

# Global Vaccination Recommendations and Thimerosal

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## KEY WORDS

thimerosal, global vaccine supply, vaccine manufacturing, global immunization

## ABBREVIATIONS

UNEP—United Nations Environmental Programme  
WHO—World Health Organization

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Vaccines remain one of the most effective ways to prevent infectious disease and deaths globally.<sup>1</sup> Universal childhood immunization provides herd immunity against many infectious agents and is a policy that has achieved dramatic reductions in common childhood illnesses. Thimerosal, which contains ethyl mercury, has been used as a preservative in vaccines to prevent contamination of multidose vials from bacteria and fungi since the 1930s.<sup>2</sup> Although there are clear neurotoxic effects of methyl mercury absorption, ethyl mercury has not been associated with those consequences. Nevertheless, before data were available on risks of thimerosal in vaccines, in 1999 the American Academy of Pediatrics and the US Public Health Service recommended moving toward removing thimerosal use in preservatives as a precautionary measure.<sup>3</sup> Thus, thimerosal as a preservative has been removed from most vaccines in the United States, generally resulting in distribution of vaccines in single-dose rather than multidose vials. US vaccines routinely recommended for children that still contain thimerosal as a preservative are seasonal influenza vaccines including the multi-dose presentation Afluria (CSL Limited) and multidose formulations (Fluzone (Sanofi Pasteur) and Fluvirin (Novartis)).<sup>4</sup> Thimerosal remains an important vaccine preservative in resource-poor countries. Thimerosal allows the use of multiuse vials, which reduce vaccine cost and the demand on already constrained cold-chain systems. Even in the United States, thimerosal could be critical for dealing with emergencies and the need to rapidly increase vaccine supply and delivery, such as during a serious pandemic of influenza.<sup>5</sup> Overwhelmingly, the evidence collected over the past 15 years has failed to yield any evidence of significant harm, including serious neurodevelopmental disorders, from use of thimerosal in vaccines. Dozens of studies from countries around the world have supported the safety of thimerosal-containing vaccines. Specifically, the Institute of Medicine, and others have concluded that the evidence favors rejection of a link between thimerosal and autism.<sup>6–12</sup> Careful studies of the risk of other serious neurodevelopmental disorders have failed to support a causal link with thimerosal.<sup>13–17</sup> In May 2002, the American Academy of Pediatrics retired its 1999 statement on thimerosal after evaluating new studies.<sup>3,18</sup> The original decision is explained in an accompanying commentary in this issue by Dr Louis Z. Cooper and Dr Samuel Katz.<sup>19</sup> Had the evidence that is available now been available in 1999, the policy reducing thimerosal use would likely have not been implemented. Furthermore, in 2008 the World Health Organization (WHO) endorsed the use of thimerosal in vaccines.<sup>20</sup>

Because of the well-known neurotoxic effects of methyl mercury and the conversion of mercury to methyl mercury in aquatic organisms, the United Nations Environmental Program (UNEP) is working admirably to

develop an international treaty that would lead to the elimination of controllable mercury pollution and exposure throughout the world; we support their efforts to do so. However, as part of this effort, in addition to removing mercury from thermometers, sphygmomanometers, and other medical uses of mercury, the UNEP is considering recommending the removal of thimerosal (ethyl mercury), which has no recognized serious toxic effects as currently used, from vaccines worldwide. Federal agencies based safety limits for ethyl mercury on limits established for methyl mercury. These limits were based on methyl mercury's accumulation in the body due to its long half-life, which is ~7 times greater than that of ethyl mercury.<sup>21</sup>

Global removal of thimerosal has the potential to adversely affect the worldwide vaccine supply. In recent reports given to WHO, estimates were presented by acknowledged experts on the impact of global removal of thimerosal; some estimates were based on expert opinion but had the advantage of input from other experts within the context of 3

WHO technical consultations or expert advisory meetings. The increases in manufacturing cost vary greatly from country to country, ranging from 200% to >500%.<sup>22–25</sup> Single-dose vials would reduce manufacturing capacity and increase the amount of transportation and storage space required more than threefold. The resulting cold-chain requirements would be untenable in many areas of the world because of programmatic challenges and increased workload.<sup>22,24,25</sup> Furthermore, single-dose packaging produces more waste (both vaccine and CO<sub>2</sub> emissions).<sup>22,24,26</sup> The continued benefits of thimerosal use in vaccine manufacturing clearly outweigh any perceived risks.

WHO's Strategic Advisory Group of Experts on Immunization<sup>27</sup> recently recommended that this part of the ban be removed from the UNEP treaty<sup>28</sup> and we concur.<sup>29</sup>

This is an exciting time for global immunization programs. Global immunization efforts are being supported worldwide by many organizations,

including the US government as both humanitarian and protective measures.<sup>30</sup> As advocates for the health of all children, we strongly support these efforts also. Immunization prevents ~2.5 million deaths a year globally. Millions more deaths could be prevented if global immunization efforts are bolstered.<sup>31</sup> The preponderance of available evidence has failed to demonstrate serious harm associated with thimerosal in vaccines. As such, we extend our strongest support to the recent Strategic Advisory Group of Experts recommendations to retain the use of thimerosal in the global vaccine supply.

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