Nursing in ICU "Intensive Care and Mechanical Ventilation" Course Mobile Learning Client Development and Application

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Abstract. Intensive care involves a wide range of knowledge, professionalism, and high skills. There is still a certain distance from the modern teaching model to the requirements for cultivating medical teaching and training goals in China. We integrated the curriculum resources for intensive care and mechanical ventilation on the point of accuracy, simplicity, and practicality. We designed and developed a mobile learning client for Intensive Care and Mechanical Ventilation on the major of ICU nursing to break down the limits of classroom time, creating a new mode and improving the quality of teaching and learning.

Critical care medicine is a clinical medical tache with the core of "saving life, stabilizing vital signs and supporting organ function", and plays an important role in modern medicine[1]. The good, steady and rapid development of critical care medicine is inseparable from the development of emergency critical care and the high-quality nursing personnel, which puts higher requirements for nursing colleges and nursing students. There is still a certain distance between the current nursing teaching mode in our country and training objectives of modern intensive care medicine in China[2]. Intensive care involves a wide range of knowledge, professionalism, high skills required, and the corresponding teaching hours are relatively small, making it difficult for students to study intensively in limited classroom hours[3-4]. Although some colleges and universities through the "Intensive Care" quality curriculum resources to achieve the sharing of quality resources courses, to a certain extent, promote the improvement of the quality of education, but these quality resources courses are presented on the computer terminal, to a certain extent limits the learning time and place. Based on this, we integrated the intensive care and mechanical ventilation course resources in nursing of intensive care from an accurate, simple and practical point of view to design and develop a "intensive care and mechanical ventilation" mobile learning client in line, aimed at breaking the limitation of the classroom time, improve the learning efficiency of intensive nursing and mechanical ventilation courses, create a new model of ICU nursing teaching and student learning in the nursing college and improve the quality of education in teaching and learning.

Data and Methods

Curriculum resource setting

According to the clinical needs of the school teaching and modern intensive care, the intensive care curriculum resources are integrated into four modules: circulatory system monitoring, respiratory system monitoring, clinical nutrition monitoring and support for critically ill patients, brain and kidney functions and other organ system functions[5].

Client interface design

Through the development of computer network technology, mobile client and needs of clinical teaching, ICU resources such as intensive care and mechanical ventilation courses, micro classes, exchange and interaction, knowledge assessment and opinion feedback were added to the "intensive care and mechanical ventilation" mobile client.

Mechanical ventilation ventilator teaching training subsystem design

According to the use of critical care of ventilator requirements, add the 3D simulation training module of ventilator, ventilator 3D simulation training software based on the model of Drager-Exita4 ventilator, the entire program using Virtools 4, combined with IOS and Android operating system closely integrated to support database technology; set teaching training, operational training, test evaluation of the three systems.

Results

Mobile Learning Client Course Library Settings

The "Intensive Care and Mechanical Ventilation" course mobile learning client integrates intensive care course resources into four modules: circulatory system monitoring, respiratory system monitoring, clinical nutrition monitoring and support for critically ill patients, and monitoring of other organ system functions such as brain and kidney. In the circulatory system monitoring module, there are hemodynamic principles, commonly used monitoring instruments and learning of monitoring indicators; in respiratory monitoring module, students can learn from clinical symptoms, signs, blood gas analysis, pulmonary function monitoring and imaging, etc; in clinical nutrition monitoring and support module, students can assess nutritional status, nutritional support techniques and learning methods to master the individualized treatment in patients with different nutritional support.
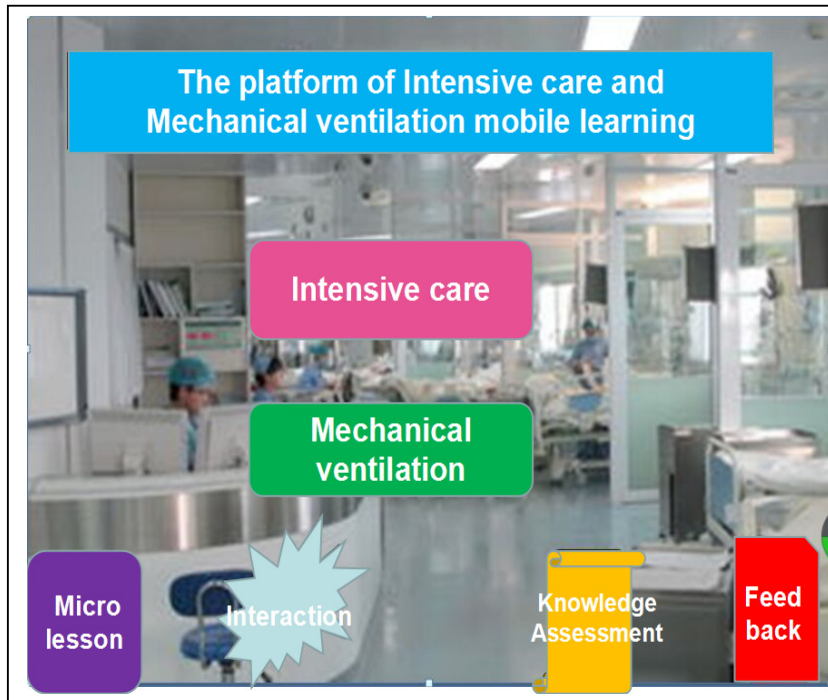

Figure 1. Client Interface Settings.

Mobile Learning Client Interface Settings

Through the development of computer network technology and mobile clients, we have added micro-courses of acute critically ill patients, micro-knowledge and micro-video, exchange and

interaction, knowledge measurement and opinion feedback in the mobile learning client of the intensive care and mechanical ventilation courses figure 1). In the Critical Care Monitoring Section, students can learn the theoretical knowledge of systems functions such as circulatory system monitoring, respiratory system monitoring, clinical nutrition monitoring and support for critically ill patients, also brain and kidney functions. In micro-knowledge and micro-video section, with short forms such as cardiopulmonary resuscitation, endotracheal intubation, mechanical ventilation, hemodynamic monitoring techniques and other important practical knowledge of operation, so that students can learn to use scattered time,   mastering the important skills; in interactive section, you can share the learning experience through communication software, then teachers can provide counseling. Knowledge Assessment section set up exams and assessment records so that students can test themselves at any time. In feedback section, students can ask questions and comments to the mobile client manager in order to improve quality of the mobile client and make it meet the requirements of teaching closer.

Figure 2. Ventilator 3D Simulation Training Subsystem Interface.

Ventilator 3D Simulation Training Subsystem Application

According to the requirement of critically ill intensive care for ventilator, adding the ventilator 3D simulation training module, the teaching training, operation training and examination evaluation system were set up (Figure 2).In teaching and training section, students can understand the history and the development of breathing machine, respiratory physiology, the use of ventilator standards, commonly used ventilator models; in operating training section, students can operate the ventilator 3D model for training, power gas switch and pipeline connection , mode parameter settings, common alarm settings and processing, respiratory waveform recognition and interpretation training; test evaluation section, students can enter the ventilator simulation test database for learning evaluation. Students can learn mechanical ventilation knowledge simply and conveniently, master the skills of breathing machine.

Discussion

Mobile learning is based on digital and wireless communications technology by mobile phones and other mobile terminals as a tool that can span a variety of situations and places of learning. Consistent with the modern way of learning, meeting the needs of lifelong learning, is the future trend of learning [6-7]. "Intensive Care and Mechanical Ventilation" Course Mobile Learning Client apply computer network technology to nursing teaching, developing a mobile client compatible with ios and Android operating system, breaking the time and space   limits, making students learn anytime and anywhere. It also enrich the approaches of education and learning in nursing institutions, meeting the requirements of diversified education and information [8-10].

"The Critical Care and Mechanical Ventilation" courses mobile learning client has established a comprehensive critical care system including circulatory system monitoring, respiratory system

monitoring, clinical nutrition monitoring and support for critically ill patients and other organ system functions such as brain and kidney, which is beneficial to students to take charge of knowledge of intensive care and their profound understanding of disease characteristics comprehensively and systematically. It plays an important role in improving learning efficiency and establishing clinical thinking. Interface of the micro-curriculum, micro-knowledge and micro-video, interaction, knowledge assessment, feedback and other sections are designed reasonably and operated simply. It is a good interaction platform between teachers and students. The 3D ventilator training module set teaching training - operation training -examination at the same time, facilitating the students to conduct a systematic study of ventilator, enhancing effectiveness of mechanical ventilation courses and improve the skills on ventilator using, training high-quality and professional nursing personnel.

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