Schedules and strategies for HPV immunization
Conclusions and proposed recommendations for SAGE

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Questions for SAGE

1. What is the incremental effectiveness and cost-effectiveness for cervical cancer prevention of different HPV vaccines based on girls-only immunization?

2. What is the incremental effectiveness and cost-effectiveness for prevention of HPV-related diseases of adolescent gender-neutral HPV immunization compared to girls-only HPV immunization?

3. What is the incremental effectiveness and cost-effectiveness for cervical cancer prevention of immunization of multiple female cohorts (multiple age cohorts within a defined age range) compared to single age cohort immunization of only girls aged 9–13 years or of both girls and boys aged 9–13 years?
(1) What is the incremental effectiveness and cost-effectiveness for cervical cancer prevention of different HPV vaccines based on girls-only immunization?
Comparison of cervical cancer incidence in countries that have and have not introduced HPV vaccine

Sources: IARC, GLOBOCAN 2012 (estimated annual number of new cervical cancer cases); World Bank, List of economies, July 2016; WHO/IVB Database, national HPV vaccine introductions as of 27 June 2016, based on country reports.
Relative contribution of different viral types to cervical cancer—World, 2012

Serrano et al, 2015
Vaccine choice

- Similar effectiveness of registered vaccines have to prevent cervical cancer due to HPV 16/18
- Clinical trials and post-introduction observational studies point to cross-protection for non-vaccine HPV types by 2/4-valent vaccines
  - Additional long-term data, including for CIN3, from post-introduction studies in near future
Question 1: Key modelling results

- **Effectiveness**
  - High population-level impact and strong herd effects

- **Cost-effectiveness**
  - Immunization with any vaccine vs. no vaccination: Highly cost-effective, irrespective of vaccine and even w/o herd immunity or cross-protection
  - Immunization with 9-valent vs. 2/4-valent vaccines: Dependent on cross-protection by 2/4-valent vaccine and vaccine cost
Question 1: Main considerations

- Priority remains cervical cancer prevention through the immunization of girls, prior to sexual initiation
  - Opportunity to harmonized age range to 9–14 years
- Introduction in national programmes should be strongly recommended, with current qualifiers
- At national level, country-wide introductions
  - Phased only when immediate country-wide vaccination not affordable or operational
(2) What is the incremental effectiveness and cost-effectiveness for prevention of HPV-related diseases of adolescent gender-neutral immunization compared to girls-only HPV immunization?
Estimated cancer cases attributable to HPV, by regions—World, 2012

Ferlay et al, 2013; Plummer et al, 2016
Burden of anogenital warts

- Incidence/prevalence varies by study setting
- Impact on quality of life is difficult to relate to cancer burden
- Overall, very low quality of evidence
Question 2: Key modelling results

Effectiveness

- **HIC**: strong herd effects from girls-only vaccination (even at low coverage) \(\rightarrow\) greater impact from increasing coverage in girls than including boys

- **LMIC**: same, but vaccinating boys can be beneficial under specific conditions

Cost-effectiveness

- **HIC**: unlikely cost-effective if coverage in girls is \(>70-80\%\)

- **LMIC**: lacking evidence, expected to vary by level of herd effects
Question 2: Main considerations

- High coverage among adolescent girls is priority, then adding boys immunization generally not cost-effective
- Nonetheless, tangible benefits of gender-neutral immunization
- Gender-neutral immunization could be considered based on national context
(3) What is the incremental effectiveness and cost-effectiveness for cervical cancer prevention of immunization of multiple female cohorts (multiple age cohorts within a defined age range) compared to single age cohort immunization of only girls aged 9–13 years or of both girls and boys aged 9–13 years?
Multiple age cohort immunization: HPV-16/18 &

Girls-only vaccination, Coverage=80%, Vaccine duration=Lifelong, Vaccine Efficacy=95%

% Reduction in HPV-16/18 prevalence

Years since start of Vaccination

%: HPV-ADVISE, Median (line) of model predictions
Question 3: Key modelling results

- **Effectiveness**
  - Rapid impact with stronger herd effects
  - Greater impact by including additional cohorts

- **Cost-effectiveness**
  - Cost-effective in ages 9–14 years, specially with 2-dose schedule
  - Incremental cost-effectiveness in female ages ≥15 years dependent on country context
Question 3: Main considerations

- Due to direct and herd effects, targeting multiple age cohorts results in faster population impact. Also, economies of scale in delivery and programme resiliency.

- Immunization of multiple cohorts of girls aged 9–14 years should be recommended:
  - As with single age cohort immunization, it will require adequate operational and financial planning.
Thank you