

CLAIMS

What is claimed is:

1. A non-transitory computer-readable medium with instructions stored thereon, that when executed by a processor, perform a method comprising:
 - 5 calculating an aggregated risk factor score representative of each of two or more risk factors associated with a patient's drug regimen, wherein the two or more risk factors are selected from the group consisting of:
 - 1) number of active ingredients in the drug regimen,
 - 2) anticholinergic burden of the active ingredients in the drug regimen,
 - 10 3) sedative burden of the active ingredients in the drug regimen,
 - 4) QT-interval prolongation risk of the active ingredients in the drug regimen, and
 - 5) competitive inhibition of the active ingredients in the drug regimen;
 - and
 - 15 combining the aggregated risk factor scores calculated for each of said two or more risk factors to provide a quantitative personalized medication risk score that is representative of the patient's risk for an adverse drug event.
2. The non-transitory computer-readable medium according to claim 1, wherein the method comprises calculating the risk factor score representative of five or more risk factors associated with the patient's drug regimen within a patient population, wherein the risk factors comprise:
 - 1) number of active ingredients in the drug regimen,
 - 2) anticholinergic burden of the active ingredients in the drug regimen,
 - 3) sedative burden of the active ingredients in the drug regimen,
 - 20 4) QT-interval prolongation risk of the active ingredients in the drug regimen, and
 - 5) competitive inhibition of the active ingredients in the drug regimen.
3. The non-transitory computer-readable medium according to claim 1, the method comprising combining the aggregated risk factor scores calculated for each of said two or more risk factors to further provide a data set representative of a patient population's risk of an adverse drug event.
- 30 4. The non-transitory computer-readable medium according to claim 1, the method comprising providing the quantitative personalized medication risk score as a visual representation of a relative risk of each of said risk factors with respect to each other.

5. The non-transitory computer-readable medium according to claim 1, wherein calculating the aggregated risk factor score representative of the number of active ingredients in the drug regimen comprises importing a data set comprising patient-specific drug regimens, converting said data set into respective active ingredients, quantifying the number of active ingredients each patient-specific regimen contains, and assigning the risk factor score representative of the number of active ingredients in the drug regimen.
6. The non-transitory computer-readable medium according to claim 1, wherein calculating the aggregated risk factor score representative of the anticholinergic burden of the active ingredients in the drug regimen comprises importing a data set comprising indices of anticholinergic burden, associating the respective active ingredients with their clinically determined anticholinergic value, quantifying the value for the entire respective regimen, and assigning the aggregated risk factor score representative of the anticholinergic burden of the drug regimen.
7. The non-transitory computer-readable medium according to claim 1, wherein calculating the aggregated risk factor score representative of the sedative burden of the active ingredients in the drug regimen comprises importing a data set comprising indices of sedation effects, associating the respective active ingredients with their clinically determined sedation value, quantifying the value for the entire respective regimen, and assigning the aggregated risk factor score representative of the sedative burden of the drug regimen.
8. The non-transitory computer-readable medium according to claim 1, wherein calculating the aggregated risk factor score representative of the QT-interval prolongation risk of the active ingredients in the drug regimen comprises importing a data set comprising indices of QT-prolongation risk, associating the respective active ingredients with their clinically determined QT-risk value, quantifying the value for the entire respective regimen, and assigning the aggregated risk factor score representative of the QT-interval prolongation risk of the drug regimen.
9. The non-transitory computer-readable medium according to claim 1, wherein calculating the aggregated risk factor score representative of the competitive inhibition of the active ingredients in the drug regimen comprises importing a data set comprising metabolic pathways and extent of metabolism for each active ingredient, associating the respective ingredients with competitive inhibition values based on shared pathways, quantifying the competitive inhibition value for the entire respective regimen, and assigning the aggregated risk factor score representative of the competitive inhibition of the drug regimen.

10. The non-transitory computer-readable medium according to claim 1, wherein calculating each of the aggregated risk factor scores comprises:
- importing a first data set comprising patient-specific drug regimens, converting said data set into respective active ingredients, quantifying the number of active ingredients each patient-specific regimen contains, and assigning the aggregated risk factor score representative of the number of active ingredients in the drug regimen;
- importing a second data set comprising indices of anticholinergic burden, associating the respective active ingredients with their clinically determined anticholinergic value, quantifying the value for the entire respective regimen, and assigning the aggregated risk factor score representative of the anticholinergic burden of the drug regimen;
- importing a third data set comprising indices of sedation effects, associating the respective active ingredients with their clinically determined sedation value, quantifying the value for the entire respective regimen, and assigning the aggregated risk factor score representative of the sedative burden of the drug regimen;
- importing a fourth data set comprising indices of QT-prolongation risk, associating the respective active ingredients with their clinically determined QT-risk value, quantifying the value for the entire respective regimen, and assigning the aggregated risk factor score representative of the QT-interval prolongation risk of the drug regimen; and
- importing a fifth data set comprising metabolic pathways and extent of metabolism for each active ingredient, associating the respective ingredients with competitive inhibition values based on shared pathways, quantifying the competitive inhibition value for the entire respective regimen, and assigning the aggregated risk factor score representative of the competitive inhibition of the drug regimen.
11. A processor configured to implement the non-transitory computer-readable medium with instructions stored thereon according to claim 1.
12. A client device comprising the processor of claim 11, a communication infrastructure, a memory, a user interface and a communication interface.
13. A system comprising one or more computing devices, the one or more computing devices comprising one or more processors according to claim 11.
14. A computer-implemented system for determining a patient's risk of an adverse drug event based as least on the patient's drug regimen comprising:
- a database containing two or more of the following data sets related to the patient's risk factors: (1) number of active ingredients in the drug regimen, (2)

anticholinergic burden of the active ingredients in the drug regimen, (3) sedative burden of the active ingredients in the drug regimen, (4) QT-interval prolongation risk of the active ingredients in the drug regimen, and (5) competitive inhibition of the active ingredients in the drug regimen; and

5 a calculating module, which applies algorithms to said two or more data sets and calculates a quantitative personalized medication risk score that is representative of the patient's risk for an adverse drug event.

15. The system according to claim 14, wherein the calculating module calculates the quantitative personalized medication risk score based on aggregated risk factor scores
10 representative of each of the two or more data sets.

16. A method of reducing a risk of an adverse drug event in a patient, wherein the patient has been prescribed a drug regimen that includes at least a first drug and a second drug, the method comprising:

 calculating a quantitative personalized medication risk score that is representative
15 of the patient's risk for an adverse drug event by combining aggregated risk factor scores representative of each of two or more risk factors associated with the patient's drug regimen, wherein the two or more risk factors are selected from the group consisting of:

- 1) number of active ingredients in the drug regimen,
- 2) anticholinergic burden of the drug regimen,
- 20 3) sedative burden of the drug regimen,
- 4) QT-interval prolongation risk of the drug regimen, and
- 5) competitive inhibition of the drug regimen; and

 adjusting the patient's drug regimen by performing one or more steps of:

- (a) removing the first drug and/or the second drug from the patient's drug
25 regimen;
- (b) reordering which of the first drug and the second drug is taken first by the patient;
- (c) changing the timing of when the first drug and/or the second drug are taken by the patient;
- 30 (d) changing time of day when the first drug and/or the second drug are taken by the patient;
- (e) replacing the first drug and/or the second drug of the patient's drug regimen with one or more alternate drugs of the same class and/or category as the first drug and/or the second drug;

- (f) reducing the dosage of the first drug and/or the second drug from an initial dosage to a reduced dosage;
 - (g) increasing the dosage of the first drug and/or the second drug from an initial dosage to an increased dosage;
 - 5 (h) performing a surgical procedure; and
 - (i) adding at least a third drug to the patient's drug regimen.
17. The method according to claim 16, wherein calculating the quantitative personalized medication risk score comprises executing instructions stored on a non-transitory computer-readable medium.
- 10 18. The method according to claim 17 comprising using a computing device to execute the instructions stored on the non-transitory computer-readable medium.
19. The method according to claim 16 further comprising comparing the patient's quantitative personalized medication risk score for the drug regimen to quantitative personalized medication risk scores of a patient population for said drug regimen.
- 15 20. The method according to claim 16, wherein adjusting the patient's drug regimen causes the quantitative personalized medication risk score to decrease.