Machine learning (ML) is a growing field in medicine. This narrative review describes the current body of literature on ML for clinical decision support in infectious diseases (ID)” Peiffer-Smadja et al (2019).

Abstract:

Background: Machine learning (ML) is a growing field in medicine. This narrative review describes the current body of literature on ML for clinical decision support in infectious diseases (ID).

Objectives: We aim to inform clinicians about the use of ML for diagnosis, classification, outcome prediction and antimicrobial management in ID.

Sources: References for this review were identified through searches of MEDLINE/PubMed, EMBASE, Google Scholar, biorXiv, ACM Digital Library, arXiv and IEEE Xplore Digital Library up to July 2019.

Content: We found 60 unique ML-clinical decision support systems (ML-CDSS) aiming to assist ID clinicians. Overall, 37 (62%) focused on bacterial infections, 10 (17%) on viral infections, nine (15%) on tuberculosis and four (7%) on any kind of infection. Among them, 20 (33%) addressed the diagnosis of infection, 18 (30%) the prediction, early detection or stratification of sepsis, 13 (22%) the prediction of treatment response, four (7%) the prediction of antibiotic resistance, three (5%) the choice of antibiotic regimen and two (3%) the choice of a combination antiretroviral therapy. The ML-CDSS were developed for intensive care units (n = 24, 40%), ID consultation (n = 15, 25%), medical or surgical wards (n = 13, 20%), emergency department (n = 4, 7%), primary care (n = 3, 5%) and antimicrobial stewardship (n = 1, 2%). Fifty-three ML-CDSS (88%) were developed using data from high-income countries and seven (12%) with data from low- and middle-income countries (LMIC). The evaluation of ML-CDSS was limited to measures of performance (e.g. sensitivity, specificity) for 57 ML-CDSS (95%) and included data in clinical practice for three (5%).

Implications: Considering comprehensive patient data from socioeconomically diverse healthcare settings, including primary care and LMICs, may improve the ability of ML-CDSS to suggest decisions adapted to various clinical contexts. Currents gaps identified in the evaluation of ML-CDSS must also be addressed in order to know the potential impact of
such tools for clinicians and patients.

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