TREAT - a system for balancing antibiotic treatment against development of drug resistance

Fact Sheet

Project Information

TREAT

Grant agreement ID: IST-1999-11459

Funded under FP5-IST

Project website

Overall budget € 1 640 260

EU contribution € 1 365 000

Start date 1 January 2000
End date 30 November 2004

Coordinated by AALBORG UNIVERSITET Denmark

Objective

The goal of the project is to develop a framework for the building and testing of medical decision support systems. The framework is based on a novel technology for the construction of very large stochastic models. The project will demonstrate the value of the proposed framework through its successful application in a specific medical area, the antibiotic treatment of infections. The medical objective of the project is thus to develop and test a decision support system, TREAT, that can help doctors reduce substantially the large and rising mortality (about 100,000 annual deaths in Europe) associated with inappropriate antibiotic treatment of patients with severe infections, and help to curb the development of bacterial resistance to antibiotics. Achievement of this goal will, in its own right, be a substantial contribution to community social objectives in terms of improved quality of life and conservation of a natural resource that is rapidly being depleted: a flora of micro-organisms that have low resistance to antibiotics.
The TREAT system will be installed and tested in hospitals in Denmark, Germany and Israel. An important aspect of this European dimension is the sharing of large and unique databases on bacterial infections owned by the partners in these countries. Resistant bacterial strains do not respect national borders and with the current level of travel, the problem of bacterial resistance cannot be solved at the national level. The results of the clinical testing are expected to show that 1) TREAT can be integrated into the informational infrastructure of the involved hospitals, 2) TREAT is clinically acceptable from the user interaction point of view, and 3) TREAT can give major reductions in mortality, compared to current clinical practice.

Based on these results, a plan for worldwide commercialisation of TREAT will be developed, and the results will be disseminated to open a path for the use of this novel technology in other medical areas.

OBJECTIVES
1. The purpose of the project is to develop a novel framework for the construction and testing of medical decision support systems and to demonstrate its soundness through a successful application of the framework to a clinical problem of major importance. A successful application implies that the system a) can be integrated into the informational infrastructure of the involved hospitals, b) is clinically acceptable from the user interaction point of view, and c) can improve diagnosis or therapy in the medical area addressed.
2. The clinical problem chosen is the selection of antibiotic therapy for the treatment of severe infections. A medical decision support system, TREAT, will be developed, that can help doctors reduce substantially the about 100,000 annual deaths in Europe associated with inappropriate antibiotic treatment of patients with severe infections, and help to curb the development of bacterial resistance to antibiotics.
3. TREAT will be tested to demonstrate that it can be integrated in the clinical and informational environment and that improvements in antibiotic therapy can be obtained in a large controlled multi-centre clinical trial in geographic regions with widely differing patterns of antibiotic resistance.
4. The steps necessary to ensure that the results will be disseminated scientifically will be taken, and TREAT will be made commercially available. Widespread clinical adoption of TREAT is expected to lead to reduced mortality, improved quality of life and savings in the health care system.

DESCRIPTION OF WORK
1. A stochastic model of infection will be built, using a combination of knowledge and data. The model will be implemented as a causal probabilistic network (CPN), where knowledge about the pathophysiology of infections is used to structure the stochastic model. A major part of this work will rest on the partners access to unique large detailed clinical and microbiological databases which permit us to identify and...
distinguish between universal features that can be assumed to be constant between hospitals and local features that must be calibrated for each hospital. The model will be integrated into the TREAT decision support system that uses a decision theoretic approach to balance the benefits (i.e., reduction of mortality) against the costs of using antibiotics (including the risk of promoting antibiotic resistance).

2. Two versions of TREAT will be developed, TREAT-LAB for use in departments of clinical microbiology and TREAT-WARD for use in other clinical departments. TREAT will be installed at three different hospitals, and integrated into the departments' workflow and informational infrastructure. Data from sources such as laboratory and hospital information systems will automatically be made available to the system. The system will provide decision support by providing graphical presentations of relevant probabilities, such as the probability of different types of bacterial infections and the probability of resistance to antibiotics, thus leaving the clinical user with the final choice of antibiotic therapy. The clinical and ergonomic acceptability of TREAT will be evaluated.

3. TREAT will be subjected to a multinational controlled clinical trial in 3 different hospitals. Measurable outcomes will be the number of patients receiving inappropriate antibiotic therapy, mortality and costs, including consumption of broad-spectrum antibiotics. Patient identifiable information will be treated confidentially and ethical approval will be applied for as appropriate.

Programme(s)

Topic(s)

Funding Scheme

CSC - Cost-sharing contracts

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