00	0.00	5.00	0.00	100.00
Domain29. Project Management in virtual healthcare	C150	4.50	0.63	5.00	0.00	100.00
	C151	5.00	0.00	5.00	0.00	100.00
Domain30. Marketing and Outreach of Virtual Health	C152	5.00	0.00	4.93	0.26	98.57
	C153	4.50	0.63	4.95	0.22	99.05
	C154	4.50	0.63	4.88	0.33	97.62

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	C155	5.00	0.00	5.00	0.00	100.00
Domain31. Virtual Health Policy Development and Advocacy	C156	5.00	0.00	5.00	0.00	100.00
	C157	5.00	0.00	4.98	0.15	99.52
	C158	4.50	0.63	5.00	0.00	100.00
	C159	5.00	0.00	4.98	0.15	99.52
Domain32. Billing and coding in virtual healthcare	C160	5.00	0.00	5.00	0.00	100.00
	C161	4.50	0.63	4.93	0.26	98.57
	C162	5.00	0.00	4.98	0.15	99.52
Domain33. Cybersecurity in virtual healthcare	C163	5.00	0.00	4.98	0.15	99.52
	C164	-	-	4.93	0.26	98.57
	C165	4.50	0.63	4.95	0.22	99.05

A list of 165 competencies in 33 domains was finalized as shown in Table3.

Table 3. Final List of Competencies from Delphi method.

Domain. 1	**Digital technology Proficiency**
	C1. Demonstrates knowledge of technologies, platforms, apps, and equipment used in virtual healthcare delivery, such as videoconferencing tools
	C2. The ability to use virtual healthcare software, apps, and other digital tools to facilitate virtual consultations, share patient information securely, and troubleshoot technical issues that may arise during virtual health sessions
	C3. The ability to continuously learn and adapt to new virtual healthcare technologies and practices
	C4. Empathy towards patients in virtual settings, recognizing the potential of virtual health in healthcare delivery.
	C5. Positive and proactive attitude towards technological advancements and emerging technologies, recognizing their potential to enhance healthcare delivery in virtual settings.
Domain. 2	**Professionalism in the Provision of Virtual Care**
	C6. It is understanding the differences between delivering in-person versus virtual health care, including the risks and benefits.
	C7. Understanding virtual healthcare protocols, standards, guidelines, and regulations is essential for ensuring compliance and delivering safe and effective virtual healthcare services.
	C8. Understanding of virtual health care scope of practice and expertise
	C9. They are utilizing the virtual care platform as the appropriate method to facilitate patient-centered care that appreciates the patient's and their family's goals, concerns, beliefs, and cultural diversity.
	C10. The ability to demonstrate professionalism and respect for the individual and ensure the virtual environment is professional and free from distractions. This includes having a clean and tidy background, dressing appropriately, and using appropriate language.
	C11. Assume responsibility and accept accountability for professional decisions in virtual healthcare.
	C12. Showing high levels of professionalism, including maintaining a professional environment and the use of personal and clinical practice skills
	C13. Expressing desire and capability in usability of virtual health design to educate, mentor, and professionally support their colleagues
	C14. Demonstrate a commitment to high-quality virtual care of their patients.
Domain. 3	**Clinical expertise and decision-making**
	C15. Demonstrate extensive knowledge of clinical guidelines, best practices, and comprehensive background in medical conditions, including symptoms, diagnosis, and treatment options.
	C16. Analyze symptoms, interpret data, and diagnose accurately in a virtual setting.
	C17. Extensive clinical knowledge and experience in their specialty to provide accurate and effective support

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	C18.	The ability to make informed clinical decisions based on virtual assessments of patient data and think critically to analyze complex health issues
	C19.	The ability to apply the knowledge of primary clinical care processes, workflow, and technologies for analysis, design, Development, and implementation of health applications and information systems.
	C20.	The ability to perform clinical assessments, diagnose conditions, and provide treatment plans through virtual platforms
	C21.	Express higher levels of professionalism with comprehensive knowledge of the medical field.
Domain. 4		**Health Equity in Virtual Care**
	C22.	Understanding the social determinants of health and non-medical factors that influence health outcomes, such as education, income, housing, and access to transportation
	C23.	The ability to tailor virtual health interventions to address specific needs and reduce disparities among diverse populations in virtual settings
	C24.	We emphasize the importance of equitable access to virtual health services and the active pursuit of health equity goals.
	C25.	An advocacy-oriented attitude, recognizing the importance of actively working towards health equity and reducing disparities in virtual health practices.
Domain. 5		**Virtual Health Leadership and Management**
	C26.	I understand leadership principles and strategies applicable to virtual health settings.
	C27.	Knowledge of the structure and functioning of healthcare systems, including relevant policies and regulations, will help you navigate the virtual health landscape effectively.
	C28.	Knowledge of effective time management ensures that team members can prioritize tasks, set goals, and meet deadlines.
	C29.	Understanding change management principles and strategies involves managing resistance, creating buy-in, and fostering a culture of innovation and continuous improvement.
	C30.	The ability to guide teams, foster innovation, and lead change in virtual health environments.
	C31.	Serve as thought leaders and expert consultants within their own and other professions, contributing to advancing therapeutic interventions, practice development, and service delivery models.
	C32.	Understand the team members' roles and responsibilities in virtual care.
	C33.	Ability to acknowledge the need for transformative leadership to shape the future of virtual health and, in addition, enhance healthcare delivery.
	C34.	We recognize the need for flexible leadership to address barriers and focus on leading the teams in virtual health settings.

Table 3. Final List of Competencies, *continued*

Domain. 6		**Legal and Ethical Considerations in Virtual Health**
	C35.	Understanding that virtual health delivery needs to follow the legal, professional, and ethical standards that guide them
	C36.	Ability to acknowledge the principles of informed consent, assessing consent from patients before their engagement in virtual health services, and ensuring they know the risks, benefits, and limitations involved
	C37.	Ability to adhere to ethical principles when delivering virtual health services
	C38.	The ability to recognize the importance of ethical and professional standards when working with patients and colleagues in a virtual environment
	C39.	Recognize the need to use Ethical decision-making skills during dilemma situations in virtual health contexts.
	C40.	Ability to promote trust and integrity in virtual healthcare practices.
Domain. 7		**Teamwork and Collaboration in Virtual Healthcare**
	C41.	The ability to use tools such as project management software, online platforms for communication, and document-sharing systems assists in enhancing collaboration among team members.

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	C42. Recognizing the need to convey ideas, active listening skills, and analyzing feedback helps to provide an efficient work environment for team members.
	C43. Understanding of the need for emotional intelligence and how it helps to build strong relationships and understanding among team members' emotions
	C44. Recognizing the need to work effectively as part of a healthcare team and respecting the expertise and contributions of others
	C45. Recognizing the need for Listening attentively to others and also seeking clarification when necessary to enhance collaboration among the team members
	C46. Respect for interdisciplinary perspectives, fostering a positive attitude towards collaborative patient care in virtual healthcare.
	Care Coordination and Integration of Virtual Healthcare
	C47. Knowledge of care coordination and transition workflows within healthcare organizations and across different care settings
	C48. Understanding the roles and responsibilities of various healthcare professionals involved and how they collaborate to ensure smooth transitions and continuity of care in virtual healthcare.
Domain. 8	C49. Understanding the process of transitioning patients between different levels and settings of care and knowledge of patient handoff procedures in virtual health, discharge planning, transfer protocols, and strategies to ensure continuity of care during transitions
	C50. Knowledge of strategies to ensure continuity of care when transitioning to virtual health services.
	C51. The ability to detect and effectively coordinate care with various providers involved in the patient care process
	C52. The ability to identify and coordinate care between providers on the patient's care team in virtual healthcare
	C53. Determine the need and timing of referral to another specialist in or out of the virtual care settings.
Domain. 9	**Cultural competency in virtual healthcare**
	C54. Understanding and recognizing diverse populations' cultural beliefs, values, practices, and norms. This includes awareness of cultural backgrounds, languages, religions, and customs.
	C55. Knowledge of various languages spoken by different cultural groups bei, ng aware of potential language barriers, and using interpreters or translation services in virtual healthcare when necessary
	C56. The ability to work effectively with patients from diverse cultural backgrounds and adapt to their needs in virtual healthcare
	C57. Developing an attitude of respect, empathy, and sensitivity toward patients' cultural differences in virtual Healthcare
Domain10	**Data Analytics and Interpretation in Virtual Healthcare**
	C58. Familiarity with the various sources of virtual health data, such as electronic health records (EHRs), wearables, mobile apps, and virtual health platforms
	C59. Proficiency in statistical methods and techniques used for analyzing healthcare data in virtual healthcare, including descriptive statistics, inferential statistics, hypothesis testing, regression analysis, and survival analysis
	C60. Knowledge of data visualization tools and techniques to present healthcare data in virtual healthcare clearly and understandably. This includes creating charts, graphs, and dashboards for effective communication and decision-making.
	C61. The ability to visualize and interpret diagnostic tests and imaging results remotely
	C62. The ability to analyze and interpret the information provided through virtual platforms quickly to make informed decisions during procedures, for example, remote patient monitoring data
Domain 11	**Disease-Specific Management in Virtual Healthcare**
	C63. Knowledge of various diseases managed virtually, including their causes, symptoms, diagnosis, treatment protocols, potential complications, and follow-up care requirements. This understanding enables accurate diagnosis and effective treatment planning in virtual healthcare.
	C64. Proficiency in diagnostic techniques and tools used to interpret clinical findings, analyze test results, and make accurate diagnoses in virtual healthcare.

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	C65. Knowledge of disease management strategies, including medication management, lifestyle modifications, and self-care techniques that can be implemented through virtual platforms
	C66. The ability to conduct rapid assessment of stroke symptoms via video, prompt diagnosis and treatment decisions, collaboration with neurologists and stroke teams, remote monitoring of vitals and neurological status
	C67. The ability to conduct remote EKG interpretation, cardiac auscultation using specialized virtual health equipment, remote monitoring of heart rhythm and vital signs, managing chronic heart conditions like arrhythmias and heart failure, patient education on heart health and medication adherence
	C68. The ability to conduct virtual consultations for cancer patients, provide emotional support and guidance, manage treatment side effects remotely, monitor progress and adjust treatment plans, collaborate with oncologists and other specialists
	C69. The ability to manage chronic conditions common in older adults, remote assessment of cognitive function and mental health, fall prevention education and monitoring, medication management, and adherence, addressing social isolation and loneliness

Table 3. Final List of Competencies, *continued*

Domain 12	**Recordkeeping and Documentation in Virtual Healthcare**
	C70. Knowledge of medical terminology in virtual healthcare to accurately document patient information and communicate effectively with other professionals.
	C71. Understanding and adhering to documentation standards and electronic health records and documentation in virtual care settings
	C72. The ability to maintain accurate, clear, and complete electronic health records and securely manage patient data in virtual healthcare
	C73. Accurately documenting virtual consultations and maintaining proper records.
	C74. Ensuring patient information is kept secure and maintaining confidentiality
Domain13	**Effective Communication in Virtual Healthcare**
	C75. Knowledge of the essential role of communication in virtual care and the different types of communication
	C76. The ability to promote effective communication within the team in virtual healthcare, providing feedback and support to staff who need assistance to develop communication skills
	C77. The ability to demonstrate practical verbal and non-verbal communication skills to promote patient safety in virtual healthcare
	C78. Ensure the information being conveyed is easily understood by patients or colleagues via virtual healthcare.
	C79. Recognize and understand the emotions of patients or colleagues in virtual healthcare and respond appropriately, offering support and reassurance when necessary.
	C80. Introduce yourself, your role, and your organization, and obtain consent for any interventions.
Domain14	**Emergency response and crisis management in virtual healthcare**
	C81. Knowledge of virtual health disaster response and emergency preparedness
	C82. Understanding crisis management strategies applicable to virtual healthcare settings.
	C83. Knowledge of backup platforms and communication channels that will be used in case of technical failures or emergencies. Healthcare professionals should be prepared to switch to alternative methods for maintaining patient contact and critical communication.
	C84. The ability to assess the severity of the crisis, categorize patients based on urgency, and determine appropriate and instant emergency care that may arise and address the critical technical problems and risk management
	C85. Recognizing the importance of proactive crisis response planning to ensure the continuity and safety of virtual health services.
	C86. Calm and composed attitude during crises, recognizing the need for effective crisis management to ensure patient safety and well-being.

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	C87. Commitment to attending regular training in emergency response protocols, crisis management techniques, and virtual tools utilization
Domain15	**Research development and Evidence-Based Practice Utilization in Virtual Healthcare**
	C88. Understand the principles of evidence-based practice and how to integrate the best available evidence into the virtual health decision-making process.
	C89. The ability to identify and acquire relevant research articles and studies in virtual healthcare. This includes proficiently searching medical databases, critically appraising research literature, and understanding statistical analysis.
	C90. The ability to critically appraise research and evaluate the quality and validity of research studies. This involves assessing the study design, methodology, sample size, statistical analyses, and the relevance of the findings to the clinical question.
	C91. Commitment to staying current with new research developments and advancements and continually updating clinical practice based on the best available evidence
Domain 16	**Governance, risk, and quality management in virtual healthcare**
	C92. Knowledge of local, national, and international virtual health standards to ensure compliance with laws and regulations in healthcare.
	C93. Understanding the principles of risk management in virtual healthcare and outcome measures
	C94. The ability to lead or participate in quality improvement initiatives to enhance patient outcomes and satisfaction in virtual healthcare settings
	C95. The ability to identify potential risks, evaluate their impact on patient safety and quality of care, and implement strategies to mitigate those risks in virtual healthcare settings
	C96. A commitment to continuous improvement fosters accountability and dedication to providing high-quality virtual health services.
Domain.17	**Health Information Management in Virtual Healthcare**
	C97. Proficiency in various health information systems and technologies used in virtual healthcare for storing, organizing, and retrieving health data
	C98. Understand key information technology concepts and components in virtual healthcare, such as networks, storage devices, operating systems, and applications.
	C99. Familiarity with health information exchange standards and protocols to enable effective sharing and exchange of health information between different healthcare organizations and systems
	C100. Understanding the principles and practices of information governance, including data quality, data integrity, and data standards, to maintain accurate and reliable health information in virtual healthcare
	C101. The ability to evaluate and recommend reliable digital health resources, applications, and information for patient education and self-management
	C102. Express the ability to utilize informatics in virtual healthcare settings.
Domain 18	**Data security and privacy in virtual healthcare**
	C103. Comprehensive understanding of the privacy, confidentiality, security, and safety features of virtual health tools
	C104. The ability to maintain privacy and confidentiality and comply with security regulations during virtual consultations
	C105. The ability to ensure that patient data is protected from unauthorized access, modification, or disclosure in virtual healthcare. This involves implementing encryption, secure data storage, and access control mechanisms.
	C106. The ability to obtain patient consent in virtual healthcare and authorization before collecting, using, or disclosing their health information.
	C107. Respect and acknowledgment of patients' confidentiality and autonomy throughout the virtual health delivery

Table 3. Final List of Competencies, *continued*

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Domain.19	**Professional Development in Virtual Healthcare**
	C108. Updated Clinical Knowledge by continuously updating knowledge and skills to keep up with advancements in clinical and technology
	C109. Engaging in professional development activities and seeking feedback to improve clinical and virtual healthcare skills continuously
	C110. The ability to identify personal learning needs and focus on attending the necessary training to equip them with current knowledge and skills relevant to virtual health technologies.
	C111. The ability to educate and train other healthcare professionals in virtual health
	C112. Willing to learn and undertake more studies throughout their professional lives in virtual healthcare
	C113. Participate actively in activities like workshops and conferences relevant to virtual health.
	C114. Show a commitment to personal growth and self-development by engaging in activities that increase their competency, such as networking with other professionals and continuing with education.
Domain.20	**Patient Assessment and Diagnosis in Virtual Healthcare**
	C115. Knowledgeable in gathering a patient's medical history remotely, including previous illnesses, family history, lifestyle factors, and medication history.
	C116. The ability to assess, plan care, support, and manage treatment using recognized tools in clinical and virtual settings
	C117. The ability to guide patients to self-perform certain examinations, such as observing skin conditions, checking vital signs with home devices, or assessing range of motion through guided movements
	C118. The ability to engage patients in their care through virtual channels and motivate them to participate in their health management.
Domain 21	**Patient education and engagement in virtual healthcare**
	C119. The ability to effectively educate and guide patients remotely on self-management techniques, exercises, and preventative measures to promote long-term rehabilitation and well-being
	C120. The ability to provide clear and concise instructions and educate patients about their conditions, treatments, and self-care
Domain 22	**Patient Safety in Virtual Healthcare**
	C121. Comprehensive understanding of safety protocols, guidelines, and patient safety culture, including reporting and learning from errors, engaging in continuous quality improvement, and advocating for patient safety
	C122. The ability to lead and manage patient safety initiatives, promoting a culture of safety in virtual care within their organizations
	C123. Participate actively in quality assurance programs, incident reporting systems, and ongoing monitoring of patient outcomes, contributing to a culture of continuous improvement.
Domain 23	**Patient-Centered care in virtual healthcare**
	C124. The ability to engage and involve patients and their families in virtual health decision-making processes
	C125. The ability to identify and provide patient-centered, family-focused care that understands and respects diversity and inclusion in virtual healthcare settings
	C126. The ability to empathize with patients, understanding their emotions, fears, and concerns in virtual healthcare settings
	C127. Commitment to patient-centered care
	C128. Respect and support clients' right to make informed decisions about their care
Domain 24	**Remote Medication Management**

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	C129. Understanding of medication safety protocols and best practices to minimize errors during remote prescribing and medication administration
	C130. In-depth knowledge of different medications that can be prescribed remotely, including their indications, interactions, contraindications, dosing, side effects, and potential adverse reactions
	C131. The ability to review the patient's medical history, medication lists from different providers, and laboratory results to confirm medication accuracy and identify potential interactions or contraindications
	C132. It is crucial to remote medication management to educate patients about their medications remotely, including proper usage, potential side effects, and adherence.
	C133. The ability to prescribe medications remotely, assessing medication adherence, and providing virtual medication management
Domain 25	**Remote Patient Monitoring**
	C134. Understanding of the conditions being monitored and the relevant physiological parameters.
	C135. Familiarity with the remote monitoring technology and devices being used, such as wearable devices, mobile apps, and virtual health platforms and their applications in healthcare
	C136. The ability to monitor patients remotely and respond to changes in their condition promptly
	C137. Emphasizing the importance of leveraging technology for continuous patient health assessment and proactive monitoring
	C138. A commitment to keep updated with developments in RPM technology, data analysis tools, and best practices to continue providing optimal care for patients in virtual healthcare settings.
Domain 26	**Public and Community Health in Virtual Healthcare**
	C139. Understanding community dynamics, social determinants of health, and community to identify health needs and develop interventions that empower individuals and communities in virtual healthcare.
	C140. Knowledgeable about various national prevention strategies and programs, such as immunizations, screening programs, and infection control practices
	C141. The ability to interpret health indicators, track trends, and contribute to research studies to improve population health outcomes in virtual healthcare.
	C142. The ability to assess and manage public health concerns through virtual health interventions
	C143. Recognizing the role of virtual health interventions in contributing to broader population health outcomes and public health advocacy.
	C144. A commitment to promoting public health in virtual settings, recognizing the broader impact of virtual healthcare on population well-being.

Table 3. Final List of Competencies, *continued*

Domain 27	**The Use of Artificial Intelligence**
	C145. Understanding the range of health-related AI applications, including their capabilities, limitations, and potential applications in their specialty in virtual healthcare settings.
	C146. The ability to interpret AI-generated insights and incorporate them into clinical and virtual decision-making processes.
Domain.28	**Innovation and Creativity in Virtual Healthcare**
	C147. Understanding the adoption and integration of innovative technologies in virtual healthcare
	C148. Have the skills to share innovative ideas and develop creative solutions in a virtual health setting.
	C149. Be able to commit to Identifying innovative methods that are cost-effective and sustainable.
Domainn29	**Project Management in Virtual Healthcare**
	C150. Ability to plan and manage projects by defining project scope, having clear objectives, setting timelines, managing resources, and ensuring deliverables are met on time and within budget.
	C151. The ability to set a well-defined project by identifying the project's objectives, scope, deliverables, and schedule.

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Domain 30	**Marketing and Outreach of Virtual Health**
	C152. Ability to market and reach the strategies needed to promote virtual health services.
	C153. Advocating the benefits of virtual care
	C154. Ability to use patient testimonials, success stories, and case studies to showcase the advantages of virtual healthcare
	C155. Ability to acknowledge the role of marketing and outreach to increase awareness and utilize the services of virtual health
Domain 31	**Virtual Health Policy Development and Advocacy**
	C156. Recognize the existing policies and guidelines related to virtual health to help identify gaps.
	C157. Ability to identify healthcare policy issues and come up with strategies that are relevant to virtual health.
	C158. Have skills to influence the Development of policies and foster favorable regulatory environments for virtual health
	C159. Understand the need to actively engage with policy discussions to shape the regulatory setting of virtual healthcare.
Domain 32	**Billing and coding in virtual healthcare**
	C160. Knowledge of virtual health financial models, reimbursement mechanisms, and budgeting.
	C161. Understand billing codes, health insurance, and coverage in virtual healthcare settings.
	C162. The ability to understand virtual healthcare's billing and coverage aspects and manage resources effectively
Domain 33	**Cybersecurity in Virtual Healthcare**
	C163. Understand network security fundamentals, including firewalls, intrusion detection and prevention systems, and secure configuration management.
	C164. Knowledge of the basics of cybersecurity, including safe browsing, email security, and recognizing social engineering attempts
	C165. The ability to protect patient information and maintain cybersecurity in a virtual environment

1.1. External validation

External reviewers were invited to validate the study's results' importance, relevance, and comprehensiveness. The reviewers included international experts in virtual care. The reviewers agreed that all items were adequately covered and the results are applicable in different virtual care settings.

Discussion

In this study, we established a set of competencies for health professionals in Saudi Arabia through a two-round Delphi survey, which identified a series of knowledge, skills, and other abilities essential to achieving virtual health. The consensus-based set of competencies provides the first comprehensive description of the competencies frameworks in Saudi health systems for healthcare professionals to work effectively in virtual health settings. In our study, one hundred sixty-five competencies were identified as highly important for health professionals who work on virtual health (Table 3). The competencies had an agreement ranging from 94.29% to 100 %. This agreement was brought about by the mean and SD of round 3, where the mean went from 4-5 while the SD, on the other hand, ranged from 0.00- 0.64. In all the domains, as showcased in Table 3, the competencies required the health professionals to understand and know the specific domain. In addition, they had to have the ability to navigate through the virtual healthcare system, including the software involved.

This study provides a framework for various stakeholders, from healthcare administrators to educators, to understand the competencies needed in an increasingly digital healthcare world. This ensures a more integrated and effective approach to virtual healthcare services, benefiting patients through improved quality and safety. While the Saudi Commission provides regulation and

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guidance for Health specialists and the Ministry for Health (MOH), the result from this study can be used to develop comprehensive rules and guidelines for virtual health practice in Saudi Arabia. A clear framework will ensure healthcare professionals have the competencies to deliver high-quality virtual healthcare. Moreover, one of the main goals of healthcare is to offer safe and high-quality service. Identifying the right competencies ensures that healthcare providers are well-equipped to provide this level of care, even in a virtual setting.

Virtual health development has brought rise to the need for health professionals who are skilled with the needed competencies to surpass the barriers associated with virtual healthcare and provide high-quality patient care. Digital technology proficiency in virtual Healthcare (C1-C5) and artificial intelligence ensures high-quality healthcare delivery and positive patient outcomes (Alowais et al., 2023). Without digital competence, there will be barriers to navigating telehealth systems, leading to disparities in healthcare access and outcomes (Le et al., 2023). Competencies related to professionalism (C6-C14) and ethical consideration (C35-C40) also play an important role.

When the health practitioners are both professional and have ethical considerations, Health Information Management skills (C97-C102), and Data Security and Privacy (C103-C107), then it is "guaranteed to have quality of care, sustainable costs, professional liability and respect of patient privacy, and data protection and confidentiality" (Solimini et al., 2021). Clinical expertise and decision-making (C15-C21) "healthcare providers to have the knowledge and ability to determine when virtual care is appropriate" (Curran et al., 2023). According to HRRS (2023), health equity in virtual care (C22-C25) and virtual health leadership and management (C26-C34) competencies will help health practitioners understand the role of virtual healthcare and aid in meeting the needs of marginalized communities. Professionals must also have a sense of collaboration and teamwork (C41-C46) for improved performance (Greilich et al., 2023).

Similarly, care coordination and integration of virtual Healthcare (C47-C53) are the common competencies needed for effective workflow and also to ensure that timely and coordinated care is received by patients (HealthSnap, 2023). Innovature BPO (2023) states that it is easier to make effective decisions when one has data utilization competence (C58-C62). In contrast, another cultural competency (C54-C57) allows practitioners to care for a diverse population (Hilty et al., 2020). A proper Recordkeeping and Documentation routine in Virtual Healthcare (C70-C74) is essential for ensuring safe continuity of care (Medical Protection, 2022). Recognition of diseases and their specific management (C63- C69) and Patient Safety competencies (C121- C123) guarantees that the patient's care is safe (Kinnunen et al., 2023).

Effective Communication (C75-C80) and Emergency Response and Crisis Management (C81-C87) competencies in Virtual Healthcare are important aspects of ensuring collaborative teamwork and fostering safe patient care (Utilities One, 2023). Similarly, practitioners with Competencies in research development and evidence-based practice guarantee high-quality Healthcare outcomes (Schetaki et al., 2023). "Digital marketing will play a role in promoting telehealth services and educating patients about its benefits" (Clapp, 2023). Therefore, health practitioners need to be competent in marketing and outreach. When patients adapt to innovative technologies (C147-C149) and engage in continuous learning and Development (C108-C114), their skills are expounded and advanced, and advancement in their careers is witnessed (Team, 2023).

Practitioners with patient care assessment and diagnosis (C121-C123) and patient-centered care (C124-C128) tend to make decisions based on patient preference as they are subjected to only the patient's needs (Kuipers et al., 2019). Project management is important because it ensures compliance with ethical and legal policies (W. Team, 2023). Remote Patient Monitoring(C134-C138) and Remote Medication Management competency (C129-C133) will reduce acute hospital events (Thomas et al., 2021). Similarly, health practitioners who can do correct billing and coding impact virtual health performance. "Incorrect billing and coding can result in denied claims or delayed and decreased payments" (Bajowala et al., 2020). According to Javaid et al. (2023), virtual health must employ cybersecurity competence in their workers for better protection of information for the patients. All the competencies of C165 are essential in ensuring that the health outcomes for patients are improved.

Recommendations and Conclusion

This study's findings are crucial for enhancing healthcare delivery in an increasingly digitalizing world. They lay out an extensive list containing 165 competencies across 33 domains. These

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competencies provide a strong foundation for training, regulation, and virtual care practice in Saudi Arabia and other countries. Several key recommendations emerge from the results, as discussed below.

Virtual care competencies should be integrated into both undergraduate and postgraduate medical curricula in Saudi Arabia (Kruse et al., 2021). Universities and educational institutions must prepare future healthcare professionals with knowledge and skills for virtual practice. They can achieve this objective by incorporating relevant competencies into telehealth, informatics, communication, ethics, and clinical care courses. Universities and educational institutions can use experiential learning through simulations and telehealth encounters to build the healthcare professionals' competency (Bajra et al., 2023). For current healthcare practitioners, the Saudi Commission for Health Specialties, which oversees licensing, can mandate certified virtual care training programs that teach the identified competencies. Healthcare professional associations can also design continuing medical education activities to develop virtual care competencies among their members.

The study provides a starting point for governments to develop a standardized national virtual care competency framework to guide the training and certification of healthcare professionals. Multiple stakeholders in the healthcare sector should adapt and validate the study's findings to create nation-specific frameworks similar to those established in the United States and Canada (Scott Kruse et al., 2020). The frameworks can define competency domains, specific skills, and performance metrics. Certifications can then be offered to validate competency attainment by providers (Shaw et al., 2018).

Virtual care technologies should be designed to enable and enhance competent practice. Platforms should embed features like intuitive interfaces, clinical prompts, smart templates, and analytics dashboards. This allows providers to seamlessly apply competencies as they interact with the system (Mbunge et al., 2022; Kruse et al., 2018). Extensive training is key so that professionals maximize these functionalities for quality care delivery.

Healthcare organizations also play a critical role in competency integration. Supportive policies, incentives and culture must be cultivated to drive adoption of virtual modalities into routine practice. Policies can promote use of telehealth for communication, consultations, monitoring and team collaboration. Incentives can encourage training, certification and ongoing development. Equally important, organizational culture needs to embrace virtual care as a legitimate model of quality care, at par with traditional in-person delivery (Alaboudi et al., 2016).

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Informed Consent Statement: Informed consents obtained from all participating experts prior to the commencement of the Delphi study. Each participant has been provided with a detailed Informed Consent Statement, outlining the purpose, procedures, potential risks, and benefits associated with their involvement in the research. The informed consent process was conducted transparently, with due diligence to respect the autonomy and rights of each expert involved in contributing to the comprehensive understanding of competencies in virtual healthcare.**Data Availability Statement:** All data generated or analyzed during this study are included in this published article. Additional information is available from the corresponding author on reasonable request.

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