electronic diaries to record infusion events. Unfortunately, such diaries do not provide actionable data from which a patient is able to plan activity levels. For example, with current systems, patients are unable to ascertain a risk of bleeding if the patient were to participate in an activity such as playing soccer at any point in time after an infusion event. In particular, with current electronic diaries, patients cannot determine their factor level at any given point in time after a prophylactic infusion event, significantly limiting the usefulness of the information provided by such sources.

SUMMARY

In one aspect, the present disclosure refers to a drug monitoring tool, the tool comprising: a data receiver configured to receive a pharmacokinetic (PK) profile of a patient; and an interactive user interface configured to display to the patient a time–varying therapeutic plasma protein level of the patient, the time-varying therapeutic plasma protein level based on an administered dose of a clotting factor VIII and the PK profile of the patient. In another aspect, the present disclosure refers to a drug monitoring tool, the tool comprising: a data receiver configured to receive a pharmacokinetic (PK) profile of a patient; and an interactive user interface configured to present to a patient a time–varying drug concentration level in the patient, the time-varying drug concentration level based on an administered dose of a subject drug and the PK profile of the patient. In yet another aspect, the present disclosure refers to a method for drug monitoring executed by a drug monitoring tool, the method comprising: receiving a pharmacokinetic (PK) profile of a patient; and enabling an interactive user interface to display to a patient a time–varying therapeutic plasma protein level of the patient, the time-varying therapeutic plasma protein level based on an administered dose of a clotting factor VIII and the PK profile of the patient. In yet another aspect, the present disclosure refers to a drug monitoring system, the system comprising: a therapeutic plasma protein dosing regimen apparatus comprising: a model generator configured to create a Bayesian model of pharmacokinetic (PK) profiles of sampled patients, the Bayesian model including (i) a therapeutic plasma protein clearance and (ii) a volume of distribution relationship for a therapeutic plasma protein based upon at least one of patient age or body weight, and a PK server configured to: determine an approximate PK profile of

a patient based upon the Bayesian model, a half-life of the therapeutic plasma protein within the patient, and at least one of an age of the patient or a weight of the patient, determine the therapeutic plasma protein dosing regimen including a dosage and a therapeutic plasma protein level over a time period based upon the approximate PK profile of the patient, modify the therapeutic plasma protein dosing regimen in response to receiving a dosing interval for applying a dosage to the patient, and transmit the modified therapeutic plasma protein dosing regimen to the client device; and a drug monitoring tool comprising: a data receiver configured to receive the pharmacokinetic (PK) profile of a patient, and an interactive user interface configured to display to the patient a time–varying therapeutic plasma protein level of the patient, the time-varying therapeutic plasma protein level based on an administered dose of a clotting factor VIII and the PK profile of the patient.

Examples of the present disclosure provide a drug monitoring tool that enables a patient to view a personalized, real-time indication of clotting factor VIII levels following a prophylactic infusion event. Advantageously, the disclosed drug monitoring tool allows a patient to significantly reduce bleeding events. For instance, the real-time indication of clotting factor VIII provided by the drug monitoring tool enables the patient to make informed decisions related to an amount and/or intensity of physical activity at any given point in time. In an example in which the drug monitoring tool provides an indication of a low level of clotting factor VIII, the patient may refrain from participating in a physically demanding activity such as a sport, decide to self-administer a non-prophylactic dose of clotting factor VIII in order to participate in the physically demanding activity, or choose a low bleed risk activity (e.g., a stationary activity such as reading a book) until the next prophylactic infusion. Thus, the drug monitoring tool advantageously eliminates patient bleed events due to a lack of actionable information.

In one example, a drug monitoring tool comprises a data receiver configured to receive a pharmacokinetic (PK) profile of a patient. The tool also comprises an interactive user interface configured to present to a patient a time–varying drug concentration level in the patient. The time-varying drug concentration level is based on an administered dose of a subject drug and the PK profile of the patient.

In another example, disclosed is a drug monitoring tool. The tool comprises a data receiver configured to receive a pharmacokinetic (PK) profile of a patient. In

addition, the tool comprises an interactive user interface configured to display to the patient a time–varying therapeutic plasma protein level of the patient. The time-varying therapeutic plasma protein level is based on an administered dose of a clotting factor VIII and the PK profile of the patient.

In one example of an example, the PK profile of the patient can be based on a Bayesian model of PK profiles of sampled patients and based upon at least one of a bodyweight, von Willebrand factor ("vWF") level, and/or an age of the patient.

In another example, the data receiver can be a camera configured to scan a quick response (QR) code storing patient information that includes at least PK profile information. Additionally, the drug monitoring tool can further comprise a QR code processor configured to extract and process the patient information stored within the QR code.

In some examples, the data receiver can be a communications interface configured to receive the PK profile from a secured server. In this example, the received PK profile can be encrypted and the communications interface can be further configured to decrypt the encrypted PK profile.

The drug monitoring tool, in other example examples, can further comprise a QR code generator configured to generate the QR code having patient information encrypted using AES–256 encryption with cipher block chaining (CBC) and public-key cryptography standards (PKCS) padding. The QR code generator can be located at a secured server remote from the drug monitoring tool.

The QR code can include at least one of or any combination of: patient identifying information, patient physiological data, patient dosing information, and/or PK profile information of the patient. The patient dosing information can include a prophylactic dosing regimen for a particular clotting factor VIII drug

In another example, the drug monitoring tool can further comprise an activation toolkit configured to enable access to functionalities of the drug monitoring tool in response to at least one of: receiving the PK profile the patient and/or receiving a log of a first prophylactic infusion of the clotting factor VIII.

In other examples, the interactive user interface can be configured to display a graphical representation of a time-varying amount of the therapeutic plasma protein within the patient at any given time. The graphical representation can delineate zones associated with the time varying amount of the therapeutic plasma

protein. Each zone can be associated with a particular concentration range of the time-varying amount of the therapeutic plasma protein within the patient.

The interactive user interface can also include a graphical control element configured to receive patient input corresponding to a request for the time-varying amount of the therapeutic plasma protein within the patient at a particular time. The interactive user interface can be further configured to display the graphical representation of the time varying amount of the therapeutic plasma protein within the patient at the particular time.

A further example includes a method for drug monitoring executed by a drug monitoring tool. The method includes receiving a pharmacokinetic (PK) profile of a patient. In addition, the method includes enabling an interactive user interface to display to a patient a time–varying therapeutic plasma protein level of the patient. The time-varying therapeutic plasma protein level is based on an administered dose of a clotting factor VIII and the PK profile of the patient.

In one example of an example, the PK profile of the patient can be based on a Bayesian model of PK profiles of sampled patients and based upon at least one of a bodyweight, von Willebrand factor ("vWF") level, and/or an age of the patient.

In another example, the method can include scanning a quick response (QR) code storing patient information that includes at least PK profile information. In addition, the method can include extracting and processing the patient information stored within the QR code.

In other examples, the method can include receiving the PK profile from a secured server. The received PK profile can be encrypted. Accordingly, the method can also include decrypting the encrypted PK profile.

In additional examples, the method can include generating the QR code to have patient information encrypted using AES–256 encryption with cipher block chaining (CBC) and public-key cryptography standards (PKCS) padding.

In certain examples, the QR code includes at least one of or any combination of: patient identifying information, patient physiological data, patient dosing information, and/or PK profile information of the patient. The patient dosing information can include a prophylactic dosing regimen for a particular clotting factor VIII drug.

Also, the method can include enabling patient access to functionalities of the drug monitoring tool in response to at least of: receiving the PK profile the patient and/or receiving a log of a first prophylactic infusion.

In further examples, the method can include displaying a graphical representation of a time-varying amount of the therapeutic plasma protein within the patient at any given time. The graphical representation delineates zones associated with the time varying amount of the therapeutic plasma protein. Each zone is associated with a particular concentration range of the time-varying amount of the therapeutic plasma protein within the patient.

Another example of the present disclosure includes a drug monitoring system. The drug monitoring system comprises a therapeutic plasma protein dosing regimen apparatus and a drug monitoring tool.

The therapeutic plasma protein dosing regimen apparatus comprises a model generator configured to create a Bayesian model of pharmacokinetic (PK) profiles of sampled patients. The Bayesian model includes (i) a therapeutic plasma protein clearance and (ii) a volume of distribution relationship for a therapeutic plasma protein based upon at least one of patient age or body weight. The therapeutic plasma protein dosing regimen apparatus also comprises a PK server. The PK server is configured to determine an approximate PK profile of a patient based upon the Bayesian model, a half-life of the therapeutic plasma protein within the patient, and at least one of an age of the patient or a weight of the patient. The PK server is also configured to determine the therapeutic plasma protein dosing regimen including a dosage and a therapeutic plasma protein level over a time period based upon the approximate PK profile of the patient, modify the therapeutic plasma protein dosing regimen in response to receiving a dosing interval for applying a dosage to the patient, and transmit the modified therapeutic plasma protein dosing regimen to the client device.

The drug monitoring tool comprises a data receiver configured to receive the pharmacokinetic (PK) profile of a patient. In addition, the drug monitoring tool comprises an interactive user interface configured to display to the patient a time–varying therapeutic plasma protein level of the patient. The time-varying therapeutic plasma protein level is based on an administered dose of a clotting factor VIII and the PK profile of the patient.