<table>
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<th>Date:</th>
<th>June 4 – 5, 2016</th>
</tr>
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<tr>
<td>Place:</td>
<td>Yeungnam University, Daegu, South Korea</td>
</tr>
</tbody>
</table>
| Organizers:| ![Organizers Image](image1) Korea Institute of Digital Convergence (KIDCO)  
              ![Organizers Image](image2) Institute of Social Science, Yeungnam University |
| Co-organizer| ![Co-organizer Image](image3) Korea Academic Society of Digital Business Administration |
| Sponsors:  | ![Sponsors Image](image4) Global Medical R&D Hub (GMRH)  
              ![Sponsors Image](image5) Daegu Gyeongbuk Medical Innovation Foundation (DGMI) |
| Hosts:     | ![Hosts Image](image6) Department of Digital Convergence Business, Yeungnam University  
              ![Hosts Image](image7) ICC-NRNA-SKI  
              ![Hosts Image](image8) SONSIK |
On behalf of the ICTMHC-2016 organizing committee, I am honored and delighted to welcome all the delegates and guests to International Workshop on ICT in Medicine and Health Care (ICTMHC-2016), held at Yeungnam University, Daegu, South Korea. The objective of International Workshop on ICT in Medicine and Health Care (ICTMHC-2016) is to provide a platform to the researchers and practitioners from practitioners, academia as well as industry to meet and share cutting-edge development in ICT in medicine and health care.

The healthcare system of many developing countries is suffering from various issues and challenges. Receiving proper healthcare service, especially for those living in rural and remote areas, is very difficult. Integration of ICT in healthcare (electronic healthcare or eHealth) and implementation of ICT to provide clinical healthcare service at a distance (telemedicine) can serve as a vehicle for the transformation of health conditions in the developing countries. E-health and telemedicine are more useful in developing world because of unmet demand of health services and unprecedented health related challenges.

The main objective of this workshop is to establish an international forum for medical doctors, academicians, engineers, and business professionals to present their excellent ideas, latest innovations and experiences. This workshop provides an opportunity for medical doctors, professionals, academicians, researchers and students to discuss the latest issues and success factors of eHealth and telemedicine in developing countries.

As an organizer, I know that the success of the workshop depends ultimately on the many people who have worked with us, from planning to organizing in all stages of the program and social arrangements. I would like to thank the Workshop organizing chair Dr. Kook Hyun Kim, Division of Gastroenterology, Department of Internal Medicine, Yeungnam University Medical Center, Daegu Metropolitan City and co-chair and workshop initiator Dr. Rajesh Chandra Joshi, Head of the Department of Family Medicine, Gyeongju Municipal Geriatric Hospital, Gyeongju city. I would also like to thank keynote speakers Prof. ByungCheol Min, Department of Computer and Information Technology, Purdue University, USA, Prof. You-Sik Hong, Department of Computer Science Engineering, Sangji University, South Korea, renowned social activist and Ramon Magsaysay Awardee Mr. Mahabir Pun, Mr. Jong-Gyu Chae, Co-Chairman, Korea Small Medium Business Association, and Prof. HG Joshi, Department of Commerce, Manipal University, India.

My special thanks to Gyanendra Prasad Joshi (PhD), Assistant Professor,
Yeungnam University, South Korea, it would not have been possible to organize ICTMHC-2016 without his hard work and support. I would like to take an opportunity to thank publication chair, workshop co-chair and publication co-chair for their brilliant advices and suggestions on organizing the workshop program. I would also like to thank the organizer Society of Nepal Loving Korean Volunteers (HANNAESA), co-organizer Korea Small Medium Business Association (KOSMBA), Korea Institute of Digital Convergence (KIDICO), Daegu Gyeongbuk Medical Innovation Foundation (DGMIF) and Institute of Social Science, Yeungnam University, Non-Resident Nepali Association, International Coordination Council, Skill, Knowledge and Innovation Task Force (NRNA-ICC-SKI) and the Society of Nepalese Students in Korea (SONSIK).

I would like to thank the welcoming speakers, keynote speakers, and authors for their willingness to openly describe their achievements, share experiences, and present their ideas.

Thank you once again and enjoy your stay in Daegu and Gyeongsan, South Korea!

Thank you.

2016-06-04

Changsu Kim (PhD)
Chairman of the Board Directors, Korea Institute of Digital Convergence
President, Korea Academic Society of Digital Business Administration
Welcome Greetings

On behalf of the Society of Nepal loving Korean Association (HANNESA), I am honored and delighted to welcome all the delegates and guests to the International Workshop on ICT in Medicine and Health Care (ICTMHC-2016), held at Yeungnam University, Daegu City, South Korea.

I am so pleased to open the joint International Workshop on ICT in Medicine and Health Care (ICTMHC-2016) by Society of Nepal loving Korean Association (HANNESA). The workshop will be held at Yeungnam University, Daegu City, South Korea on 4th and 5th of June, 2016. In fact, HANNESA was eagerly established last year by some Nepal loving Koreans, however this workshop will be a steppingstone for the great leap of development and growth of HANNESA.

I wish, many Koreans who love Nepal from students to businessmen, researchers, medical doctors and scholars will participate in ICTMHC-2016 and enhance understanding of the culture, history, issues and medical conditions of Nepal.

ICTMHC-2016 will also be the platform to share productive ideas between Nepalese and Koreans. We expect that many Koreans and Nepalese will participate and make the workshop program successful and productive.

Finally, on behalf of HANNESA, I wish all the participants to enjoy the opportunity of exchanging their opinions and knowledge in ICTMHC-2016.

Thank you once again and enjoy your stay here in South Korea.

2016-06-04

Dr. Kook Hyun Kim

Professor of Gastroenterology, Dept. of Internal Medicine, Yeungnam University Medical Center

President of Society of Nepal Loving Korean Volunteers (HANNESA)
ICTMHC-2016 Organizing Committee

Organizing Chair
- Changsu Kim (PhD), Chairman of the Board Directors, Korea Institute of Digital Convergence, South Korea
- Dr. Kook Hyun Kim, Division of Gastroenterology, Department of Internal Medicine, Yeungnam University Medical Center, Daegu Metropolitan City, South Korea

Workshop Co-Chair
- Dr. Rajesh Chandra Joshi, Head of the Department of Family Medicine, Gyeongju Municipal Geriatric Hospital, Gyeongju city, South Korea
- Gyanendra Prasad Joshi (PhD), Yeungnam University, South Korea

Publication Co-Chair
- Bhanu Shrestha (PhD), Kwangwoon University, South Korea
- Roshan Pradhan (PhD), Kolmar Korea Co., Ltd., South Korea

Programme Committee
- Devi Basnet (PhD) Medytox Biopharmaceuticals Co. Ltd.
- Saurabh Mehta (PhD), Vidyalankar Institute of Technology, Mumbai, India
- Hak J. Kim (PhD), Hofstra University, USA
- Tao Wang (PhD), Southwestern University, China
- Robin Shrestha (PhD), Yonsei University, South Korea
- Chang Soo Kim (PhD), Pukyong national University, South Korea
- Young Gon Kim (PhD), Korea Polytechnic University, South Korea
- Woong Cho (PhD), Jungwon University, South Korea
- Jang Young Kim (PhD), University of Sumon, South Korea
- Young Sang Kim (PhD), Cheju Halla University, South Korea
- Kwang Chul Son (PhD), Kwangwoon University, South Korea
- Jin Kim (PhD), Jungwon University, South Korea
- Chae Bong Sohn (PhD), Kwangwoon University, South Korea
Inauguration

10:00-12:00, Saturday June 04, 2016 (Yeungnam University, Sang-Gyeong Hall, Room #255)

- Registration (10:00-10:30)
- Inaugurations (Host: SONSIK)
  - Speech by President, Yeungnam University (Noh-SeokKyun, PhD)
  - Welcome speech by Chairman KIDICO (Changsu Kim, PhD)
  - Welcome speech by Vice President HANNESA (Dr. Rajesh C. Joshi)
  - Speech by Honorary consul for Nepal (Seong-Do Yoon, PhD)
- Guest speech
  - Prof. HG Joshi, PhD, Manipal University, India (Title: Rural Healthcare Model using ICT)
- Keynote speech
  - Prof. You-Sik Hong, PhD, Department of Computer Science Engineering, Sangji University, South Korea
  - Co-Chairman, Jong-GyuChae, Korea Small Medium Business Association, South Korea
  - Prof. Byung-Cheol Min, PhD, Department of Computer and Information Technology, Purdue University, USA

Lunch

Time: 12:00am~1:30pm

Place:

Session-1

1:30pm-5:00pm, Saturday June 04, 2016

Session -1 Technology in Medicine and Healthcare (Yeungnam University, Sang-Gyeong Hall, Room #255)
1:30pm-4:00pm, Saturday June 04, 2016

Chair (Roshan Pradhan, PhD, Kolmar Korea Co., Ltd.)
Moderator (Suhrid Banskota, PhD, Yeungnam University)
Session-2

1:30pm-5:00pm, Saturday June 04, 2016

Session -2Scope and Challenges of Telemedicine in Developing Countries (Yeungnam University, Sang-Gyeong Hall, Room #251)

Chair (Devi B. Basnet, PhD, Medytox, Inc., Member, NRNA-ICC-SKI)

- **Keynote Speech** (Mr. Mahabir Pun, Title: Current state of IT infrastructure in Nepal for ICT in Medicine and Healthcare)
  - "E-health: Opportunities and Challenges in the Context of Nepal," Pratibha Bhandari, Assistant Prof. Department of Nursing, College of Health and Welfare, Wooson University
  - "Environmental Health Issues in Nepal," Dirga Kumar Lamichhane, Dept. of Social and Preventive Medicine, School of Medicine, Inha University.
  - "Introduction of Telemedicine and E-health in Nepal," Prof. Yoon-Nyun Kim, Division of Cardiology, Department of Internal Medicine, Keimyung University Dongsan Medical Center
  - "Health & Social Services in Rural Areas of Nepal," President Tae-Heung Jun, Future TNC (Technology And Counseling), Leader of Namaste Group.
  - Current State of IT Infrastructure in for ICT in Medicine and Healthcare, Mahabir Pun, National Innovation Center.
10:00am-1:00pm, Sunday June 05, 2016

- **Session-1** (Yeungnam University, College of Pharmacy, Seminar Room # 205)
- **Chair** (Taraman Kadayat, PhD, Daegu Kyeongbuk Medical Innovation Foundation)
  - SONSIK Gyeongsan-buk do’s program (Poster Presentation)

1:30pm-4:00pm, Sunday June 05, 2016

- **Session-2** (Yeungnam University, Sang-Gyeong Hall, Room #251)
- **Session Chair** (Dr. Rajesh Chandra Joshi, Head of the Department of Family Medicine, Gyeongju Municipal Geriatric Hospital, Gyeongju city)
  - Discussion about ‘How to start and when to start eHealthcare service’?
  - Issues and challenges
  - Software and hardware requirements
  - Discussion and minute
Conference Venue

SanggyeongGwan

Yeungnam University
280 Daehak-Ro, Gyeongsan, Geongbuk 38541 KOREA

ICTMHC–2016 Secretariat
www.kasdba.org/ictmhc2016
info@kasdba.org

Korea Academic Society of Digital Business Administration

Global Medical R&D Hub
Daegu-Gyeongbuk Medical Innovation Foundation

ICTMHC-2016
June 4 – 5, 2016
Yeungnam University, Daegu, South Korea
IoT-based healthcare trends & Introduction of IM Healthcare

- Smart Healthcare Outlook -

2016.04.28

IM Healthcare Co., Ltd.
Bruce Lee / General Manager

Email: bruce_lee@im2006.com

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Chapter 1  IoT Smart Healthcare Trend

Chapter 2  Introduction of IM Healthcare
Healthcare Mega Trend

- Aging spread of developed countries
  - The reorganization of the global division of labor
  - Overweight older workers and women

- Convergence in all industrial areas
  - IT + NT + BT Convergence, Industry Megatrend
  - Breakthrough expected convergence of applications and technologies
  - First of convergence technology products is health care products

1. The survey of new growth power through aging, the central axis of innovation
2. The possibility of market penetration in biotechnology
   - Exploration of accessible business Model
   - Application for a index of future Business
   - New Business Domain Survey

Healthcare Market Status (Megatrend)


- Development of personalized medicine
- Bio-leading medical industry
- Generalization of u-Health
- Globalizations of Health and medical care
- Spread of consumerism

Future strategies of global leading companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Main contents</th>
</tr>
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<tbody>
<tr>
<td>P&amp;G</td>
<td>Introduction of biotechnologies in necessary industry → Established a Healthcare Institute</td>
</tr>
<tr>
<td>Toyota</td>
<td>Pioneer of new business: agriculture, health, chemistry, focused on marine and healthcare unit</td>
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<tr>
<td>Nike</td>
<td>Re-positioning the high tech firm seek: the wellness lifestyle using a high social interest in health</td>
</tr>
<tr>
<td>Four season</td>
<td>Business development focused on SPA and fitness by ‘wellbeing fever’</td>
</tr>
<tr>
<td>Nestle</td>
<td>Strategic direction for promoting direction: Health, wellbeing and food.</td>
</tr>
</tbody>
</table>

Implication

- Attention to Health Economy
- As the health is emerging as the main criteria for consumers, global companies are exploring the next generation of strategic projects in the health and bio sector.
  - Attention to the needs of the consumer
    - Redesign of all services and products to health and wellness
    - Personalized service necessary for the various needs of healthcare consumers

Source: Sori Economic focus, 5 mega trends and implications for the health care industry.
10 trends to shape mHealth market through 2017

1. Smartphone user penetration will be the main driver for the mHealth uptake.
2. mHealth applications will be tailored specifically for smartphones or tablets
3. Health applications will be native rather than web-based applications
4. mHealth niche stores will become the home of the 2nd generation of mHealth apps
5. Missing regulations are the main market barrier during the commercialization phase
6. Buyers will continue to drive the market
7. Applications will enter traditional health distribution channels
8. mHealth market will grow mainly in countries with high Smartphone penetration and health expenditure
9. 2nd generation mHealth applications will focus on chronic diseases
10. mHealth business models will broaden

"By that time, 50 percent of these users will have downloaded mHealth applications"

July 24, 2013 | By Greg Slabodkin
Smart Healthcare Market Status

- Healthcare market is in the process of development through a smartphone, application, and dedicated terminal.
- Led by Fitbit, Jawbone, Misfit etc. Major companies such as Nike, Adidas, Samsung, LG, Fujitsu enter the wearable computing market. 
  → Provides smartphone linked physical condition and health monitoring
- Computerized medical - Medical information transmitted via wired high-speed internet access
  - HIS (Hospital Information System)
  - OCS (order communication system)
  - LIS (Laboratory Information System)
  - PACS (Picture Archiving Comm. System)
- BMI (Body Mass Index) - Ubiquitous healthcare

Homecare Technologies & Group

<table>
<thead>
<tr>
<th>Patient Comfort</th>
<th>Patient Safety</th>
<th>Patient Monitoring</th>
<th>Mobility Monitoring</th>
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<tbody>
<tr>
<td>Noise meter</td>
<td>Smoke sensors</td>
<td>Temperature</td>
<td>Pressure</td>
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<tr>
<td>Blood pressure</td>
<td>Blood pressure</td>
<td>- IR Thermometers</td>
<td>- RFID</td>
</tr>
<tr>
<td>Temperature</td>
<td>Blood pressure</td>
<td>- Oxyimeters</td>
<td>- Accelerometers</td>
</tr>
<tr>
<td>Pressure</td>
<td>Blood pressure</td>
<td>- Blood pressure</td>
<td>- Magnetometers</td>
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<tr>
<td>Humidity</td>
<td>Blood pressure</td>
<td>- ECG</td>
<td>- Gyroscopes</td>
</tr>
<tr>
<td>Width</td>
<td>Blood pressure</td>
<td>- Glucose</td>
<td>- Sleep Sensors</td>
</tr>
<tr>
<td>Height</td>
<td>Blood pressure</td>
<td>- Glucose</td>
<td>- Fall detection</td>
</tr>
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IoT Healthcare Sector Status

<table>
<thead>
<tr>
<th>Sector</th>
<th>Consumer Application</th>
<th>Non-Consumer Application</th>
</tr>
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<tbody>
<tr>
<td>Drivers</td>
<td>Consumer needs for health</td>
<td>Cost reduction, operating efficiency, improved functionality and service levels</td>
</tr>
<tr>
<td>Function</td>
<td>Rapid development of aging society</td>
<td>The importance of interfacing with existing systems</td>
</tr>
<tr>
<td>Margin</td>
<td>Markets generated from the HRI sales</td>
<td>Additional revenue from M2M is not large</td>
</tr>
<tr>
<td>Ex.</td>
<td>Home / personal health monitoring</td>
<td>Medical equipment for treatment and research</td>
</tr>
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<table>
<thead>
<tr>
<th>Sector</th>
<th>Applications</th>
<th>Sensors</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Healthcare</td>
<td>ECG, Pulm, HRV, GPS</td>
<td>1. Measures the biological information from a measuring device 2. Personal health index analysis and storage and health data services through a web server</td>
<td></td>
</tr>
<tr>
<td>Health &amp; Fitness</td>
<td>Camera</td>
<td>Heart rate measurement by acquiring the camera’s image information</td>
<td></td>
</tr>
<tr>
<td>Nike+GPS</td>
<td>GPS, Acc.</td>
<td>Service Running distance, speed, time etc.</td>
<td></td>
</tr>
<tr>
<td>CardiacFit</td>
<td>GPS, Acc.</td>
<td>Check heart momentum, record heart rate</td>
<td></td>
</tr>
<tr>
<td>Walk</td>
<td>GPS, Acc.</td>
<td>Tracking athletic performance, motion path</td>
<td></td>
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Time
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Chapter 1  IoT Smart Healthcare Trend

Chapter 2  Introduction of IM Healthcare

Wellet – Smart Balance

- Smart app and web viewer
- Intuitive long-term accumulation management for body weight/composition
- Provide personalized health care information
- Provide self papeweight services (stress / skin condition)
- Provide individual movement guide in accordance with the measurement result

Smart BALANCE

- ITO transparent electrode applied
- Biological parameter measurements (Weight / BMI / body fat / lean mass)
- User automatic recognition algorithm (Up to 8 people)
- Measurement results : with communication

- Accumulated management of measurement data
- Personalized health management information / Self papeweight / Exercise Guide / DB management
Device

- Interlocking management (Wi-Fi) with smartphone app (Android & iOS)
- Power: 4 standard 1.5V size AA batteries
- 4 feet covers for use on carpets
- Dimension: 330 x 330 x 33 mm

Applications

- Color: White, Black, Red, Pink, Sky Blue, Gold

App viewer & web-site

- Android, iOS, WWW

Features

- Provides basic information trend: Weight, body fat, muscle mass, BMI
- BMR service-based on the actual measurement
- Provide body fitness age- Cumulative (hospital-supplied software)
- Provide indoor temperature and humidity (the elderly solution)
- Automatic update of device firmware
- Intuitive consists of graphs and tables
- Simple Goal Setting: slim / standard / muscle / Plum
- Propose ongoing level to achieve the goal
- Provide customized health information (1 times / day)
- Skin condition, postpartum hair loss, self-paperweight for stress
- Provide optimal exercise guide for individual users
**Biz Model**

- **Fitness**
  - Exercise
    - Smart TV Game
    - Watch TV
    - Burn up 440 kcal per hour (75kg standard)
  - Cumulative confirmation of exercise time / momentum
  - Cumulative confirmation of Weight / body composition / muscle mass
  - Provide user management services
  - **Smart Personal Trainer**

- **Smart TV**

- **Smart Balance**
  - Bio-signal measurement device
  - Comparison before with after of exercise
    (Ex. After exercise: 0.3kg decrease)
    (Ex. Fat Burn: 0.2% decrease)
  - Targeting goal weight / body fat
  - Propose goal & effect of diet

**Company Profile**

- **Company** IM Healthcare Co., Ltd.
- **Office**
  - HQ: #9608 Medical Device Complex Center, 207 Geopdosiro, Jijeongmyeon, Wongsu, Gangvondo, Korea
  - Branch: #1907, A Bldg., 13 Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea
- **Product**
  - Bio-FET, QCD, Wellfit Smart Balance, Ionizer, IoT Smart Healthcare
- **Established** 2011.01.03
- **Homepage** [www.im-healthcare.com](http://www.im-healthcare.com)

**Global Healthcare Solution Provider**

- **Biosensor Module**
  - Stable market entry
  - Stable revenue-base expansion
  - HFET
  - LFA

- **Disease Diagnostic Market expansion**
  - New revenue-base diversification
  - QCD (Cancer Diag.)
  - Infectious Disease

- **IoT Healthcare**
  - Portfolio diversification
  - SmartHealth Application

**Biosensor (Nano-wire & Nano-Particle) Original technology secure**
Thank you!!
Infusion Monitoring System with Reflective Optical Sensor

Hyun-woo Lee1, Sanghyun Joung1, Jinhan Lee1, Hyun Hee Bang1, Ilhyung Park1
Medical Device and Robot Institute of Park, Kyungpook National University, Daegu, S.KOREA.
ihparkmdrip@google.com

Chul-woo Park2
TTM(Techology To Market Inc), Daegu, S.KOREA.
pcw.ttm@gmail.com

Abstract

Intravenous injection is frequently used in hospitals. However, it causes inconvenience such as by modulating the injection speed of the intravenous by medical staff or replacing it in a new solution bag. As such, a new system that automatically detects the infusion quantity and reports the injection speed or abnormal injection status of infusions is required to prevent such inconveniences.

We suggest a method of detecting the infusion quantity using a reflective optical sensor. On the process of designing the sensors, a core part of the infusion monitoring, it was found that the reflective optical sensor was more reliable than the conventional transmissive optical sensor when the detection of the infusion drips was tested with different positions of the drip chamber. We compare the reliability of the conventional transmissive optical sensor with that of the reflective optical sensor that was optimally designed for a clinical environment.

Keywords- Medical device, Sensor, IV monitoring.

I. INTRODUCTION

Intravenous Injection (IV) is a method of injecting infusions or blood by inserting a needle into the patient’s vein. It is the most frequent form of treatment in hospitals. At the early stage of preparation for IV, the injection speed of the infusion should be adjusted based on the prescription for individual patients. Medical staff usually adjust the speed of the infusion using a regulator by observing the number of drips in the drip chamber, which requires many years of practical experience. Regular monitoring during the intravenous injection is also required. An empty solution bag should immediately be replaced to prevent the blood of the patient from flowing back to the IV tube. Therefore, medical staff need to stay during the night to check the infusion quantity for the patient while he or she is sleeping.

Many researches, combined with IT, have been conducted on systems that automatically monitor the intravenous injection status to reduce repetitive and tiring tasks such as checking the residual infusion quantity and to prevent related medical accidents. The role of the sensor in infusion monitoring is important. Most systems use methods such as weight measurement, capacitance, or optical methods.

The weight measurement method is highly reliable because the weight of the infusion is directly measured to calculate the residual. However, zero calibration is required, and there is a high possibility of error due to the weight and vibration of the IV tube apparatus. Moreover, no other abnormal status associated with the intravenous injection can be detected using this system [1].

The capacitive method attaches sensor electrodes to the solution bag to measure the residual infusion directly. However, the sensor is difficult to attach and is incompatible with various types of solution bags [2].

The optical method includes many different methods. In the most common type of optical method, a sensor is attached to the drip chamber of the IV tube to detect infusion drips and calculate the injection speed [3]. This method, apart from residual infusion quantity monitoring, can detect any other abnormal
injection status such as blockage due to the coagulation of blood in the needle or an abnormal change in the injection speed.

In most optical devices, IR LEDs and receivers face each other. An infrared ray beam is emitted from the IR LED to the receiver, and infusion drips pass the middle of the light path to detect the shadow of the infusion drips. We define this methods as “transmissive” method.

The transmissive method is the most common method in many fields that use optical sensors such as a limit switch, which detects an object in a particular and narrow section. When this method is used for infusion drip detection, the detection range varies depending on the angle of the drip chamber, and the deviation of the output sensitivity is marked.

Therefore, a stable drip detection system is required against a change in the drip chamber position or shaking. We suggests a reflective method as an improved optical sensor to overcome the problems with conventional transmissive optical sensors. In the reflective method, a receiver detects the reflected infrared ray against the infusion drips. It has a wider sensing range than that of the transmissive method. In clinical practice, there are many motions due to the patient’s movement or travel. As such, the authors believed this reflective method would yield more reliable results. We designed the reflective optical sensor and compares its performance with that of the optimized conventional transmissive sensors.

II. METHODS

The sensor of the infusion residual detector is fit into the drip chamber of the IV tube. It was designed to be fixed and stationed using the elasticity of the apparatus. The fixation apparatus was designed based on the optical sensor design and produced using a 3D printer.

a. Structure of the Transmissive Optical Sensor

The basic structure of the transmissive optical sensor is presented in Fig 1. The IR LED of the infrared ray and that of the receiver are placed facing each other, and the drip chamber is situated in the middle of them. Considering the difference in the detection range based on the size of the drip chamber, this study used the basic type, which utilizes an IR LED and receiver pair, as shown in Fig. 2 (a), and the advanced type (with an improved detection range), which uses two IR LED and receiver pairs, as shown in Fig. 2 (b).

![Figure 1. Basic structure of the transmissive sensor](image)

(b) Two-pairs type of the transmissive optical sensor

Figure 2. Structure of the transmissive optical sensor

b. Structure of the Reflective Optical Sensor

The suggested reflective sensor structure is shown in Fig 3. The IR LED and receiver were located at the back of the drip chamber, and the fixation apparatus was designed as shown in Fig 4. Two IR LEDs were used to expand the detection range.

c. Design of the Amplifier Circuit

The amplifier circuit of the sensor was designed as shown in Fig 5. The functions of the parts are as follows.

- Pre-amplifier: Amplifies signals in the receiver
- Differentiator: Detects displacement of signals
Mid-amplifier: Amplifies the output of the differentiator
Comparator: Converts analogue signals into pulse signals

The pre-amplifier particularly uses an AC couple to block the DC signal component and minimize the effect of a continuous light source such as sunlight. The differentiator is designed to be sensitive to the displacement (shift) of the infusion drip, to selectively detect the signals. Hysteresis was added to the comparator, which enables one output pulse per infusion drip.

In the amplifier circuits of the sensor, many stages of analogue amplifiers with high amplifying gain were applied. To minimize the power ripple or noise due to the several amplifiers, a low-noise power regulator was applied. Also, a single power source was used in the circuit for convenient use of the battery.

III. EXPERIMENT

Two experiments were performed using the infusion drip devices, as shown in Fig 6, to compare the performance of the transmissive optical sensor with that of the reflective optical sensor.

First, the drip detection rates were compared depending on the position angles of the drip chamber using both methods. For the front/back, left/right, and diagonal angles of the drip chamber, 0°, ±15°, and ±30° were used. The position angle of the drip chamber was limited to ±30° because that is the angle at which infusions run down the inner wall of the drip chamber. One hundred infusion drips were used, and the injection speed was set at 50 drips/minute using an infusion pump (BT100-1L; Boading Longer Precision Pump Co., Ltd, Hebei, China).

The drip detection rate was calculated using the following formula.

\[
\text{Detecting rate} (%) = \frac{\text{drip detecting count}}{\text{Total drip count}} \times 100 \quad (1)
\]

As seen in Equation (1), the drip detection count, an output of the sensor amplifier, was divided by the total drip count, which is the number of drips injected at constant speed using the infusion pump BT100-1L and obtained as a percentage after multiplying the result by 100.

Second, the error drip detection rates of the two methods were compared under the condition in which the patient’s movement was simulated by hanging the solution bag from the portable hanger. The walking speed was supposedly less than 1 km/h, similar to the normal indoor walking speed, and the experiment was repeated 10 times for each method. The number of infusion drips and the injection speed were the same as those in the first experiment.

The error rate was calculated using the following equation.

\[
\text{Error rate} (%) = 100 - \text{Detecting rate} \quad (2)
\]
The experiment devices used in this experiment are described in the table 1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>IR LED</td>
<td>950nm Infrared LED (SI5312-H; KODENSHI AUK Co.,Ltd Semiconductor, Japan)</td>
</tr>
<tr>
<td></td>
<td>· 10mA Constant current drive</td>
</tr>
<tr>
<td></td>
<td>· Package: Clear plastic mold Φ 5 round type</td>
</tr>
<tr>
<td>Receiver</td>
<td>Photo transistor (ST5811; KODENSHI AUK Co.,Ltd semiconductor, Japan)</td>
</tr>
<tr>
<td></td>
<td>· Peak sensitive wave: 700 ~ 1000nm</td>
</tr>
<tr>
<td></td>
<td>· Package: IR filter plastic mold Φ 5 round type</td>
</tr>
<tr>
<td>Infusion set</td>
<td>Infusion set (500-0150003073; KOREA MEDICAL SUPPLY Co.,Ltd, Seoul, South Korea )</td>
</tr>
</tbody>
</table>

IV. RESULTS

The drip detection rate depending on the position angle of the drip chamber in the first experiment is shown in Fig 7. The one-pair transmissive optical sensor showed a high detection rate in the left/right area. However, large non-detection areas were observed in the front/back and diagonal areas. The two-pair transmissive optical sensor had a larger detection area than the one-pair sensor, but its general detection rate was lower than that of the one-pair sensor. The reflective optical sensor showed a non-detection area at more than 30° of the left/right angles, but the detection area and rate were greater than those of the conventional sensor in the other areas. The drip detection rate of all the sensors was 100% at 0°, which is not included in the figures.

The results of the second experiment are presented in Fig 8. The reflective sensor showed a low error rate of less than 11%, and the transmissive sensor showed an up to 65% error rate.

![Figure 7. Sensor drip detection range depending on the position angle of the drip chamber](image1)

![Figure 8. Error rate of the drip detection during the movement](image2)
V. DISCUSSION

The important functions that an infusion monitoring device must have are as follows.

- Residual infusion measurement.
- Intravenous injection rate measurement.
- Detection and reporting of the abnormal intravenous injection status [4].
  - Abnormal supply discontinuation of infusions.
  - Acute change in the intravenous injection speed.
  - Detection of infusion free-flow [5].

The aforementioned important functions can be produced based on the medical staff’s needs. Therefore, the accuracy of the drip detection sensor in the infusion monitoring device is crucial. The transmissive sensor was considered insufficient for use with the infusion monitoring device, based on the results of this study. The problems observed can be improved with the use of the reflective sensor suggested by us.

There are several points to note when using the infusion drip detection sensor. First, the drips at a more than ±30° position angle of the drip chamber are undetectable, because the infusion runs through the inner wall of the chamber. This does not happen frequently, but the notification function for this occurrence is considered to be required for the infusion monitoring system.

Second, the drip detection sensor should be set up where the falling drips are surely caught by the sensor. If the sensor is fixed at the bottom, where the infusions gather, or at the top, where the infusions start to drip, the drips cannot be detected properly. This problem can be overcome with a proper apparatus design, considering the drip chamber device.

VI. CONCLUSION

We suggested the use of a reflective optical sensor to detect infusion drips. The conventional transmissive optical sensors were also optimized for detection, considering their characteristics, and designed in two different types. The results of the experiment showed that the reflective optical sensor had a larger detection area depending with inspect to the angle of the drip chamber than the conventional method. The experiment results also showed high reliability in detecting drips when there were vibrations and motions in the simulated condition of the patient’s movements. As such, the residual infusion detection system that uses the suggested reflective optical sensor is considered to more significantly reduce the error rate than the conventional method.

VII. REFERENCES

Abstract

The health status in Sri Lanka is well above the regional health indicators which can be partly attributed to the free health care system. However, lack of pharmacy supplies in government health institutions, especially in divisional and rural hospitals is a major complaint from the general public. Health care institutions under the Provincial Director of Health Services (PDHS) receive pharmacy items from the Regional Medical Supplies Division (RMSD). Some of the reasons for shortage of pharmacy items are poor communication between RMSD & health institutions, maldistribution of items at RMSD & actual drug shortage.

Currently there is no manual or electronic mechanism to monitor an institution’s essential drugs status at any level, resulting in difficulty to replenish stocks in a timely manner.

Objective:

The objective of this system is to alert the health care institutional heads and regional/provincial administrators about essential drug status and to effectively mobilize available drugs.

Method:

A Web based system is designed with a simple data entry format and color code system. A dashboard visualizes the available stock with green (satisfactory), yellow (reorder), red (zero stock). User levels in the system include institution, RMSD, Regional and Provincial levels. Currently 26 essential drug items are monitored by the system.

Results: At the start of the system (August 2015) 11.73% (n=38) of items were at zero stock and 20.37% (n=66) were at low stock in all district and rural hospitals in the Colombo region. This has improved to 1.54% and 8.02% respectively as at April 2016.

Keywords- Drug information System.
Big data analytics for healthcare in Singapore

Sang Soo Seo, M.D. Department of Child and Adolescent Psychiatry, Bugok National Hospital
sss2913@korea.com

Abstract

Singapore has a world-class healthcare system that is ranked by the World Health Organization (WHO) as the best in Asia. Currently, the use of big data analytics is increasingly being adopted by healthcare groups in Singapore reform decision-making, from managing department and clinic workloads, to identifying target groups for intervention programs and treatment. Singapore has an electronic database to keep track of all hospital records as big data. Revealing the value in data and to translating numbers to meaningful information is expected to improve healthcare. There are some healthcare groups that are using big data to manage disease in Singapore. TeleMetrix+ is the first commercial cloud based telehealth service that enables patient vital signs, such as blood pressure, blood sugar, weight and temperature to be remotely monitored and tracked. Healint has proposed a unique way of tracking data from patients that platform allows various healthcare stakeholders to take advantage of mobile devices, sensors, machine learning and big data for the optimal management of chronic diseases. Singapore has a pervasive telecommunication infrastructure, Smart Health-Assist, and is expected to implement IoT (internet of things) infrastructure nationwide. In the near future, it will be interesting for clinician and the general public in Singapore as more big data platforms are expected to be used in the healthcare market, and better apps will be available for disease management, and also enable governments to gain insights to best develop and deliver healthcare policies.

Keywords- Healthcare, Big data, Analytics, Singapore
BTE System
Biofeedback Therapeutic Exercise

EMG, Motion, Pressure, Tension
Multiple movement analysis
Corrective exercise guide
분석 및 평가를 위한 전문가용 프로그램

근전도 (EMG) / 동작 (Motion) / 압력 (Pressure) / 장력 (Tension)을 동시에 분석
목적에 따라 원하는 센서를 사용하여 다양한 분석 및 훈련이 가능합니다.

측정 및 훈련을 위한 개별 모드 프로그램
독자개발한 스마트폰 어플리케이션을 통해 편리한 측정 및 훈련을 제공합니다.
직관적인 인터페이스로 사용자가 쉽게 맞춤형 훈련 프로그램을 설계할 수 있습니다.

데이터 저장 및 E-mail 전송
PC, Notebook, Tablet PC, Smart phone 등의 장비와 호환성이 뛰어납니다.
Excel 호환성을 통해 데이터 저장 및 분석이 용이합니다.

사용자 목적에 따른 다양한 바이오 피드백 활용
근활성도(EMG) 조절을 위한 강화모드 및 이완 모드 / 역치 및 유지간격 조절
특정 동작의 유도 또는 제한을 위한 3차원 벡터 설정 및 움직임 범위 제시
압력 센서를 통한 움직임 훈련
장력 센서를 통한 근력 측정

목적에 맞는 조합식 채널 구축가능
지속적인 훈련 프로그램 업데이트

근전도 전용 모드 가능
▼ 근전도 전용 모드

충전 기능이 탑재된 거치대
BTE System의 강력한 기능
초소형 센서 탑재 / 스마트폰 연동
순수 국내 기술로 개발된 종합 운동 분석・훈련 시스템
바이오피드백 기능을 활용한 재미있고 과학적인 근거기준 운동 중재 제공

과학적 근거 기반의 바이오피드백 훈련 제공
실시간 근전도 피드백을 통한 올바른 움직임 훈련
신체 분절 움직임의 즉각적 피드백을 통한 불필요한 움직임 조절
치료적 바이오 피드백 훈련 연구를 통한 기기개발
임상에서 다루는 각 질환에 대하여 근전도, 동작, 압력, 장력 센서 등을 이용하여 과학적인 바이오피드백 치료를 적용한 운동 및 치료 중재 방법을 연구

주소: 경상남도 김해시 주촌면 소망길 88 김해의생명센터 109호
Tel: 055-337-0701
Fax: 055-337-0702

담당자: 강민혁 / 연락처: 010-4125-4113 / e-mail: kmhyuk01@gmail.com
01 Explanation of Product

<table>
<thead>
<tr>
<th>Title</th>
<th>Multi-Purpose Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>EYE-CARE</td>
</tr>
<tr>
<td>Volume</td>
<td>355ml</td>
</tr>
</tbody>
</table>

**Function**
- Equal to Remu Fresh in its Function
- Disinfecting, Cleansing, Moisturizing, Deproteinizing
- Completing Product Safety Test
- Completing Equivalence Test
- Completing Biological Test

**Certificates**
- 2014.09 : Obtaining a Production License from MFDS
- 2014.10 : Obtaining a Certificate of Free Sales from MFDS
- Obtaining a Pharmaceutical Manufacturing License from MFDS
- Obtaining ISO 9001 Certification
- 2015.09 : Obtaining ISO13485 and CE Certification
02 Layout of Production

Reporting Quasi-drugs Manufacturing Business
(Approved by MFDS)

- Passion & Air cleaner
  - Placing the bottle automatically
  - Air cleaning

- Filling machine
  - Feeding the bottle
  - Filling the liquid

- Capping machine
  - Placing the cap
  - Feeding parts
  - Crimping the cap
  - Capping

- Loudengue machine
  - Cutting the roll film
  - Covering the cap with film

- Sticker rabelra
  - Feeding the label
  - Printing the manufacturing date with an inkjet printer
  - Attaching a sticker

- Systolic
  - Generating the hot wind
  - Pressing the film

Automatic packing machine toner car
Feeding the bottle – Molding the case – Putting the product into casing – Flat folding – Hot melting – Printing with the inkjet Printer

03 Production Facilities


Systolic → Compressive film → Stickers rabelra → Capping → Filling

Out box packing → Inspection[4] → 24ea box packing → Pallet load → Shipping

1) : Raw Material Quality Control : Checking each of the all raw material in accordance with quasi-drugs quality control standards (Sterile Distilled Water, Appearance, pH, purity test (Ca, Sr, Pb, Zn, Cu, Al), vitamin content, turbidity, residue solubility, impurity contents, heavy metals, potassium permanganate-reducing substance, residue solubility, sterility test, detection of microorganisms)

2) : Sufficiently stirring for homogenization of raw materials (sterilized by heating during the mixing process moments)

3) : Solution Test : Appearance, pH, confirmation & analysis, heavy metal, detection of microorganisms

4) : Final Product Test : Appearance, pH, confirmation & analysis, heavy metal, detection of microorganisms

* : Testing and inspection in accordance with the MFDS & KPI (KOREA PHARMACOPOEIA) regulations

Production Standard 70ea/minute :: 1,000,000ea/month
### 04 Production Facilities

<table>
<thead>
<tr>
<th>Production of sterile distilled water</th>
<th>Air quality</th>
<th>Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image of production of sterile distilled water]</td>
<td>[Image of air quality]</td>
<td>[Image of manufacturing]</td>
</tr>
<tr>
<td>A strict quality control in the production of sterile distilled water</td>
<td>Air quality over 10,000 class hygienic environment</td>
<td>A strict quality control in manufacturing [ISO 13485, MFDS Quasi DRUG quality control standards]</td>
</tr>
</tbody>
</table>

### Production of sterile distilled water

1. Use: Production of sterile distilled water
2. Water Quality:
   - Resistivity: over 16 MΩ
   - Particles: 0.2 um
3. Capacity:
   - Flow Rate: 3 m³/hr
   - 0.25 m³/30°/hr

### Air quality

1. Use: Clean room
2. Control Class: 100000 Zone
3. Control environment:
   - Temperature: (20±0.5)°C
   - Humidity: (50±5)% RH
04 Production Facilities

Manufacturing
[ISO 13485, MFDS Quasi DRUG quality control standards]

<table>
<thead>
<tr>
<th>Agitator</th>
<th>Filling Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use : Multi Purpose Solution Agitator</td>
<td></td>
</tr>
<tr>
<td>2. Electricity : 380V(AC), 60Hz, 30A</td>
<td></td>
</tr>
<tr>
<td>3. Capacity : 3,000ℓ x 2 Sets</td>
<td></td>
</tr>
<tr>
<td>4. System configuration :</td>
<td></td>
</tr>
<tr>
<td>1) Mixing tank</td>
<td></td>
</tr>
<tr>
<td>2) Heating stock</td>
<td></td>
</tr>
<tr>
<td>3) Pump&amp; Piping</td>
<td></td>
</tr>
<tr>
<td>4) Control Panel</td>
<td></td>
</tr>
<tr>
<td>1. Use : Multi Purpose Solution Filling Machine</td>
<td></td>
</tr>
<tr>
<td>2. Using Material : Bottle(PE), Cap(PE), Sticker, Ink, Rudeng,</td>
<td></td>
</tr>
<tr>
<td>Inbox, Outbox</td>
<td></td>
</tr>
<tr>
<td>1. System configuration :</td>
<td></td>
</tr>
<tr>
<td>1) Unscrambler</td>
<td></td>
</tr>
<tr>
<td>2) Filling Machine</td>
<td></td>
</tr>
<tr>
<td>3) Capping</td>
<td></td>
</tr>
<tr>
<td>4) Labelling</td>
<td></td>
</tr>
<tr>
<td>5) Automatic Carton Packaging Machine</td>
<td></td>
</tr>
</tbody>
</table>

05 EYE CARE (Multi-purpose solution)

Product Safety

Received MFDS Approval
Received CE Approval
Received ISO 13485 Approval
06 Certification of Technology

Attached 1 Certificate of Analysis
Attached 1 Certificate of Analysis
Corporate motto and business philosophy

We envision a healthy lifestyle for everyone by developing and manufacturing eco-friendly products based on the business philosophy that is “to connect the environment with people.”
Brief information about the company

Patent/trademark
2013. 10 : composites for dental health care (Korea, 10-2010-0130623)
2012. 03 : FDA OTC registration (US, 776199-101 / 76170-102 / 76170-103)
2012. 05 : disposable cup for bubble toothpaste (Korea, 10-2012-0091272)
2012. 06 : trademark registration (Korea, 450-9899690, 450-0999420)
2013. 02 : trademark registration (US, 4,580,396, 4,589,404)

Certificates
2011. 02 : acquisition of production license by MFDS (Ministry of Food and Drug Safety)
            (license no.: medical agent for dental care no. 02310)
2012. 03 : FDA's safety test on major substances
2013. 02 : in-house lab certificate

Certificates – Multi-Purpose Solution
2014. 09 : acquisition of production license by MFDS (product: EYE CARE, OJO)
2014. 10 : Certificate of Free Sales (Product: EYE CARE, OJO)
2014. 10 : Certificate of Pharmaceutical Manufacturing License by MFDS
2014. 10 : ISO 9001 certificate
2015. 09 : ISO 13485 and CE certificate
2016. 04 : FDA 510(k) submission.

Brief information about the company

- Control to meet the requirements of medical device production quality management standards of the
  ISO13485:2003 (Medical Devices - Quality Management Systems - requirements for regulatory purposes)
  to design, manufacture, and sell E-SOUP EYE CARE Multi-Purpose Solution.

- Our facility is authorized to manufacture quasi drug under The Pharmaceutical Affairs Act, and the E-
  SOUP EYE CARE Multi-purpose solution is permitted to be freely sold in domestic and overseas markets.
## 01. Explanation of Product

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<thead>
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02 Layout of Production

Reporting Quasi-drugs Manufacturing Business (Approved by MFDS)

- Passion & Air cleaner
  - Placing the bottle
  - Arranging the bottle automatically
  - Air cleaning

- Filling machine
  - Feeding the bottle
  - Arranging the bottle
  - Filling the liquid

- Capping machine
  - Placing the cap
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- Loudengue machine
  - Cutting the roll film
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- Sticker labeling
  - Feeding the label
  - Printing the manufacturing date with an inkjet printer
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- Systolic
  - Generating the hot wind
  - Pressing the film

Automatic packing machine toner car

Feeding the bottle – Molding the case – Putting the product into casing – Flat folding – Hot melting – Printing with the inkjet printer

03 Production Facilities

1) Raw Material Quality Control: Checking each of the all raw material in accordance with quasi-drugs quality control standards
2) Raw Material: Appearance, test item, pH, confirmation & analysis, detection of microorganisms,
   sterile distilled water, appearance, pH, test item, alkali, chloride, sulphate, nitrate, nitrite, nitrogen, nitrous substance,
   ammonium, heavy metal, potassium permanganate reducing substance, residual solids, sterility test
3) Solution Test: Appearance, pH, confirmation & analysis, heavy metal, detection of microorganisms
4) Final Product Test: Appearance, pH, confirmation & analysis, heavy metal, detection of microorganisms

Production Standard: 70ea/minute = 1,000,000ea/month
## Production Facilities

<table>
<thead>
<tr>
<th>Production of sterile distilled water</th>
<th>Air quality</th>
<th>Manufacturing</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram of production system]</td>
<td>![Air quality Image]</td>
<td>![Diagram of manufacturing process]</td>
</tr>
<tr>
<td>A strict quality control in the production of sterile distilled water</td>
<td>Air quality over 10,000 class hygienic environment</td>
<td>A strict quality control in manufacturing [ISO 13485, MFDS Quasi DRUG quality control standards]</td>
</tr>
</tbody>
</table>

### Production of sterile distilled water

1. Use: Production of sterile distilled water
2. Water Quality:
   - Resistivity: over 1600
   - PARTICLE: 0.2um
3. Capacity:
   - FLOW RATE: 3 ml/hr
   - PRESSURE: 2.5kg/cm²

### Air quality

1. Use: Clean room
2. Control Class: 100000 Zone
3. Control environment:
   - Temperature: (20±0.5)°C
   - Humidity: (45±5)% RH
04 Production Facilities

Manufacturing
[ ISO 13485, MFDS Quasi DRUG quality control standards]

<table>
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1. Use: Multi Purpose Solution Agitator
2. Electricity: 380V(AC), 60Hz, 30A
3. Capacity: 3000L x 2 Sets
4. System configuration:
   1) Mixing Tank
   2) Heating Block
   3) Pump/Piping
   4) Control Panel
5. Use: Multi Purpose Solution Filling Machine
6. Using Material: Bottle(PE), Cap(PE), Stricker, Ink, Packing
7. Inbus, Outbus
8. System configuration:
   1) Unscrambler
   2) Filling Machine
   3) Capping
   4) Packaging
   5) rubber
   6) Automatic Carton Packaging Machine

05 EYE CARE (Multi-purpose solution)

Product Safety

- Received MFDS Approval
- Received the safety Test of Product [Biological safety testing]
- Received CE Approval
- Received ISO 13485 Approval
06 Certification of Technology

[Image of certificates]

[Image of a bottle of toothpaste with text: "Dentree Foaming Toothpaste Product Introduction"]

Anytime, and Anywhere Convenient Oral Care
Distinctive Features of E-SOUP Foaming Toothpaste

E-SOUP Foaming Toothpaste with a fresh flavor of an three mints (apple, strawberry, peppermint) is the all-in-one oral care product from brushing your teeth, gargling to washing your mouth. Not only that, but it sterilizes the harmful bacteria in a mouth, prevents sensitive teeth and gum disease as the Total Oral Care product.

1. There is no need for another tool including a toothbrush. The E-SOUP Foaming Toothpaste removes the residual foods left deep into your teeth area with its powerful hydration power not only bring about a sense of freshness in your mouth but also prevent cavity and gum disease.

2. Unlike the conventional toothpastes, the E-SOUP Foaming Toothpaste has no abrasive substances and protects the surface of your teeth, maintaining the health of your teeth and gum.

3. The E-SOUP Foaming Toothpaste contains antibacterial substances to prevent the harmful bacteria from being accumulated on the teeth walls or gum.

Efficiency

- Prevent Cavity
- Chilled Tooth
- Fresh Breath
- Clean Mouth
- Prevent Tooth Diseases
- Periodontal Diseases
- Sterilization
- Whitening
- Aesthetic
Conveniences

Outdoor Activity
- For a simple oral care during outdoor stays, E-SOUP Foaming Toothpaste can be carried in hands and helps to make a perfect oral health care easily without toothbrush.

Implant Fixing
- After implant surgery, patients unable to use toothbrush, but is recommended to have more careful oral care than normal times. E-SOUP Foaming Toothpaste can be carried in hands to gargle occasionally and which protects gums and any inflammations in and around of implant surgery.

During the Period of Pregnancy
- Oral care is very important especially during advanced stage of pregnancy as mother’s health and gums influence the baby’s health. Using E-SOUP Foaming Toothpaste is one of the simple and easy ways to ensure mother’s oral health care.

For Sensitive Teeth
- E-SOUP Foaming Toothpaste does not contain any abrasive ingredients that cause damages on the enamel layer of teeth when brushing.

For Orthodontics Treatment
- Carrying out orthodontics treatment is difficult to adopt a proper oral health care.
- E-SOUP Foaming Toothpaste cleans beyond the maximum points that are not easily accessible to toothbrushes.

Safety

KFDA Approved
Main Ingredients passed Safety test
Registered to FDA (US)
Produced by internal laboratory of a public institution

Food and Drug Administration
National Drug Code Directory

Infomation
KM.UD.0001799
S11 Multifunctional Tissue Adhesion Accelerator
Features

1. No abrasive and you don’t have to brush your teeth strongly and dentil is damaged and protect gum.
2. Bubble permeates into the niches between teeth, sanitize every nook of the mouth and keep the mouth fresh all the time.
3. Excellent fresh breath makes you confident to face other persons.
4. Easy to carry and use everywhere you go.
5. More rapid cleaning effects than general tooth paste by rich bubble.

Features

Main Ingredients

1. Main Ingredients
   - Allatoin
   - Fluoric Sodium
2. Additive
   - Hydroxyapatite (HAP)
   - Wormwood Extract
   - Cnidium officinale Extract
   - Ginger Tincture

Cautions

1. How to Store
   - Keep in room temperature (10°C-30°C).
   - Pump may not work in case the product is kept in humid place.
   - Keep away from children.

2. How to use
   - Due to natural HAP is included and sediment can exist and please shake before using.
   - After spraying into mouth and brush 2 or 3 times and gargle and brush for a minute.
   - To refill, please separate pump and container and fill 70% of the container and use after assembling them.
     (If the container is fully filled, it may not work.)
   - Don’t need to wash your mouth after gargling.
   - In case of using tooth brush, please do not brush strongly. Just brush softly like massage the teeth.
Weight training is NOT AN OPTION BUT IMPERATIVE

Participation Rate of Physical Activity

Ratio of Workout types

- 근력운동: 45%
- 요가: 13%
- 짐: 10%
- 에어로빅: 0%
- 태권도: 0%
- 병원: 0%
- 출산기: 0%

Data source: National Health Service, Public Health Korea 2015
Machine Weight Training?

Possibility of Injury
“the principle of progressive overload”

Machine Weight training
Limited Users – beginner, women

WE FOCUS ON FREE WEIGHT

The essence of body building
Strength training

Effectiveness
High effect of Exercise

Wide range of users
Mid · High, Pro-users

No limit
Infinite degree of freedom
Safe and Organized Workout Managing System

Free Weight Training
Workout Spotting Function
The world-First Released

Safe Workout Environment
Maximizing Workout Effectiveness

Weight Lifting Assist
Patent License: Workout assistance control system which can control automatically assistant power

Contactless Measuring Type

BEYOND Wearable
Guarantee Freedom of Workout

Providing Monitoring System
(DATA-BASE)

Utilizing Workout Database
Customized Management by individual

I Control and Measurement Integration Technology

- Workout Motion Recognition Technology
- Workout Repetition and Trace Recognition
- Maximum Muscle power and Calorie Consumption Recognition

- Workout Assistance Core technology
- Variable Power and Trace

Robot Arm Control Technology
Motion Recognition Workout Data
System Integration Technology
Measuring System Technology

- Inner Safety-Bar Measurement System modularization Technology
- Attachable Structure Making Technology
Well aging with Weight Training

- Workout
  User with Fitvisor

- Database
  Collecting from Workout

- Advice
  Increasing workout efficiency

- Treatment
  Medical advice

People with disability

- Workout
  Safety

Not for just work out, But for Life
The elderly

Not for just aging, But for healthy life

EXHIBITION AND RESPONSE

2016 SPOEX

Offline reaction
Domestic Fitness Company Encouragement
Increasing Interest as Most Sensational Product

Online reaction
Sharing Video clip Voluntarily Watch here
Watching 511 Million Comments 2.7 Million (Being posted After 14 hours)
We make a better world with technology
ReCap

Revitalizer of Capillary (Ultrasonic Cupping)
모세혈관 재생장치(초음파 부착기)

- 피부혈액순환을 촉진하여 모세혈관을 재생하는 초음파부착기 -

MOSE MEDI 조대희 (Joh, Day)
KASDBA
The Korea Academic Society of Digital Business Administration

4~5th. JUNE, 2016

Contents

What? ReCap

Why? Keep the hometown

How? Recap

Expectation To the world
What? Recap -1

1. Ultrasonic & Vacuum can be compatible?
   초음파와 진공은 양립할 수 있을까?
   a. Ultrasonic & negative pressure are incompatible
      전통적으로 초음파와 진공은 양립할 수 없다
   b. There is not exist any media in Vacuum
      과학적으로 진공에는 매질이 존재하지 않는다
   c. Ultrasonic can not be transferred without the media
      기본적으로 초음파는 매질없이 전달할 수 없다
   d. Is it really true?
      과연 그렇까?

What? Recap -2

2. Ultrasonic & Vacuum should be consilience!
   초음파와 진공을 부합시켜야 한다!
   a. Make the impossible possible 안되면 되게 하라
   b. begin developing of the device (ReCapS) 2011.10.29
      Ultrasonic & Vacuum Control Artificial intelligence Medical device
      초음파 진공제어 인공지능의료기 개발시약 2011.10.29
   c. Patent application(cupping device) 10-2012-0045964(2012.5.1)
      특허출원 (열과 파동의 심부진달기능을 갖는 부항장치)
   d. Patent registration (cupping device) 10-1337708-0000 (2013. 11)
      특허등록 10-1337708-0000 (2013. 11. 29)
      특허출원(초음파와 진공을 이용한 하이브리드 치료기)
Why?  Keep the hometown 1

1. Keep the hometown 고향을 지켜라
   a. Mom had reservation for the surgery of removing the womb (2011.10.29)
   b. Cupping therapy + moxibustion therapy = keep the hometown
      부항요법 + 음열치료 (2011.10.29)로 어머니자궁을 지켰다
   c. Overcome the weakness of Existing products
      (i.e. operations, drug, acupuncture, moxibustion, massage, heating therapy...)
      기존의 단점을 극복하려 (예. 수술, 약물, 침, 불, 부형, 마사지, 염고, 음열기)
   d. Complexity, Danger, inconvenient -> simple, safety, convenient
      복잡, 위험, 불편

2. Develop it was not exist! 세상에 없는 의료기술을 개발하라
   a. Begin the develop of UCAM (2011.10.29)
      초음파관경 관광재능 의료기기 (UCAM) 개발작수 (2011.10.29)
      patent application (cupping device) 10-2012-0045964 (2012.5.1)
      임과 파동의 심부전달 기능을 갖는 부형기치 10-2012-0045964 (2012.5.1 특허출원)
      patent registration (cupping device) 10-2012-0045964 (2012.5.1)
      임과 파동의 심부전달 기능을 갖는 부형기치 10-1337708-0000 (2013.11 특허등록)

Why? Keep the hometown -2

b. Hybrid therapy device using ultrasonic and vacuum
   patent application no. 10-2015-0185328 (20161223)
   초음파와 진공을 이용한 하이브리드치료기 특허출원 10-2015-0185328 (20161223)

c. Function: (Multi transmit effect of ultrasonic & negative pressure control-
   flow, wave vibration, frequency, power)
   기능: 초음파응용 다중조절 초음파응력파동과 음압유량제어 전달작용
   Effect 1. Capillary blood circulation by maximizing the capillary vibration
   모세혈관진동극대화로 모세혈관혈액순환
   Characteristic: simple, safety, convenient (No side effect)
   간단 안전 편리 부작용이 없다

Case 1: Uterine fibroids 75mm -> 3 time uses -> Cured 2015.5 (its took 2 months)
   자궁근종 75mm 3회 실시한치 2015.5
   Case 2: Anemia* due to uterine bleeding up (Cervical cancer) 2015.8
   Hemoglobin levels 7-12 (it took 3 months)
   하혈로 인한 빈혈치료 자궁중양 2015.8  혈모글로빈수치 7-12 (3개월 소요)
   *Anemia: a condition marked by a deficiency of red blood cells or of
   hemoglobin in the blood.
How? Developing range

1. Piezoelectric element + Ultrasonic oscillator
   + Negative pressure, wave, flow control regulator
     초음파 압전소자 + 초음파 발진기 + 초음파 출력제어조절기

2. Individually optimized program with ultrasonic & negative pressure + UVCAM control board + wireless remote controller
   개별맞춤형 초음파 응답조절장치

3. Ultrasonic piezoelectronic element & frequency power range
   초음파 압전소자 및 주파수출력범위
   주파수 (frequency) : 0.5~1MHz (심부혈관검사)
   전달깊이 (transfer depth) : 5~10CM
   출력범위 (electric power) : 0.5~3W/CM²
   소비전력 (Power consumption) : 12V / 30W

Expectation

Prospect after 3 years (향후 3년 전망)

- **ReCap** (Hybrid medical device)
  한양방의 응합의료기

- Korean Wave from 2015
  2015년 이후 한류바람

- **Recap** (for hospital & individual)
  병원용, 개인용

- 시장적합성과 시대로구 부합 (고령전환) (consilience)
- 한방의료기기 해외수요증가 (모세혈관 질환의 해결법)
- 세계시장개척의 블루오션전략

Recap
(모세혈관 재생의료기)
- 차세대성장 동력-
**Expectation Go to the World-2**

**Prospect after 3 years (향후 3년 전망)**

- **Recap (모세혈관재생의료기)**
  - Develop the medical device that was not exist!
  - a. 선도적 투자와 기술개발로 공격적 세계시장개척 전략
  - b. 기술과 자제권선점 → 세계표준 확득
  - c. 전조경제 선도성행 신생장동력으로 무한한 고용창출

고령전화 한방의료기술수요 성장추세 시장전략
(후기산업사회, 초고령사회 진입국가, 선진국중심)
538억원 (2010년) → 2374억원 (2020년)
- 보건복지부 고령전화제품 실효조사 2010
SmartHealthyChek™

Self-checking health survey system

Company Motto

Only people who have dream will be free
The expected effect of system

- Lifestyle improvement
- Social costs reduction
- Sodium intake reduction
- Vulnerable social group accessible
- Early diagnosis
- New patients hunt
- Chronic patients management

Contents

System Outline

- System Composition
  - SmartHealthyChek™ Kiosk
  - SmartHealthyChek™ Note
  - SmartHealthyChek™ Application
  - SmartHealthyChek™ Zone
  - Installation photos
System composition

Contents

System Outline
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- Installation photos
SmartHealthyChek™ Kiosk

- **Brand**: Smart HealthyChek™
- **Operation**: Infrared touch screen
- **Form**: 19” touch, 40” touch monitor
- **Height**: 1m75cm
- **Operation condition**: Based on internet
- **System**:
  - **OS**: Windows 7
  - **Memory**: 2GB up
  - **Hard disk**: 50GB up

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**Test start**

1. Choose what you like to test at Kiosk machine
2. About 20 questions using touch screen
3. Auto Upgrade Method / Auto Contents Add

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If normal
- Get the result paper immediately
- Prevention & Management with mobile application

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If abnormal
- Information transmission to public health center
- Contact to someone who is abnormal
- Complete medical checkup
- Management & control
- Mobile application survey & Management

---

In case Normal with test result

In case Abnormal with test result
SmartHealthyChek™ Kiosk

System Main Screen

- Dementia survey
  - Forgetfulness, Dementia

- Mental health
  - Depression: adult, old age, teenage
  - Stress, ADHD

- Cardio, cerebro-vascular disease
  - Metabolic syndrome, Diabetes, High blood pressure, Stroke

- Healthy lifestyle
  - Obesity, Antismoking, low-salt diet, walking program

Data Source

- Metabolic syndrome self-survey
  - The Ministry of Health & Welfare (WHO)

- Dementia, forgetfulness
  - SDQ (Samsung Dementia Questionnaire)

- ADHD (부모용)
  - ADHD Rating Scale-IV (ADHD Rating Scale-IV; DSM-IV, 1994)

- A low-salt diet
  - Daegu Salt Reduction center (www.saltdown.com)

- Depression self-survey, ADHD
  - Korean-CES-D, DAND, DASDQ, children's depression inventory, CIDI
  - Clinical guidelines for depression in primary care, 1995

- 우울증 설문
  - 문해: 정신문해, 자녀의 정신문해, 부모의 정신문해, 자녀의 정신문해

- 치매 조기검사
  - 간양증/치매 조기검사

- 개선가능
  - 치매 예방, 간양증 예방, 낮은 소금 섭취, 스트레스 관리, 건강한 라이프 스타일

- 대사증후군
  - 당뇨, 고혈압, 고지혈, 식사, 운동, 운동, 건강한 식이 관리, 바른 생활습관

- ADHD
  - 주의결핍 과동행동 장애

- 스테레스
  - 주의결핍 과동행동 장애

- 비만
  - 운동, 식사, 낮은 소금 섭취, 스트레스 관리, 건강한 라이프 스타일

- 급변
  - 전염병, 비염, 바이러스 감염, 감기, 독감
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Installation photos

Daegu 2015 Mental health Expo
Installation photos

Daegu Line 1 Songhyun station

Daegu Line 2 YoungSan station

Installation photos

Daegu Metro Line 2
Installation photos

Daegu Line 1 Banwaldang station  Daegu Line 1 Susungguchung station

Conclusion

1. Chronic disease patients
   Find & Prevention (Public health center)

2. Competition strength
   with differentiation & accessibility
   (hospital & clinics)

3. Medical service improvement
   between public health center and hospitals
   using monitoring system

4. National key medical business
   Brand competition enforcement
Anytime, and Anywhere
Convenient Oral Care

Distinctive Features of Esoup Foam Toothpaste

Esoup Foam Toothpaste with a fresh flavor of an three mints/apple, strawberry, peppermint) is the all-in-one oral care product from brushing your teeth, gargling to washing your mouth. Not only that, but it sterilizes the harmful bacteria in a mouth, prevents sensitive teeth and gum disease as the Total Oral Care product.

1. There is no need for another tool including a toothbrush. The Esoup Foam Toothpaste removes the residual foods left deep into your teeth area with its powerful hydrofloss power th not only bring about a sense of freshness in your mouth but also prevent cavity and gum disease.
2. Unlike the conventional toothpastes, the Esoup Foam Toothpaste has no abrasive substances and protects the surface of your teeth, maintaining the health of your teeth gum.
3. The Esoup Foam Toothpaste contains antibacterial substances to prevent the harmful bacteria from being accumulated on the teeth walls or gum.
Efficiency

- Prevent Cavity
- Chilled Tooth
- Fresh Breath
- Clean Mouth
- Prevent Tooth Diseases
- Periodontal Diseases
- Whitening
- Aesthetic

Conveniences

Outdoor Activity
- For a simple oral care during out door stay, Esoup Foam Toothpaste can be carried in hands and helps to make a perfect oral health care easily without toothbrush.

Implant Fixing
- After implant surgery, patient is unable to use toothbrush, but is recommended to have more careful oral care than normal times. Esoup Foam Toothpaste can be carried in hands to gargle occasionally and which protects gums and any inflammations in and around of implant surgery.

During the Period of Pregnancy
- Oral care is very important especially during advanced stage of pregnancy as mother’s healthy teeth and gums influence the baby’s health. Using Esoup Foam Toothpaste is one of the simple and easy ways to ensure mother’s oral health care.

For Sensitive Teeth
- Esoup Foam Toothpaste does not contain any abrasive ingredients that cause damages on the enamel layer of teeth when brushing.

For Orthodontics Treatment
- Carrying out orthodontics Treatment is difficult to adopt a proper oral health care. Esoup Foam Toothpaste cleans beyond the maximum points that are not easily accessible to toothbrushes.
### Safety

- KFDA Approved
- Main Ingredients passed Safety test
- Registered to FDA (US)
- Produced by internal laboratory of a public institution

### Features

1. No abrasive and you don’t have to brush your teeth strongly and dentill is damaged and protect gum.
2. Bubble permeates into the niches between teeth, sanitize every nook of the mouth and keep the mouth fresh all the time.
3. Excellent fresh breath makes you confident to face other persons.
4. Easy to carry and use everywhere you go.
5. More rapid cleaning effects than general tooth paste by rich bubble.

### Main Ingredients

- 1. Main Ingredients
  - Allatoin
  - Fluoric Sodium
- 2. Additive
  - Hydroxyapatite (HAP)
  - Wormwood Extract
  - Craniun officinale extract
  - Ginger Tincture
888 Caution

1. How to Store
   - Keep in room temperature(10-30°C).
   - Pump may not work in case the product is kept in humid place.
   - Keep away from children.

2. How to use
   - Due to natural HAP is included and sediment can exist and please shake before using.
   - After spraying into mouth and brush 2 or 3 times and gargle and brush for a minute.
   - To refill, please separate pump and container and fill 70% of the container and use after assembling them.
     (If the container is fully filled, it may not work.)
   - Don't need to wash your mouth after gargling.
   - In case of using tooth brush, please do not brush strongly. Just brush softly like massage the teeth.
E-health: Opportunities and Challenges in the Context of Nepal

Pratibha Bhandari¹, Ph.D.
Assistant Professor, Department of Nursing,
College of Health and Welfare
Woosong University

Abstract

According to World Health Organization (WHO), e-health refers to the transfer of health resources and health care by the use of electronic means. The main domains where e-health is widely used are, delivery of health information for health care providers and the use of IT to educate and train the health workers. The main advantages of e-health is that despite geographical barriers, it makes high quality health care services and reliable health information available to all; and at the same time it saves energy time and resources. In Nepal, a developing country, the access to health care services and health care information is unequally distributed. One of the main barrier identified is the geography and topography of the country. Availability of e-health services in rural areas would greatly benefit the public health by providing cost effective, high quality health care services and information. In my presentation, I will review the existing health care delivery system of Nepal and discuss the emerging trends and practices relating to e-health in Nepal. The benefits, challenges and long term sustainability issues will also be discussed.

¹ Pratibha Bhandari works as an Assistant Professor in the Department of Nursing at Woosong University, South Korea. She received her Bachelor’s degree in nursing (2005) from College of Nursing, Christian Medical College and Hospital, Vellore, India, and her Master’s degree (2011) and PhD in Adult Health Nursing (2014) from Ewha Womans University, South Korea. Her research areas include chronic illness with a special focus on health promotion and health related quality of life. She is particularly interested in the use of mixed method research design to elucidate how cultural, social, psychological and physical factors affect the health decision making process for individuals with chronic illness and their families. Other than teaching and research, she is involved as a core member of Global Solar Volunteer Corps, Seoul National University.
Feasibility of Short Message Services (SMS) Based Data Collection System for the Surveillance in Nepal

Prabin Shakya
Seoul National University

Introduction

Natural Disease increase the risk of morbidity and mortality caused by communicable disease without well understood mechanism. The devastating earthquake in Nepal had escalated the threat of disease outbreaks in these areas. Nepal is endemic for many communicable diseases including cholera.

Evidence from past experiences have established the importance of infectious disease surveillance to protect survivors during disasters. Real-time monitoring of morbidity can provide early signs of outbreaks, providing an opportunity to prevent outbreaks.

Epidemiology and Disease Control Division (EDCD) of Nepal Government revived and started surveillance system right after the earthquake along with pre-existing Early Warning and Reporting System (EWARS). “Timeliness” and “Completeness” of reports were the two major problem faced by these surveillance systems. The adaptation of electronic records had shown improvement in timeliness and completeness of reports as well as increased breadth and depth of information collected. The ICD coded health record used for surveillance had been demonstrated as effective method. Health Management Information System (HMIS)’s register number 1.3 (HMIS1.3), records socio-demographic, geographic information along with ICD 10 coded working diagnosis, making it a perfect record for syndromic surveillance. this study explored the possibility of using digitalized HMIS1.3 with nominal modification transmitted via SMS for syndromic surveillance.

1 Prabin Shakya had completed my bachelor's in Public Health in 2008 and worked for government and various (I)NGOs which provides best opportunity to explore and understand ground reality of Nepalese Health System. For last six years he has been experimenting with a wide array of health informatics related issues in my home institution Dhulikhel Hospital Kathmandu University Hospital (DH) and has been working very closely with people of different disciplines from numerous national and international organizations. He also worked closely with “Health Information Systems Program” (HISP). He had also successfully implemented Open Data Kit (ODK) based system for Dhulikhel Heart Study (DHS), population based longitudinal study on cardiovascular disease and risk factors in Nepal, one of the first of its kind in a developing country. He also worked for as consultant for developing ODK based monitoring and evaluation system, and developed “Audio Guided Color Coded Data Collection Tool” which enables to collect personal data from people who are not able to read and write. He also involved in development of some mobile app and currently pursuing masters in Medical informatics at Seoul National University Seoul. He is involved in various organization during his professional carrier.
Objective

This study aims to develop SMS based syndromic surveillance system and evaluate feasibility of SMS based health record collection for surveillance.

Methodology

For the purpose, mobile phones with android platform was selected, as they are cheap and easily available in developing world. Opendatakit collect, widely used opensource data collection app developed by university of Washington was customized to incorporate SMS capabilities. The outpatient register (HMIS 1.3) was digitalized. The de-identified individual record of the patients was entered into the android app and transferred via SMS to main server. The system was tested for six weeks (from 22nd Feb to 4th April 2016).

Center for Disease control and prevention (CDC)’s framework for surveillance system evaluation was used. All nine attributes suggested framework was not valid as the system was in early stage of implementation, hence, suitable four attributes namely, Timeliness, Data Quality (Completeness, Error Rate), Acceptability (cost of SMS) and Simplicity (Ease of Use) were selected.

Metadata related to date and time was used for calculating timeliness. Data elements were categorized as compulsory and optional to calculate completeness. Patient counseling was video recorded and reviewed for error rate calculation. The cost of SMS per individual’s record was calculated using mean number of characters in SMS received. Self-administered questionnaire was used for ease of use.

The system was tested in “Bahunepati Health Center” and “Thangsen Health Center”, rural health centers from network of eighteen health centers of Dhulikehl Hospital- Kathmandu University Hospital, Nepal. Bahunepati Health Center located in Sindupalchowk district which was hit with maximum number of aftershocks and Thangsen Health Center located in Nuwakot District which is adjacent district hit by largest magnitude earthquake.

Results

During the study period 459 cases were reported via SMS. The mean time required to fill digital form was 109.3 seconds (SD 182.75) and median time required was 67.25 seconds, difference in mean time required to fill digital form was nominal between two outreach centers. Similarly, mean transmission time was 447.85 seconds (SD 637.71) and median for the parameter was 226 seconds. There is noticeable difference in mean and median transmission time between outreach centers, for Bahunepati Health Center mean was 569.03 seconds (SD 676.11) and median was 346 seconds whereas for Thangsen Health Center mean was 26.7 seconds (SD 58.96) and median was 12 seconds. All the report submitted were 100% complete and error rate was found to be 1.95%. The error was related with geographic information and ICD classification. The cost for transmission of data per patient was NRs. 4.26 (equivalent to USD 0.04). The mean user rating of parameters for ease of use was high with mean point of 6.6 out of 9. Two parameters “overall flexibility” and “performance of task is straight forward” got rating below 6.
Discussion and Conclusion

The surveillance system introduced had made complete data from individual patients available for the analysis within few minutes of entry with minimum error. The study demonstrate feasibility of using SMS based syndromic surveillance with acceptable cost and addressing problem faced by current surveillance system in Nepal i.e. completeness and timeliness of data.
Environmental Health Issues in Nepal

Dirga Kumar Lamichhane

Department of Social and Preventive Medicine,
Inha University, Korea

Abstract

A growing body of literature links environmental factors with adverse health condition. Although few studies have examined the effect of environment on health in Nepal, the existing studies indicate several environmental factors that have increased the burden of disease (BoD). Poor quality of drinking water, low coverage of sanitary facilities, heavy use of solid biomass fuel for cooking, lack of proper waste management system are some of the factors increasing the BoD in both rural and urban areas of Nepal. Although Nepal shows a progress in infant mortality, maternal mortality, and average life expectancy, it is mainly reflected from the increase in health services rather than the improvement in the environmental conditions.

With an increase in the urban population, there is a substantial increase in demand for environmental services such as clean drinking water, sanitation, and proper sewerage management; however, the quality standards of those services have not been met with the rise in demand. Contaminated water sources, inadequate sanitation, and poor management of household and municipal waste would continue to affect human health. Air pollution in Kathmandu valley and other big cities is coming up as a serious problem which exceeds both the national and international standards. The problems of solid waste management and indoor air pollution are threatening issues both in urban and rural areas. On the other hand, changing climatic condition can initiate a vicious circle where affected populations will be more susceptible to infectious disease and would have a serious implication in Nepal. The temperature is rising and will continue to rise in the coming years partly due to increase in the human population, vehicles, development activities, and change in agricultural patterns. Climate-related disasters such as floods due to glacier melt are projected to increase and would have a direct impact on health in Nepal. Similarly, vector-borne and water-borne diseases have been increasing and a strong relation of these diseases with temperature and precipitations have been identified. It is already evident that some vector-borne diseases have shifted the geographic range in which they can live with changing temperature and precipitation in different part of the country.

Nepal is confronting a changing health scenario attributed to demographic transition, change in

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1 Mr. Dirga K Lamichhane is currently a PhD scholar in Inha University with his several professional backgrounds. He served as Executive Director in Animal Health Training and Consultancy Service; worked as teaching assistant, International University of Japan Niigata, Japan; as director, Animal Health Training and Consultancy Service Pokhara, Nepal, as senior training officer (Veterinarian), United Mission to Nepal/AHTCS and so on.
environment, and the double BoD, old problems of communicable diseases along with a rapid emergence of non-communicable disease. Although the government of Nepal (GoN) has committed to develop an efficient health care system with legal and technical measures, they are still unable to address those challenges and to improve the health status as expected and up to a desired level. However, the GoN acknowledges that environmental health research is needed to generate evidence to improve the decision-making process at all levels (central, regional, district, and below). This presentation explains the current environmental health issues in Nepal along with policy and legislative responses, and also identifies research gap and data needs.
Policy and Prospects of E-Health in Nepal

Deepak Banjade
Nepal Embassy
Seoul, South Korea

Abstract

Government of Nepal is committed to facilitate people’s access to health service through enhancing information communication technology. For this purpose, Nepal government has promulgated relevant policies and allocated funds for strengthening public access to Information Communication technology. Though, we still have a long way to go, the cooperation from private sectors and donor countries and efforts of the government are expected to accelerate this purpose.
Current State of IT Infrastructure in Nepal for ICT in Medicine and Healthcare

Mahabir Pun
National Innovation Center

Abstract

Providing healthcare to the remote region of the least developed countries like Nepal has always been a challenge from the public health and clinical perspectives. Populated urban areas have historically benefited in quality and services over populations residing in hill and mountain areas. The sparsely populated mountain communities are deprived of basic health services even if the government of Nepal is trying to provide basic health services free of cost. Now technological innovation in information and communication sector is making it possible to effectively address the health needs of millions of marginalized people of Nepal to some extent. The mobile and wireless broadband internet services are expanding to the rural areas even if it is at slower pace. As a result, tele-medicine is reaching out to remote rural clinics by establishing connections between rural health care workers and doctors in urban hospitals through voice or video conferencing. The rural telemedicine program can be made more effective by making digital equipment available for the rural clinics and by connecting them to city hospitals through Internet. As a result basic medical services will be within the reach of the vast majority of people living in rural areas. This approach will be the fastest and cheapest way to bring basic health services for the people in need. Mahabir Pun is going to explain as how Nepal Wireless and Public Health Concern Trust are trying to address the highly needed health care issues in Nepal using information and communication technology.