Review Article

Cancer care improvement through positive patient identification technologies

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ABSTRACT

One of the information technology applications in the cancer care process is positive identification of patients; several studies show that misidentification in cancer care may cause many problems such as lots of medical errors due to wrong person. Improvement in cancer care processes for positive patient identification through information technology is necessary to reduce mortality and morbidity rate; because errors due to misidentification decrease patient safety. For this reason patient identity information should be clear and explicit. Applying new technologies and standardized methods of patient positive identification can prevent these errors; and enhance the quality of cancer care process. In this literature review, search was conducted with keywords including cancer, positive identification, patient misidentification, information technology, Wireless networks, Barcodes, RFID, and Biometric in Science Direct, Google Scholar, and PubMed databases since 1989 until now. This study explains significant technologies such as Wireless networks, Barcodes, RFID (Radio Frequency Identification) and Biometric tools for positive patient identification in cancer care.

Keywords: Cancer, Positive identification, Information technology

INTRODUCTION

Cancer is one of the most mortality causes in the world and Imposes large costs to societies.[1,2] Globocan reports shows, there are 14.1 million new cancer cases, 8.2 million cancer deaths and 32.6 million people who living with cancer in 2012 worldwide.[3] With regard to the expensive treatment process of cancer, it is necessary to introduce ways for improving cancer care.[4,5] One of the significant problems that patients and providers in cancer care process are facing with is misidentification.[6] Patient misidentification leads to many errors in medication, transfusion, testing and wrong person procedures.[7-9]

Positive patient identification plays an important role in the patient safety improvement.[8,10-12] For this reason in United States positive identification is one of the most important criteria of Joint Commissions for health centers accreditation.[13] Because in cancer treatment process positive patient identification prevent errors in the ordering, transcribing, dispensing, and to provide steps of the medication administration process; Some technologies that can help to improve patient identification are described in this paper.[6]

METHODS

The following article investigates existing articles on positive identification technologies influences in cancer care process. In this literature review study, search was conducted with keywords like cancer, identification technology, positive patient identification, information technology, RFID, barcode, wireless networks and biometric devices in Science Direct, Google Scholar and Pub Med databases since 1989 to 2016. Non English, unavailable full texts and abstracts and studies that not defined as a journal article were excluded from this study.

RESULTS

Patient identification technologies in cancer

In recent years information technology has many outstanding progresses in all areas in order to increase competitiveness and cost saving.[14,15] Due to the growth of cancer incidence; applying the modern information technology approaches in chronic diseases care such as cancer is necessary.[16-19] Improvement in medical technologies leads to main changes in all health related fields such as patient identification issues.[20-22] Misidentification of patient is one of the main concerns that health care centers and providers are face to.[23,24] Errors that occur due to patient misidentification are common in cancer care.[25] Schulmeister's study show that 14% of 140 reported chemotherapy errors involved patient identification.[26]

Due to importance of this issue, health policy makers and providers in cancer field must define appropriate policies in correct identification.[27,28] The current identification technologies, cause fast and reliable patient identification and prevent misidentification.[24,29]

Identification technologies use for gather, collect and transfer data to information systems. This section explains most common technologies that applied in positive patient identification; such as wireless networks, barcodes, radio frequency identification tags (RFID) and biometric devices.[24,29,30]

Wireless networks

According to the definition from Webopedia, wireless networking is the term used to describe any computer network where there is no physical wired connection between sender and receiver.[31,32] In hospital, wireless networks apply to share data between devices and users.[33]

Wireless networks provide a suitable platform for using other identification technologies such as RFID, barcodes, biometric devices and smart cards.[24] They can facilitate quick access to health information for health care providers at point of care and in result enhance productivity of care.[34,35] These technologies are using in

cancer care for patient identification like other health care areas.

Barcode

A barcode is a graphic representation of alphabetical characters and numbers that is machine-readable by optical reader or scanner; and provides information about products. Barcodes are highly accurate, convenient, timely feedback, improved efficiency. They save hospital time and resources. Identifying patients with barcode in healthcare organizations leads to right treatment for right Patient and prevents most medication errors.

Barcode can be used in patient wristbands, specimens' samples, drugs, material and equipment to identification and tracking. Barcode can increase patient safety in cancer by help to correct identification of patient and materials.[36,37]

RFID

One of the information technology innovations is RFID that also use in health area. Radio frequency identification or RFID is a wireless tool that enables automated identification of things and people.[38] Tag and reader are two component of RFID. Tags are embedded in things that being tracked and readers also can be handheld or attached to a point of RFID-tagged item entry.[39] RFID has two types, passive and active; it don't need to straight line of sight between tags and reader.[40,41] Active tags have own power source such as battery, Passive tags use reader's power via signals and applied to patient identification, control of medical assets location and drug inventory.[42,29]

According to another classification there are Implantable and non-implantable RFIDs. Implantable RFIDs contain information about person and embedded under the skin.[43]

Like other industries, RFID also has many applications in the healthcare industry especially to enhance patient safety.[44-46] It is suitable tool to gather valid data about all people and processes that involved in the care process.[47] This technology helps reducing assets search time, decreasing medical errors and reducing waste in health care through identifying and tracking of equipment, inventory, personnel, and patients.[48,49] Patient care improvement and decreasing the health care costs are the main benefits of the RFID in health.[47]

In addition of mentioned capabilities, RFID in cancer care improves patient safety, operational efficiencies and total satisfaction via prevention of errors in patient misidentification and mistreatment.[50,51] If some barriers such as prohibitive costs, technological limitations, and privacy concerns can be overcome, RFID can be very useful tool in health.[52] RFID through quick patient information retrieval and correct identification is

considered as an important step towards achieving the health goals of cancer patient's care.

Biometric

One of the most critical concerns of the health process is correctly identifying the patients. Privacy and security of patient identity are main challenges for patients and providers. For this reason in recent years tendency to use biometric devices grows up.

Biometrics is a technique that commonly known as the automatic identification or verification of an individual by his or her anatomical, physiological or behavioral characteristics.[46,53] Some examples of physiological characteristics are heart sounds, DNA, iris, vein, face, retina, odor and voice recognition, touch practices, special clothing with biosensors, fingerprint, hand geometry and palm print. Behavioral characteristics instances are gait, keystroke dynamics, Typing rhythm and signature.[53-59]

Biometrics is universal, distinctive, effective, unique, permanent, invulnerable collectable.[60-62] Biometrics are effective for person identification because they has high security and cannot be lost, stolen or forgotten.[63,64]

In healthcare, biometric technology functions extend well beyond patient identification and used to secure and restrict access to medical facilities, identify patients and healthcare providers, facilitate quick and secure access to healthcare information, protect and manage confidential information and reduce fraud in healthcare programs.[56,65-67]

In cancer care biometric solutions prevent patient misidentification and in result reduce wrong drug prescriptions and helping to ensure safe patient care.[25] Biometric technologies create positive healthcare identification and enhance health information security and privacy. Undoubtedly, in the near future with the progress of information technology we will witness its prosperity.

CONCLUSION

Use of information technology approaches improves cancer care and provider's effectiveness; it also decrease mortality rate. One of the applications of information technology in health care is providing valid information for patients and providers. Accurate and precise information are crucial for cancer treatment. It is obvious that identification information is a main part of patient information. Positive patient identification is a critical issue in health care centers, because patient misidentification can cause many risks for patients. Wireless networks, RFID and biometrics technology can enhance cancer care effectiveness through positive patient identification.

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