Quantifying the Extent of Human Papillomavirus quadrivalent recombinant vaccine (HPV4) Wastage in a Safety Net Population

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Introduction:

Methods:

• A retrospective study of HPV4 usage was conducted between July 1, 2006 and October 1, 2009, the time frame when HPV4 was the exclusive HPV vaccine approved by the FDA.
• The date, dose number, visit type and subject characteristics were abstracted from the electronic medical records for all females 10-26 years old who received HPV4 in the TMC system.
• Unique dose wastage was classified as a dose given too early or too late from the prior dose, defined for dose 1-2 as < 4 weeks, for dose 2-3 as < 12 weeks and for dose 1-3 as > 24 weeks.
• Dose wastage was defined as less than three doses in a series (singleton or doublets) or the fourth dose when a triplet or quadruplet was given.
• This research was approved by the TMC Privacy Board and by the UMKC Adult Health Sciences Institutional Review Board.

Results for Insufficient Numbers of Doses:

• Three-quarters of the wasted doses were either singletons (651/1961) (missed second and third dose) or doublets (818/1961) (missed third dose) (Figure 1).
• Over half of the singleton and doublet doses were administered at a visit without a physician at which only HPV4 was provided, termed a HPV4-only visit (Figure 2).
• Singleton doses were administered more frequently at the postpartum visit and in the year 2009 compared to a dose in a doublet. A doublet dose occurred significantly more often than a singleton doublet dose if it was given at a HPV4-only visit, a preventice visit, a follow up from an acute illness visit or in 2010 (Figure 2 and 3).

Results for Mistimed Doses:

• Among uniquely mistimed doses, significantly fewer doses were early (90/225) than late (133/225) (41% vs 59%).
• Among early doses, third doses were early from the first dose significantly more often than second doses from the first dose (26% vs 2%); likewise, among the late doses, third doses were late from the first dose significantly more often than second doses from the first dose (25% vs. 2%) (Figure 4).
• Mistimed second doses occurred significantly less often than mistimed third doses when provided at a HPV4-only visit (37% vs. 53%) and more often when provided at a postpartum visit (22% vs. 8%) (Figure 5).
• After adjusting for all visit types and year of administration, only the postpartum visit administration increased the likelihood of a mistimed second dose compared to a mistimed third dose (aOR=5.58 (95% CI: 2.21, 14.04). Likewise, the likelihood of a mistimed second dose was significantly higher than a mistimed third dose in years 2008, 2009 and 2010 of the HPV4 implementation program.

Discussion:

• Studies of HPV4 and other vaccines to date have shown that compliance with dosing intervals is critical for the induction of immune response and long term memory. insufficient numbers of and mistimed HPV4 doses have had little rigorous attention but substantially and negatively impact the cost effectiveness of the vaccination program.
• Our study showed that HPV4 doses as administered in our safety net system cannot provide the expected efficacy to reduce abnormal Pap screening, colposcopies, and treatment procedures.
• The vast majority of the wasted doses in our study were due to insufficient numbers of doses.
• Thus, a program which is effective in less than three doses, might be more cost effective.

Conclusion:

• Until behavioral changes can be implemented to ensure three doses are administered on time, using HPV2 as it is effective in less than three doses, or encouraging adherence to screening guidelines will offer more cost effective cervical cancer prevention.

Reference: