

Development of Tailored Antimicrobial Treatment Regimens and Novel Host- Pathogen Insights for Respiratory Tract Infections and Sepsis

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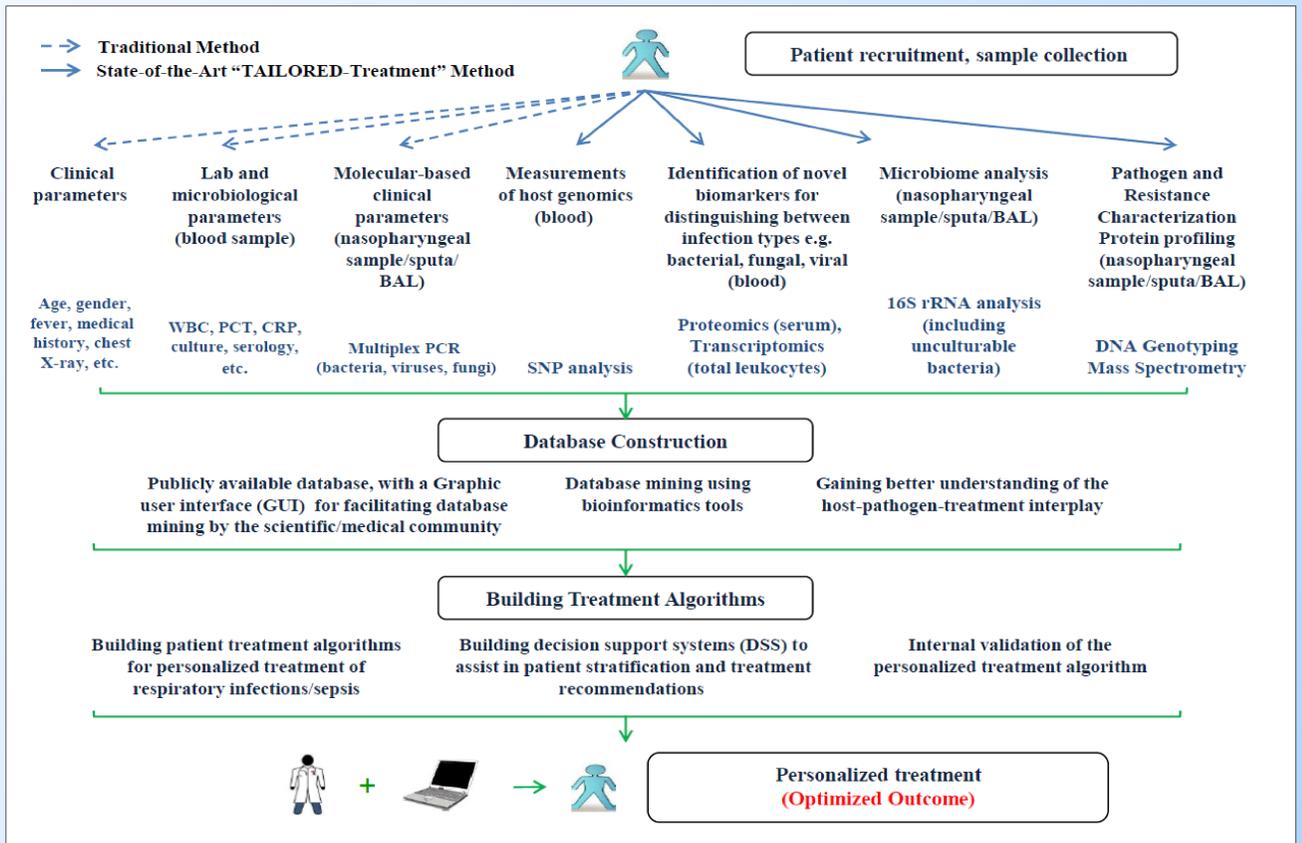
Introduction



- Though of tremendous benefit to global health, antibiotics currently represent the most misused drugs in the world. Global overuse is estimated at 40%-70%, with overuse leading to preventable adverse events that may impact on patient care.

Importantly, overuse also leads to the emergence of antibiotic-resistance, a phenomenon that is recognized as a major threat to global health. Further, the current diagnostic tools for facilitating the appropriate use of antibiotics are often inadequate as antibiotic consumption and the spread of antibiotic resistance are continually increasing.

- The TAILORED-Treatment project aims to help clinicians make informed decisions regarding the need for, and type of, antimicrobial therapy required for individual patients.
- Our main goal is to establish a broad-based strategy (not limited to a particular antibiotic group) that can be implemented on a broad scale to increase the effectiveness of antibiotic and antifungal therapy, reduce adverse events, and help limit the emergence of antimicrobial resistance in children and adults.



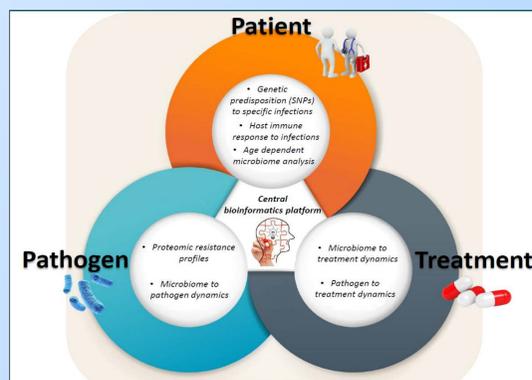
Multifaceted approach adopted by the TAILORED-Treatment consortium to help personalize antimicrobial prescribing practices to individual patients. The data collected will be used to identify novel host-pathogen-treatment dynamics and generate a web-based predictive treatment algorithm for use by physicians. (BAL- Bronchoalveolar lavage, WBC- white blood cell, CRP - C-reactive protein, PCT-procalcitonin, SNP- single-nucleotide polymorphism)

Combining Clinical Data with Omics Technologies

- At the heart of the TAILORED-Treatment project is a prospective clinical study in which we will recruit 1200 patients (>2000 patient samples) presenting with respiratory tract infections and/or sepsis. Patient cohorts will include equal representation of genders, children and adults. State-of-the-art molecular and biochemical technologies will be developed and applied to characterize the host and pathogen at the genomic, transcriptomic, proteomic and clinical level. The result will be a large-scale unique multi-dimensional dataset stored in a publicly available database, which is accessible to the EU scientific and clinical community.
- Next, the consortium partners will develop and apply new computational tools to interrogate the data, in order to provide new insights into personalized host-pathogen interactions, including the discovery of novel biomarkers for patient diagnosis and disease monitoring. By incorporating these new insights into current clinical knowledge, we will construct a predictive personalized treatment algorithm that will lead to informed and personalized antibacterial, antifungal and antimicrobial treatment regimens (indication, dosage, and duration) that are tailored to the needs (type of infection, presence of novel biomarkers etc) of children and adults presenting with respiratory infections and sepsis. Finally, the algorithm and large-scale unique multi-dimensional dataset will be built into an easily navigable web-based, free-to-use, decision support system ready for use by physicians to explore, test and assist in patient-tailored antimicrobial treatment decisions

Creation of a Novel Database and Treatment Algorithm

- Omics-based surveys of the host transcriptome, proteome, genome and microbiome within a large cohort of patients will generate a substantial amount of novel data. The newly collected data will be stored and mined using a dedicated bioinformatics platform, enabling efficient statistical analysis and the identification of significant associations between the different data sets.



The Future of Personalized Infectious Disease Therapy

- Cloud-based computational platforms will be integrated with patient-based omics information such as genomics, transcriptomics, proteomics, microbiome, and drug metabolism kinetics to generate accurate physician-friendly algorithms. Combining accessibility to personal data and algorithms with point-of-care diagnostic tests will transform the management of infectious disease.



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