

Table 1 Essential competencies required for approaching patients with COVID-19

Domain	Competency
Knowledge	1. Recognize COVID-19 Epidemiology
	2. Differentiate between epidemic, outbreak and pandemic of COVID-19
Etiology	3. Recognize the virus etiology, origin, incubation period and transmission models
	4. Apply the principles of isolation, quarantine, contacts, and contacts tracing
	5. Identify high- risk groups of COVID-19 patients
Assessment & Diagnosis	6. Recognize types of different diagnostic tests
	7. Identify signs and symptoms of COVID-19
	8. Apply infection control and prevention strategies
	9. Recognize health and safety of medical equipments
Management	10. Discuss isolation and quarantine periods, isolation conditions
	11. Apply therapeutic protocols and empirical drugs
	12. List indications and contraindications of medications and procedures
Skills	13. Take accurate clinical history
Etiology	14. Assess the readiness of health facility
	15. Perform appropriate medical examination
	16. Draw blood samples, nasal swaps and bronchial lavage safely and correctly
Assessment & Diagnosis	17. Screen and triage at all points of access to the health system
	18. Interpret results of laboratory tests and radiographic images correctly
	19. Provide correct differential diagnosis in each medical case
	20. Apply health and safety procedures
	21. Educate patients to the extent that they can understand
	22. Calculate therapeutic doses accurately
	23. Apply treatment in the correct way and time and make appropriate adjustments for each case
Management	24. Use medical equipment and devices for managing patients with COVID-19
	25. Appraise and assimilate scientific evidence
	26. Provide accurate diagnosis of COVID-19
	27. Decide the right time for initiating and finishing treatment
	28. Appraise the scientific publications about COVID-19
	29. Perform triage and control origin of infection
Prognosis	30. Manage clinical cases according to development and stage and complications
	31. Start and terminate isolation precautions when necessary
	32. Perform a plan to monitor health care staff who were in contact with definite cases of COVID-19
Attitude	33. Provide protection measurements for health care workers
	34. Demonstrate Professionalism to peers, staff, patients and patient's families
	35. Work with health care professional including other disciplines
	36. Keep patient safe and protect him/her from harm
Management	37. Demonstrate respect to patients' privacy and confidentiality
	38. Maintain patients' dignity during providing health care
	39. Show sympathy and compassion to patients
	40. Explain all information regarding COVID-19 to community

Table 1 Essential competencies required for approaching patients with COVID-19 (concluded)

Domain	Competency
Management	41. Demonstrate an investigatory and analytic thinking approaches to meet the needs of COVID-19 patients
	42. Provide the best health care to patients regardless of age, gender, cultures and economic situations without discrimination
	43. Provide spiritual support to patients and suspected infected persons
	44. Demonstrate Self-management and self-awareness
	45. Develop the required skills to prevent transmission of COVID-19
	46. Promote health against COVID-19 and anticipate when priorities should be changed
	47. Develop strategies for consultation, collaboration, and referral
	48. Provide optimal value care
	49. Communicate effectively with patients, their families and colleagues to inform them about case development
	50. Show leadership, initiative, optimism, and influence to control disease spread in the most effective manner
	51. Work flexibly under stress and under changing conditions and remain calm
	52. Apply the national health policy, guidelines and recommendations

testing, transport, treatment, nursing, specimen collection, pathogen detection, pathologic examination or technical personnel, should all have the necessary competencies to deal with this pandemic (2).

Participants were instructed to write competencies required for dealing with COVID-19 in the light of those competencies already constructed for professionals dealing with accidents and emergencies in the United States of America (26), United Kingdom (27) and Canada (28). For example, according to Clerkship Directors in Emergency Medicine (CDEM), six core competencies should be acquired when dealing with COVID-19 including patient care, medical knowledge, professionalism, systems-based practice, practice-based learning and improvement, and interpersonal and communication skills (26). In the present study, 52 essential competencies related to ethical behaviour, professionalism, personal development health promotion, disease prevention and management were identified.

To the best of our knowledge, this study is the first that has identified competencies examining knowledge, skills, and attitudes domains and categories, including etiology, assessment and diagnosis, management, and prognosis of COVID-19.

Following studies by George Miller (1990) (29), it is suggested that knowledge, competencies, performances and actions are required for health professionals at the frontline of the COVID-19 pandemic. This study has adopted the hierarchy proposed by Miller whereby three domains of learning competencies – including knowledge (cognitive), skills (psychomotor) and attitude (affective) – have been addressed (29). For example, if the health professionals are in the frontline of the pandemic they should know the etiology of the disease (cognitive domain), should be able to perform physical examination (psychomotor domain), and should have communication

and teamwork skills in a trauma situation (affective domain). Health professionals who have the information 'know what' and expertise 'how to' will master the process. Through the skills 'knowing how' and attitudes 'knowing why', health professionals will be encouraged and remain committed to the patient. It is also clear that the unity of knowledge with attitudes can grant them an over-arching sense of purpose in patient care (25,29,30). Union of purpose, process and commitment provides the health professional with the 'Ability', enabling effective disease control and maintain health and safety of patients and society in general (Figure 1).

The present study is unique in gathering core competencies needed for health-care workers to face COVID-19 patients. In the literature, a previous research article assessing knowledge, skills, and attitudes among 327 health-care workers about COVID-19 at District 2 Hospital in Ho Chi Minh City, Viet Nam (31), found that the majority of health-care workers had good knowledge and positive attitude toward COVID-19. However, researchers also found that the level of learning was lower than expectation. Therefore, they suggested updating knowledge and learning materials about this epidemic and as well as to communicate information to professionals who have a lack of knowledge or were not aware of COVID-19 (31).

Similarly, another study assessed the knowledge, attitude, and practice (KAP) of 1357 health professionals towards COVID-19 across ten hospitals in Henan, China (32). The study addressed the need to understand the KAPs of health workers and possible risk factors in order to deliver the relevant training and policies that can provide protection and decrease occupational exposure during the outbreak (32).

The current study has introduced a novel and practical model for development of training programmes during