Telehealth and Medical Management: Applications, Case Studies, and Intelligence from RFID

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The Health Resources Services Administration defines telehealth as:

- The use of electronic information and telecommunication technologies to support:
  - Long-distance clinical health care
  - Patient and professional health-related education
  - Public health and health administration [1].
 TELEHEALTH

Telehealth technologies include [1]:

- Videoconferencing
- The internet
- Store-and-forward imaging
- Streaming media, and
- Terrestrial and wireless communications
American Telemedicine Association (ATA)

Definition of telemedicine

The use of medical information exchanged from one site to another via electronic communications to improve patients’ health status [2].
Telehealth refers to a broader scope of remote healthcare services than telemedicine.
TELEMEDICINE APPLICATIONS [3]

- Intensive care units (ICUs)
- Caring for children in clinics
- Caring for patients at home
- Rural health care
- Diabetic care
- Cardiovascular care
- Emergency and trauma care
Emergency medical services (EMS) use telemedicine to provide high-quality pre-hospital stroke treatment [4]

An RFID tag is an object that can be attached to or incorporated into a product, animal, or person for the purpose of identification using radio waves.
A basic RFID system [20]
RFID SYSTEM COMPONENTS

**Hardware components:**

- Tag
- Reader
- Antenna
- Host computer
RFID READERS [21]
RFID data transfer occurs with the connection between a tag and a reader

- also known as coupling
- passes through the antennae on either end
OPERATIONAL DESCRIPTION

RFID [5]
SOFTWARE COMPONENTS [5]

- RFID system software
- RFID middleware
- Host application
SOFTWARE COMPONENTS [5]
RFID MIDDLEWARE [6] [7]

- RFID middleware standardizes ways of dealing with the flood of information the tiny tags produce.
- Sort, filter, and process data so that it can be managed in real time.
- Data volume is reduced and data is transmitted selectively.
RFID IN MEDICAL MANAGEMENT [8-14]

- Identifying laboratory specimens
- Tracking personnel and patients
- Monitoring patients
- Tracking medical devices and potentially hazardous materials
- Linking key drugs with patients and personnel
RFID IN MEDICAL MANAGEMENT
[8-14]

- Detecting medically significant events
- RFID integrated with sensors and network can monitor the temperature of blood products
- Continuously monitor the physiological status of a patient
RFID IN MEDICAL MANAGEMENT

RFID tagging hospital patients improves safety [22]
RFID IN THE PHARMACEUTICAL SUPPLY CHAIN

Based on the Electronic Product Code (EPC) and the EPCglobal Network:

- RFID can perform traceability of products and track all transactions from the beginning to the end of the supply chain in the pharmaceutical industry

- Combats counterfeit products and protects product brands [15]
AN RFID SYSTEM IN MEDICAL MANAGEMENT

Applications
1. Patient medication and monitoring
2. Equipment management
3. Drug management
4. Workflow management
5. Emergency handling

Central Information System

Middleware

Readers

tags
Staff & Patients

Middleware

Readers
tags
Equipment

Middleware

Readers
tags
Drugs

RFID tags
RFID-BASED TELEMEDICINE

- RFID has been applied in telemedicine which employs wired or wireless communications to provide medical information and services [8]

- Physicians can remotely assess and diagnose
  - Video and audio communications to assess the patient
  - And the patient’s physiological data [16]
Wireless sensor networks (WSNs) have been used in health status monitoring [17].

The integration of WSNs and RFID systems has also opened up new opportunities in health care systems and wireless telemedicine [17].
RFID-BASED TELEMEDICINE

Health care professions in both hospitals and in the community are using telemedicine and RFID technology as new modes of health care delivery to [8] [18]:

- Meet the demands of an aging population with chronic illnesses.
RFID-BASED TELEMEDICINE

- Decrease the numbers of specialized physicians
- Increase health care access in rural areas
CASE STUDIES

Case 1: RFID Applications in Controlling Epidemics

In 2003 Alexandra Hospital in Singapore used an RFID tracking system during the severe acute respiratory syndrome (SARS) outbreak [8].
All patients, visitors, and staff entered the hospital using RFID ID cards so that if someone was diagnosed with SARS later, all individuals who contacted the person in the hospital could be immediately identified [8]
CASE STUDIES

Case 2: RFID Integration with Mobile Smart Phone, Wireless Sensor Network and Bluetooth [19]

- Continuous monitoring and patient identification during intra-hospital or inter-hospital patient transport.
CASE STUDIES

- The patient’s physiological sensor network comprises several medical sensor nodes and a control node.

- A mobile smart phone can be used as the control node and communicates with medical sensor nodes via Bluetooth.

- Observed data will be forwarded to remote users using wide area networks.
REFERENCES


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Thanks!