Clinical specimen receipt system using a mobile smart device

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Introduction

In hospitals, with doctors’ requests, clinical specimens from patients or from persons doing health checkups are usually sent to the hospital laboratory. However, for more sophisticated tests, the specimens are sent to the reference (or commercial) laboratories.

To deliver the specimens to the reference laboratories, the courier system is often utilized. The couriers pick up the specimens from clinics or hospitals, etc along with requisitions of the tests to be done, and they often pick up large numbers of specimens in a short period of time.

In such situations, there may not be enough time to input the corresponding data such as patient’s name/id, type of specimen, desired tests, hospital id and courier id against each specimen and sometimes these entries are prone to clerical errors which may lead to serious consequences.

To decrease these kinds of errors, we have developed a mobile photographic transmit reception system called “NEMO” which we describe in this manuscript.

1. Methods

1) A mobile APP (application) based on the android platform was developed by SKT Telecom Co.
2) The mobile phone “Samsung Galaxy 2” [Samsung Electronics Co.] is used to take pictures of the requisition data and specimens
3) A special photo stand was designed to fit this system, and built
4) The SKT Telecom, Co. mobile network system is utilized for NEMO operation

When the courier visits to pick up the specimens, he takes a picture of the request sheets and the specimen(s) in the same shot using a special photo stand that keeps the specimen(s) and the request together, and then sends electronically the photos to the image server in the laboratory and sends the specimen by the courier where the tests will be done. The expert transcriptionists in the reception department of that laboratory

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input the requisition data into the system in text format either via an OCR reader or manually.

2. Results

We have built “NEMO system” as follows;

**Hardware**

1) The mobile smart phone (that transmits pictures of the requisition data and specimens)
2) The image server (that receives and stores the pictures received)
3) The OCR readers and the manual input device (like computer/keyboard: for those items that the OCR reader cannot read)
4) The photo stand (that allows uniform quality pictures to be taken)

**Software**

1) The mobile APP. in android format: for reception
   1-1) takes the picture of the specimens and requisitions, stores them in album, and then sends them to the image server
   1-2) review the total number of pictures taken, delete or modify them if necessary.
   1-3) provides information on the next job one job after another

2) The list of hospitals to visit and the scheduling system (main server)
   2-1) receiving input data (pictures and requisition) via image server
   2-2) updating and storing patients’ results and
   2-3) sending results to clients through the web or mobile systems and in printed materials

3. Discussion

The advantage of this system is that it reduces significantly the errors arising from data input by non-medical related courier as well as any hassles involved. The errors in 2014 were 79 of 320,000 patient samples per month in average (0.02%).

Data input is done instead by specialized transcriptionists, subsequently resulting in much better services to clients including preventing the delayed turn-around time (TAT) as well as cost savings by eliminating expenses related to errors such as error correction and retesting.

The specially designed photo stand allows for obtaining standardized photos that help to obtain better results when reading by OCR reader, or inputting data manually when needed. This system allows us more accurate and faster processing.

NEMO is an IT based, efficient processing system of patient’s test requests and specimen reception.