

Laboratory Specimen Collection Management System

Description

[0001] The invention relates to a laboratory specimen collection management system for the clinical laboratory, and especially, a system to identify the type and number of tubes to use to collect patient specimens for testing by the laboratory analyzer and facilitate the collection of the specimens at the point of care.

[0002] Existing specimen collection requires a specimen taker (clinician) to determine the type of tube, number of tube and the amount of specimen of each tube before collecting the specimen. This is not a simple exercise and requires experiential knowledge on the part of the specimen taker. Usually, the specimen taker consults a chart for each of the specimen test orders ordered by a doctor. As there are a number of different permutations in tube selection, the process becomes tedious and mistakes are inevitable, compromising patient safety in medical care.

[0003] In the existing system, specimens collected at the point of care are labeled to identify them with the patients providing the specimens. The label is a non-standard label produced by specimen takers to assist them in their administration of specimen collection. Tube labels at the point of care are pre-generated *en masse* and applied to the tubes when the specimens are collected. Such practice has led to errors in tube labeling where a tube has been labeled with a wrong patient identification, again compromising patient safety. Although the number of errors is not huge, one is simply too many in a healthcare environment where the prognosis of a patient's health is based on the result of a specimen test.

[0004] When the specimens arrive at the laboratory, a new set of labels, readable by the laboratory analyzer, is generated. Among other information, the new label contains the accession number essential for the laboratory analysis process. In total, there are two labels for every tube of specimen collected. Having to stick two labels onto a tube is inefficient and potentially a systemic problem in the specimen collection process. Not only does it take time to print labels for the tubes, ensuring correct tube-label match is time-consuming and error-prone in a manual setting during peak period when the stress level on the care-giver is at its highest.

[0005] In accordance with the present invention, a laboratory specimen collection management system comprises a number of specimen collection stations coupled to a specimen processing system. Each specimen collection station consists of a user interface device, a bar-code scanner or data input device, a processing unit, and a printer. Located at the point of care, specimen collection stations are used by clinicians to collect specimens. A specimen collection station can be stationary or mobile.

The advantage of a mobile specimen collection station is that it can be pushed to the point of care e.g. to the patient bedside.

[0006] Patients are identified and verified electronically by the specimen collection station via the bar-code scanner. The specimen tests ordered by the doctors are displayed graphically on the user interface informing the specimen taker of the specimen requirements for the test order including the type of tube, number of tubes, color code of the tube and the amount of specimen to take for a patient. A label is printed *in situ* for each tube displayed on the user interface. Each printed label contains the patient identification code, patient name, the unique laboratory analyzer test accession number for a specimen, date and time of print, location, test codes, specimen test sample id and color of tube. Only one unique label is required for each tube of specimen taken. The specimen processing system has a processing unit that is coupled to a database containing among other information, the laboratory analyzer test accession number for a specimen.

[0007] The specimen processing system contains the business logic for determining the specimen requirements including the type of tube, number of tubes, color tube and the amount of specimen to take for a patient.

[0008] An advantage of the invention is that by having a laboratory specimen management system in which information on the tubes to collect is controlled by the system; it is possible to ensure the correct types and number of tubes to collect, ensuring patient safety and improving efficiency in specimen collection.

[0009] Another advantage of the invention is due to *in-situ* printing of labels. Because the labels are printed *in situ* at the point of care, label mix-up is eliminated and errors arising will be reduced, again contributing to enhanced patient safety.

[0010] Preferably, the specimen collection processing server is additionally coupled to a specimen receipt unit that verifies that the label attached to a specimen tube is indeed the correct label. Thus, the specimen collection management system may further reduce another level of error due to the wrong attachment of available labels for a patient.

[0011] Typically, a number of specimen collection stations may be located at different geographical locations within the care-giving premises.

[0012] Typically, the specimen collection stations may be mobile that can be moved about or stationary in a fixed location within the care-giving premises.

[0013] An example of a laboratory specimen collection management system in accordance with the invention will now be described with reference to the accompanying drawings in which:

[0014] FIG. 1 is a schematic diagram showing a laboratory specimen collection management system. Specimen collection stations are connected to a set of specimen processing system via the Internet (3) on a wireless (1) or wired (2) mode. The specimen processing system communicates with the laboratory analyzer system using the international HL7 standard protocol. Coupled to the specimen processing systems is a database management system containing among other things, the unique laboratory analyzer test accession number for a specimen.

[0015] FIG. 2 is a perspective view of a specimen collection station for use within the laboratory specimen collection management system shown in FIG. 1. A specimen collection station consists of four major components: printer, static or mobile user interface device, processing unit, and data input device. A static user interface device could be a touch screen monitor and a mobile user interface device may include PDA (personal digital assistant) or tablet PC (personal computer). A data input device may be a keyboard or bar-code scanner. All devices communicate via the processing unit.

[0016] FIG. 3 shows how a mobile specimen collection station looks like when deployed at the point of care. The entire specimen collection station can be stationary, or mobile if all the devices and processing unit are placed on a trolley as shown in FIG. 3. A mobile specimen collection station allows it to be pushed to the point of care e.g. at the patient bedside.

[0017] FIG. 4 is a schematic view of the specimen processing system within the laboratory specimen collection management system shown in FIG. 1. There are five major components in a specimen processing system. A HL7 listener server (1) listens to incoming messages from a computerized clinician ordering system. An incoming message contains information about specimen orders made by clinicians done via a separate system that is beyond the scope of this patent filing. All incoming messages are stored in a database server (5). Users interface with the specimen processing system via a rich internet application/user interface (2). The behavior of the specimen processing system is controlled by the proprietary processing logic (3) – the heart of the specimen processing system. The specimen processing system is coupled to the laboratory analyzer via the laboratory analyzer connector (4). The communication protocol between the specimen processing system and the laboratory analyzer is HL7 – an international standard for healthcare information communication.

CLAIMS

1. A laboratory specimen collection management system comprising a specimen test ordering system having functional features for entering specimen test orders; a specimen collection station having a bar-code scanner or data input device for capturing the identity of the patient providing specimens; a specimen processing system in communication with the specimen collection station and coupled to a database, wherein the specimen processing system determines the specimen requirements for the specimen test orders to be graphically displayed at the specimen collection station; a specimen receipt system; and a laboratory information system.
2. A system according to claim 1, wherein specimen test orders are entered into the specimen test ordering system; information in a specimen test order includes patient unique identification code, the specimen test ordered, the unique identity code of the person ordering the specimen test, and the location where the specimen test is ordered.
3. A system according to claim 1, wherein the specimen processing system in response to the receipt of specimen test orders from the specimen test ordering system stores the patient unique identification code, the specimen test ordered, the unique identity code of the person ordering the specimen test, and the location where the specimen test is ordered into the database.
4. A system according to claim 1, wherein the specimen collection station identifies and verifies the patient via the bar-code scanner or data input device.
5. A system according to claim 1, wherein the specimen collection station retrieves from the specimen processing system the patient unique identification code, the specimen test ordered, the unique identity code of the person ordering the specimen test, and the location where the specimen test is ordered, the specimen test collection station displays graphically on a user interface the type of tube, number of tubes, colour code of the tube and the amount of specimen to take for the identified patient, the specimen test collection station prints *in situ* for each tube displayed a bar-code label or any form of digitally readable label containing the patient identification code, patient name, the unique laboratory analyzer test accession number for a specimen, the date and time of print, location, test codes and colour of tube.
6. A system according to claim 5, wherein the specimen collection station retrieves from the specimen processing system a specimen test sample id and the unique laboratory analyzer test accession number for a specimen.

7. A system according to claim 6, wherein the specimen processing system is additionally coupled to a laboratory information system; a processing unit retrieves from the laboratory information system the specimen test sample id and the unique laboratory analyzer test accession number for a specimen when the laboratory information system is provided with the patient unique identification code.
8. A system according to claim 1, wherein the specimen test ordering system also sends to the specimen processing system patient unique identification code, the specimen test ordered, the unique identity code of the person ordering the specimen test, and the location where the specimen test is ordered to indicate an order has been made.
9. A system according to claim 1, wherein the specimen processing system is additionally coupled to a specimen receipt unit that verifies the label attached to a specimen tube is indeed the correct label.
10. A system according to any of the above claims, wherein a number of specimen collection stations are provided at the point of care.
11. A system according to claim 10, wherein a point of care is a location within and without a hospital or clinic.
12. A system according to any of the above claims, wherein a data input device is also a mobile data input device.