

by the platform interface module. A staging table may be generated and stored at the platform interface module in relation to a dose order. The staging table may include a standardized intermediate format for storage of dose order metadata in corresponding relation to dose order data fields for a given dose order.

In this regard, it may be appreciated that different various EMR systems (e.g., one or more HISs, one or more physician order entry (POE) systems, or the like) may be used to generate and/or transmit dose orders to a pharmacy. In turn, receipt and processing of the health information data stream to generate staging tables may facilitate generation of a standardized intermediate format for the dose order. The standardized intermediate format may be beneficial as the dose order may be routed to one of a plurality of different dose order fulfillment clients for use in fulfillment of the medication dose associated with the dose order. In turn, rather than having to facilitate specific respective correlations between different EMR system formats and specific dose fulfillment client input formats, the standardized intermediate form (e.g., the staging table) may be utilized such that a plurality of different EMR system formats may be standardized into the standardized intermediate form and the standardized intermediate form may be in turn transformed into one of the plurality of different input formats associated with different respective ones of dose fulfillment clients. In this regard, upon addition of different EMR systems, the data from the EMR system may be standardized into the standardized intermediate format such that the system may process dose orders received from the new EMR system without having to generate application functionality specific to each dose fulfillment client for the new EMR system. Furthermore, as new dose fulfillment clients are added the system, transformation of the data in the standardized intermediate format may be accomplished without having to generate application functionality for the new dose fulfillment client specific to each EMR system. Accordingly, a robust and modular data exchange system may be realized that allows for any one of a plurality of EMR systems to be utilized in conjunction with any one of a plurality of dose fulfillment clients.

In at least some embodiment examples, the dose order records maintained in a staging table may have some dose order management functionality applied thereto. For example, functions in connection

with viewing, modifying, prioritizing, or otherwise organizing the dose orders may be applied to the dose order

Accordingly, at least some of the dose fulfillment clients may comprise automated dose preparation systems for fulfillment of dose orders without the need for human intervention. In turn, in at least some embodiment examples facilitated herein, the processing performed on the dose order may be completely automated such that there is no human intervention between the entry of the dose order by a physician or the like and the fulfillment of the dose order by an automated dose fulfillment client.

A first aspect example of the disclosure presented herein includes a method for automated transformation of healthcare information by a transformation module between a first form from an electronic medical record (EMR) system and a second form associated with a dose fulfillment client for preparation of a dose in accord with a dose order of the health information data. The method includes retrieving dose order metadata, at a transformation module, for a dose order from a staging table corresponding to the dose order. The staging table is populated with dose order metadata received from a healthcare information data stream in a first form from the EMR system. Additionally, the staging table includes a plurality of dose order data fields populated with corresponding respective portions of the dose order metadata. The method further includes transforming the dose order metadata into a predefined second form corresponding with a dose fulfillment client and providing the dose order metadata in the second form to the dose fulfillment client for fulfillment of a dose associated with the dose order based on the dose order metadata.

In one aspect, the present disclosure refers to a healthcare information exchange system for exchange of healthcare information, the system comprising an electronic medical record (EMR) system, a platform interface module, configured to execute on one or more processors, and a dose fulfillment client for fulfillment of a dose order, wherein the platform interface module receives a healthcare information data stream comprising information related to the dose order, parses dose order metadata for the dose order from the healthcare information data stream, wherein the dose order metadata comprises one or more dose characteristics associated with the dose order, populates a staging table with the dose order metadata for the dose order, wherein the staging table comprises a plurality of dose order data fields populated with corresponding respective portions of the dose order metadata, and transforms the dose

order metadata into a predefined format corresponding to a particular dose fulfillment client to generate transformed dose order metadata, such that the particular dose fulfillment client accesses the transformed dose order metadata, to fulfill the dose order based on the transformed dose order metadata.

A number of feature refinements and additional features are applicable to the first [aspectexample](#).

- 5 These feature refinements and additional features may be used individually or in any combination. As such, each of the following features that will be discussed may be, but are not required to be, used with any other feature or combination of features of the first [aspectexample](#).

For example, the method may further include receiving the healthcare information data stream at a platform interface module from the EMR system. The healthcare information data stream may include  
10 information related to the dose order (e.g., among other information related to different dose orders and/or unrelated data). The method may also include identifying the dose order from the healthcare information data stream and parsing the dose order metadata for the dose order from the healthcare information data

In an [embodiment example](#), the method may include exception processing (e.g., in response to the validating, mapping, or translating of dose order data). In this regard, the method may include generating an exception in response to an error associated with at least one of the mapping or validating.

Additionally, the exception may include prompting a human user to resolve the error. As such, the

method may include receiving, from the human user, an input associated with the resolution of the error.

In turn, the input may include at least one of a correct mapping between a dose order data field of the staging table and a corresponding respective one of a dose fulfillment client input fields or a correct correlation between a portion of dose order metadata and a formulary record of the dose fulfillment client.

As such, the exception processing may further include updating at least one of a mapping logic or a

correlation logic for use in the mapping and correlating, respectively, based on the input received from the human user.

In an [embodiment example](#), the method may include updating the staging table to indicate the dose order metadata for the dose order has been retrieved by the dose fulfillment client. As such, the processing status of a dose may be maintained at the staging table to provide an indication of dose orders that have been processed and those that have not been processed. The method may also include managing the dose order (e.g., by organizing, prioritizing, etc.) prior to providing the dose order metadata in the second form to the dose fulfillment client. For instance, the managing may include providing a user interface to allow a user to perform a management function relative to the dose order. Specifically, the managing may include at least one of modification of dose order metadata, cancellation of the dose order, organization of the dose order relative to other dose orders, or prioritization of the dose order relative to other dose orders.

Additionally, the method may include performing logistical processing on the dose order. The logistical processing may include performing an action relative to the dose order in response to receipt of an EMR system message subsequent to the receipt of the dose order. The EMR system message may include at least one of a dose order change message or a dose order discontinuation message. As such, the logistical processing may include determining if the dose order metadata has been provided to the

dose fulfillment client, and wherein the logistical processing is at least in part based on whether the

determining. The logistical processing may include performing an action relative to the dose order record corresponding to the EMR system message for a dose order record that has not yet been provided to the dose fulfillment client. For instance, the logistical processing may include providing data to the dose fulfillment client related to the EMR system message for a dose order record that has been provided to the dose fulfillment client. The data provided to the dose fulfillment client related to the EMR system message may also be transformed into a form corresponding to the dose fulfillment client.

In an [embodimentexample](#), the dose fulfillment client may include at least one of a pharmacy workflow management application for manual preparation of the dose order, an automated dose preparation device, an automated total parenteral nutrition (TPN) compounder, or a dose dispensing cabinet. Additionally, the EMR system may include a hospital information system (HIS). As such, the method may include exchange of a message from independent healthcare systems comprising the EMR system and the dose fulfillment client. The data exchanged between the EMR system and the dose fulfillment client may be otherwise incompatible without the use of the healthcare information exchange system. For instance, the healthcare information data stream may be a Health Level 7 (HL7) format.

The method may also include logging activity taken with respect to the dose order to generate a log regarding activities relative to the dose order. The logging may include aggregating a plurality of logs generated relative to different respective actions taken with respect to the dose order.

A second [aspectexample](#) includes a method for automated exchange of healthcare information between an electronic medical record (EMR) system and a dose fulfillment client for fulfillment of a dose order. The method includes receiving a healthcare information data stream at a platform interface module. The healthcare information data stream includes information related to a dose order. The method also includes identifying the dose order from the healthcare information data stream and parsing dose order metadata for the dose order from the healthcare information data stream. The dose order metadata includes one or more dose characteristics associated with the dose order. The method further includes populating a staging table with the dose order metadata for the dose order. The staging table includes a plurality of dose order data fields populated with corresponding respective portions of the dose

order

metadata. The method further includes transforming the dose order metadata into a predefined format corresponding to a particular dose fulfillment client to generate transformed dose order metadata. Also, the method includes providing the particular dose fulfillment client access to the transformed dose order metadata, wherein the dose fulfillment client is operable to retrieve the transformed dose order metadata from the staging table to fulfill the dose order based on the transformed dose order metadata.

A number of feature refinements and additional features are applicable to the second [aspectexample](#). These feature refinements and additional features may be used individually or in any combination. As such, each of the following features that will be discussed may be, but are not required to be, used with any other feature or combination of features of the second [aspectexample](#). For instance, any of the foregoing features described in relation to the first [aspectexample](#) may be applicable to the second [aspectexample](#).

A third [aspectexample](#) includes a healthcare information exchange system for exchange of healthcare information between an electronic medical record (EMR) system and a dose fulfillment client for fulfillment of a dose order. The system includes a stream processing module in operative communication with an EMR system to receive a healthcare information data stream from the EMR system. The system further includes a staging table database in operative communication with the stream processing module for storage of a staging table populated with dose order metadata included in the healthcare information data stream. The staging table includes a plurality of dose order data fields populated with corresponding respective portions of the dose order metadata. The system further includes a transformation module operatively disposed between the staging table data base and a dose fulfillment client. The transformation module is operative to identify the dose fulfillment client for use in fulfillment of the dose order and transform the dose order metadata into a predefined format corresponding to the dose fulfillment client. Specifically, the predefined format defines dose order data fields and corresponding dose order metadata formats associated with the dose fulfillment client.

A number of feature refinements and additional features are applicable to the third [aspectexample](#). These feature refinements and additional features may be used individually or in any

combination. As such, each of the following features that will be discussed may be, but are not required to be, used with any

other feature or combination of features of the third aspectexample. For instance, any of the foregoing features described in relation to the first aspectexample may be applicable to the third aspectexample.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic view of an embodiment of a system for facilitating exchange of healthcare information.

Fig. 2 is a flowchart depicting an embodiment of a method for exchange of healthcare information.

Fig. 3 is a schematic view of an embodiment of a system for facilitating exchange of healthcare information between an EMR system and a plurality of dose fulfillment clients.

Fig. 4 is a schematic view of an embodiment of a system for facilitating exchange of healthcare information between an EMR system and a dose fulfillment client for fulfillment of total parenteral nutrition dose.

Fig. 5 is a schematic view of an embodiment of a system for facilitating exchange of healthcare information between an EMR system and a pharmacy workflow management application for fulfillment of a dose order.

Figs. 6-8 are schematic views of embodiments of a system for facilitating exchange of healthcare information between an EMR system and a plurality of dose fulfillment clients.

Fig. 9 is an embodiment of a textual representation of a mapping between a healthcare information data stream and an input format for a dose fulfillment client.

Fig. 10 is an embodiment of a human readable representation of an EMR system message comprising a dose order.

Fig. 11 is an embodiment of a human readable representation of the operation of a transformation module executing relative to the EMR system message of Fig. 10.

Fig. 12 is an embodiment of a dose fulfillment client interface corresponding to the dose order of the EMR system message of Fig. 10.