

EDITORIAL

Infectious Disease

Overdiagnosis and overtreatment of infectious diseases at the intersection of individual disease diagnosis, treatment, and public health

Overdiagnosis occurs when people with or without symptoms are diagnosed with a disease that ultimately will not cause them to experience worsening physical symptoms, disability, or early death. Clinicians have been paying more attention to the problem of overdiagnosis as part of the more general problem of “overmedicalization” of society in general. This also includes overtreatment, diagnostic creep, and disease mongering.¹

In this issue of *JACEP Open*, Meltzer et al demonstrated that a point-of-care multiplex polymerase chain reaction (PCR) analyzer identifying the microbiological cause of an infectious disease at an urgent care center (UCC) led to increased patient satisfaction.² Patients presenting to an UCC with respiratory symptoms were randomized to point-of-care multiplex PCR testing identifying viral and bacterial pathogens or a control group that got no testing. They found patients were more cognizant of the need to quarantine and take time off work when they knew the test results. There was no significant effect on antibiotic prescription, although the study was only powered for patients' satisfaction.

Superficially, this seems reasonable for UCCs, and some may argue that this technology could be useful in the Emergency Department. However, this begs the question of whether the wider use of these diagnostic tools would increase the potential for overdiagnosis.

The definition of overdiagnosis was articulated in a 2018 editorial:³ “identification of abnormalities that were never going to cause harm, abnormalities that do not progress, that progress too slowly to cause symptoms or harm during a person's remaining lifetime, or that resolve spontaneously.” They focused primarily on the overdiagnosis of cancers, but the concept is also applicable here. Overdiagnosis and over-testing are a complex problem, with many implications. The risk of overdiagnosis increases with the number of tests ordered that identify a disease not destined to meaningfully harm the patient, making the risks of testing outweigh the benefits. While difficult to determine at the individual level, this should be studied in population samples where the chance of an overdiagnosis in a particular situation can be estimated.³

It is understood that overdiagnosis has many harms including the cost of the tests, the need for follow-up testing, treatment for diseases that will not affect health or longevity, and giving patients either a false sense of security or causing unnecessary anxiety. Patients may not understand why testing should be avoided and health care providers must spend more time counselling patients to avoid unnecessary testing.

Overused medical testing also effects patients' life by involving them in more frequent medical encounters and potentially serious effects of unnecessary treatment. Another harmful impact is that patients may worry about diseases that they do not have or will not affect their health. Although not observed in the study by Meltzer et al, over-testing might lead to inappropriate prescription of antibiotics or antivirals and additional testing in the patient or exposed community members. Over-prescribing is not helpful and may lead to increased adverse effects, some being as serious as *Clostridium difficile* infection.⁴

A systematic review and meta-analysis by Schober et al. demonstrated an increase in prescriptions for antiviral agents in patients testing positive for influenza.⁵ It is unlikely that antivirals help most low-risk patients with influenza or COVID-19,⁶ and there is ecological evidence that higher antiviral use drives resistance.⁷

There are incentives for practitioners to perform additional testing. Indication creep is increased use of a test or a treatment for indications that would not normally require treatment. The ease of testing will lead to tests being performed unnecessarily. This is more likely with studies sponsored or supported by industry.⁸

So, are multiplex analyzers useful for infectious diseases? Beyond patient satisfaction, it would be critical to analyze the benefits and harms. This question lends itself to studies using a rigorous methodology. Nonetheless, antivirals are too often prescribed without indication that the patient is at risk for severe disease.⁹

Research in overdiagnosis is complex and currently limited. We can carefully accept the results of Meltzer et al. showing a slight increase in patient satisfaction. This study provides an impetus for more rigorous research on the role of multiplex PCR, problems associated with overdiagnosis, and its potential for use in public health systems.

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