

Model against unnecessary use of antibiotics

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Patients in intensive care units are often administered antibiotics against ventilator-associated pneumonia, "to be on the safe side." Dutch researcher Stefan Visscher has developed a model that can quickly establish whether or not a patient has pneumonia. This can prevent unnecessary treatment with antibiotics.

In his thesis Stefan Visscher studied 238 cases of antibiotic treatment of which – with hindsight – only 157 patients were actually suffering from pneumonia. An absence of suitable patient-friendly tests makes it difficult to determine with certainty whether or not a patient has developed pneumonia.

Visscher developed and tested a Bayesian network model, a probabilistic model, that can distinguish between patients that do and do not have ventilator-associated pneumonia (VAP). His model calculates the probability that an individual patient is suffering from pneumonia, predicts which bacteria has caused it and indicates which antibiotic can best be prescribed. This method is more reliable than the cultures on which physicians currently base their decisions. The data needed to make the probability calculations are automatically retrieved from the electronic patient file.

In his model Visscher processed the clinical data and other details of all ventilated ICU patients over a period of three years. The computer models were initially based on expert knowledge. At a later stage this was enhanced with 'machine-learning' techniques in order to optimise the reliability of the predictions where needed.

Visscher's research is part of the TimeBayes project that is responsible for the implementation of the electronic patient file. The electronic patient file contains all relevant laboratory data and clinical patient information. The TimeBayes project develops methods, techniques and tools that use this information to help support physicians in their decisions. Visscher concludes that the new computer models form a basis for a reliable decision-support system for ICU-physicians. The next step should be to set up a large study to test the value of these models in daily practice.

Source: Netherlands Organization for Scientific Research

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