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Computer-assisted Cancer Chemotherapy Planning and Alerting System

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Abstract and objective

Chemotherapy misadministration can be serious devastating to patients. One reason for iatrogenic injury during chemotherapy is the information management is complicated. The use of computerized chemotherapy management system has been proposed to improve patient safety and quality of care. To develop a computer-assisted chemotherapy planning system, we set two requirements. i) Creating the chemotherapy planning model emphasized on the physician's decision-making process. ii) Building up expressions to reason about particular knowledge associated with each decision-making process. Based on the requirements, we have developed the model of chemotherapy planning. In this paper, we present development of web-based prototype system of chemotherapy planning and alerting system. Through the inspection by implementing prototype system, it seems to be useful from the viewpoint of preventing physician from overlooking the information about patient.

Keywords:

chemotherapy, decision support system, alerting system

Methods

We have developed the model[1] of chemotherapy planning, emphasized on the decision making process of the physician. This model consists of entity model of chemotherapy, process model of chemotherapy planning, and expression language to reason about particular status of the patient. Based on this model, we structured chemotherapy regimen into computer readable form. Figure 1 shows a part of structured regimen.

Results

We constructed a knowledge base that includes several kinds of structured-regimen, and developed web-based prototype system. Overview of the system architecture is shown in Figure 2. There are two functions in this system. 1) Providing decision support for the physician to create administration schedule. In each decision point such as pretreatment evaluation and dosage modification, system evaluates decision criteria based on the patient data, and shows the result to the physician. 2) Providing notification support all day long. When dosage should be modified depending on the additional patient data, system sends a recommendation message to physician. Through the inspection by implementing prototype system, it seems to be useful from the viewpoint of preventing physician from overlooking the information about patient.

```
<regimen name="CHOP" code="001" cycle_frequency="5">
  <cycle duration="21">
    <pretreatment_evaluation>
      <lhs> phenomenon(NCICTC_Leukocytes_Grade).greaterThan(3) </lhs>
      <rhs> Recommend beginning at the cycle to be postponed </rhs>
    </pretreatment_evaluation>
    <drug name="vincristine" standard_dosage="1.4" max_dosage="2.0" dosage_unit="mg">
      <date_allocation> 1 </date_allocation>
      <administration_method route="iv">
        <division unit="min">60</division>
      </administration_method>
      <dosage_modification time_context="14" unit="day">
        <lhs> phenomenon (NCICTC_Leukocytes_Grade).greaterThan(2) </lhs>
        <rhs> Recommend reduce to 80% dose </rhs>
      </dosage_modification>
```

Figure 1- Example of a structured chemotherapy regimen. Element of "pretreatment evaluation" is a decision criteria of start of the therapy cycle. Element of "dosage modification" is a decision criteria of modification of a drug dosage

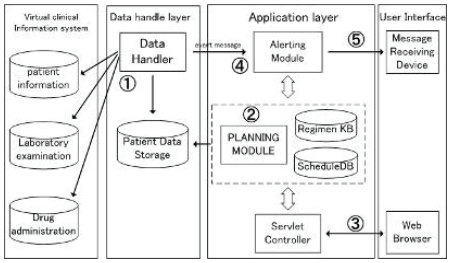

Figure 2 - Overview of the system architecture. 1) Different kind of patient data are collected and unified into the data storage. 2) Planning module provides an administration schedule while evaluating decision criteria based on the patient data. 3) Physician can operate planning module to create an administration schedule. 4) Alerting module is evoked by data handler and evaluates drug dosage using planning module. 5) If dosage should be modified, alerting module sends recommendation massage to the physician

1 We contributed the article of this model to MEDINFO 2007.