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## Re-estimating annual deaths due to multidrug-resistant organism infections

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### To the Editor—

Multidrug-resistant organisms (MDROs) are responsible for an increasing number of infections each year.<sup>1</sup> An oft-cited statistic is that MDRO infections cause > 2 million illnesses and 23,000 deaths each year in the United States.<sup>1</sup> However, the true burden of MDRO infections remains uncertain due to insufficient national reporting rates and an absence of ICD-10 codes specifically for MDRO infections. Therefore, we sought to provide an updated estimate of deaths due to MDRO infections in the United States. Based on availability of data, we provide an estimation of mortality from MDROs for the year 2010.

In 2010 in the United States, 2,468,435 deaths were registered,<sup>2</sup> of which 715,000 (29.0%) were inpatient hospital deaths.<sup>3</sup> Using a conservative estimate for deaths due to sepsis,<sup>4</sup> 34.4% of inpatient deaths occur among patients with sepsis,<sup>5</sup> and the reported rate of MDR pathogens in sepsis is 28.8%.<sup>6</sup> With these parameters, MDRO sepsis could cause 70,837 inpatient deaths each year (Table 1).

We have yet to assign infection as a cause of death to the 1,753,435 outpatient deaths in 2010. Subtracting deaths that are unlikely to be due to infection (eg, suicides, accidents, and homicides), we are left with 1,572,624 deaths. After subtracting deaths due to infections, 1,550,536 deaths remain. If 17%–19% of these 1,550,536 deaths are due to infections (despite not being indexed as such)<sup>7</sup> and 28.8% are due to MDROs, there would be 285,680–316,690 deaths in which infection contributed to death, of which 82,276–91,207 deaths were due to MDROs (Table 1).

Summing the lower bounds of our estimates for inpatient and outpatient deaths due to MDRO infections gives us 153,113 deaths, a number almost 7-fold higher than that estimated by the CDC (ie, ~23,000).<sup>1</sup> Assuming a worst-case scenario and summing the upper limits of our estimate, 162,044 deaths in the United States were due to MDRO infections in 2010 (Table 1). This would move MDRO infections to the third highest cause

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of death in the United States for 2010. All infections would then supersede the MDRO infections group as the third highest cause of death,<sup>2</sup> with > 500,000 (Table 1).

Our estimates illustrate a need for better surveillance and reporting mechanisms for MDRO infections. With rampant overuse of antibiotics, establishment of MDRO breeding and transmission centers (long-term acute-care hospitals and nursing facilities), and increasing rates of iatrogenic immunosuppression, the population at risk for MDRO infections and the likelihood of drug resistance will continue to increase. To address this critical issue, establishing the burden of MDROs is crucial to guide research funding allocation.

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**Table 1.**

Estimates of Number of Deaths Due to Infection and Multidrug-Resistant Organisms in the United States in 2010

<b>Category</b>	<b>Deaths Due to Infection</b>	<b>Deaths Due to Multidrug-Resistant Organism Infection</b>
Inpatient	245,960	70,837
Outpatient	285,680–316,690	82,276–91,207
Total	531,640–562,650	153,113–162,044

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