SAGE TRACKING RECORD OF RECOMMENDATIONS AND ACTION POINTS

SAGE recommendations are reflected in the SAGE tracking sheet. The “Recommendations/Action item” column reflects the specific recommendation made by SAGE. The “Meeting Date” column displays the date of the SAGE meeting during which the recommendation was originally made. The “Status” column indicates whether the work is currently ongoing, pending or completed.

Each recommendation has an appointed WHO focal point (not displayed in SAGE Yellow Book). The focal points are requested to update their recommendation in advance of each SAGE meeting and report on progress towards the recommendation in the “Comments and Follow Up” column.

When the recommendation is finalized, it is displayed as “Completed” in the SAGE yellow book. This item is then included in the SAGE Yellow Book for one additional SAGE meeting. After, the completed item is archived. Archived recommendations are no longer displayed in the SAGE Yellow Book but may still be accessed upon request to the SAGE secretariat. Therefore, the online tracking sheet provides a historical record of all SAGE recommendations and the Yellow Book displays the current recommendations.

Topic	Recommendations/Action item	Meeting Date	Status	Comments and Follow up
General	SAGE recommended that ways to improve curricula for medical personnel should be explored.	Nov 2008	Ongoing	The Regional Office for Africa (AFRO) has published the pre-service curriculum and efforts are being made to disseminate the findings and ensure that medical and nursing schools change their outdated curriculum. This is a long process but few steps have started in that direction.
General	SAGE stressed that additional disaggregation was needed in the analysis of the progress achieved on the ground, and in identifying bottlenecks for progress, and recommended that reports display disparities observed at sub-national levels.	Apr 2015	Ongoing	WHO headquarters (HQ) is working closely with regional offices to obtain subnational level data. Surveillance data for measles and rubella as well as for new vaccines is collected at the district level on regular basis and there are efforts to collect sub-national level coverage data. Currently this is happening in the African Region on monthly as well as annual basis; and in the South East Asian Region and the European Region it is done on annual basis. In October 2016, at the Global Monitoring Meeting all regions agreed to collect and submit to HQ district level coverage data (numerator, denominator and coverage from DTP1, DTP3 and MCV1) as part of annual data collection exercise. Out of 194 member states, 125 countries reported subnational coverage, 36 at the 1st subnational level and 89 at the 2nd subnational administrative level (often corresponding to districts). The 20,000 districts for which data were received are home to 88 million children, two-thirds of the surviving infants worldwide. An initial analysis shows large differences in the size of these districts and the coverage they report. A large proportion report coverage over 100%, revealing the challenges to accurately measure coverage at subnational level. Detailed analysis and reported data will be made available by October 2017.
AEFI reporting	SAGE urged that efforts be pursued to enhance Adverse Events Following Immunization (AEFI) reporting worldwide.	Apr 2016	Ongoing	With Gavi support, 30 African countries have established work plans. A first analysis of the new Global Vaccine Action Plan (GVAP) indicator for adverse events following immunization (AEFI) monitoring has identified 84 member states that meet the recommended level of at least 10 AEFI cases reported per 100,000 surviving infants per year. A manuscript is currently submitted that describes the AEFI reporting ratio through Joint Reporting Form (JRF). 2016 data are currently analyzed and indicate an increase in the number of member states that fulfill the indicator requirement.

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AEFI reporting	SAGE commented on the passive surveillance data from the Uppsala Monitoring Centre (UMC) and raised concerns that the safety signal detection was not undergoing appropriate peer review. SAGE concurred with GACVS on the need to increase collaboration and to implement a strong review process.	Apr 2016	Ongoing	The Global Advisory Committee on Vaccine Safety (GACVS) concluded that signals documented by the Uppsala Monitoring Centre (UMC) provide useful information in monitoring the safety of vaccines from worldwide sources. It was proposed that a strengthened process of collaboration with UMC would allow use of the expertise on vaccine safety available within the GACVS and partner agencies for the review of this information before it is communicated to the network of pharmacovigilance centres and to vaccine manufacturers. This review should take into account the limitations of signal detection methods along with the reviews performed routinely by the United States Food and Drug Administration (FDA) and the European Medicines Agency (EMA), given their extensive experience and access to more complete information with the Individual Case Safety Reports (ICSRs) they receive and that may not all be shared with UMC. The GACVS Secretariat will liaise with UMC to identify mechanisms for such collaboration. UMC revised its signal assessment guideline in April 2015. In March 2016, UMC was recommended to establish a review group for the vaccine signals. So far this has not happened though and new signals are being generated. The WHO Essential Medicines and Health Products (EMP) Department has examined the issue and requested a reply from UMC Director to the WHO Safety and Vigilance team.
Data quality	SAGE requested the establishment of a Working Group on Quality and Use of Global Immunization and Surveillance Data.	Apr 2017	Completed	The call for nominations was issued in June 2017. The selection panel met on 14 July 2017 to decide on the composition of the group. The group has now been established and has taken up its work during an initial teleconference in August 2017.
Decade of vaccines/GVAP	The SAGE working group should continuously review the need for reformulation of the indicators or mechanisms for collection and reporting of data.	Nov 2012	Ongoing	The SAGE Decade of Vaccines (DoV) Working Group (WG) continues to review the need for reformulation of the indicators and mechanisms for data collection. In 2016 the WG has specifically discussed safety and demand side indicators as well as discussed indicators to be used as part of the Sustainable Develeopement Goals (SDGs). The SAGE report of progress with the Global Vaccine Action Plan (GVAP) for 2016 i.e. the midterm progress report was published online and is available at: http://www.who.int/immunization/global_vaccine_action_plan/en/ This report was tabled at the Executive Board in Jan 2017 together with a draft GVAP resolution sponsored by Australia, Brazil and Colombia. A series of calls the SAGE WG took place in Q2 2017 with specific focus on the selection of the SDGs indicator for Immunization (3.8 and 3.b.1), on discussing data quality and on selecting priority countries for the 2017 GVAP Secretariat report. The SAGE DOV WG calls started on 18 July to revise the different sections of the draft secretariat report 2017. The SAGE DoV WG will met in person from 29-31 August for the yearly revision of progress in the implementation of GVAP for the year 2016, with a focus on the regional and country reports, the acceleration of pace, the Gavi and Polio transition and the post 2020. SAGE will be informed on these issues during the GVAP session at the October 2017 meeting.
Diphtheria	SAGE expressed concern with the shortage of Td vaccine (tetanus toxoid + reduced diphtheria toxoid content) for routine immunization of children and adolescents, catch-up vaccination of adults and tetanus prevention after injury, and recommended that the demand and supply scenarios for Td vaccines should be assessed.	Apr 2017	Ongoing	An assessment of global demand and supply for Diptheria and Tetanus containing vaccines is being finalized. The assessment was conducted with support from Linksbridge and MMGH consulting group. A temporary Advisory Group of expert was convened to guide this work advising on methodology, assess current and future supply risks and advice on policy implications. A final meeting of the Advisory Group was held on September 13th concluding that: i) shortages of D&T containing vaccines are minor and are rather linked to product preference/registration issues (e.g. aP containing vaccines in Europe); global supply is more than sufficient to meet demand over the next 15 years even assuming global switch from TT to Td vaccines and global introduction of 3 booster doses as per recommendations; nevertheless, Td and aP vaccines require careful management as they can become (Td) or are (aP) in tight supply. The final assessment will be available mid October 2017.

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Diphtheria	SAGE advised that WHO collaborate closely with partners to establish and manage a global procurement mechanism and a physical or virtual DAT stockpile that would be available to all countries. SAGE further urged that regulatory pathways be established to ensure the rapid deployment of DAT. In the long term, SAGE advised WHO to identify mechanisms to support the development of a monoclonal antibody as an alternative to DAT of equine origin.	Apr 2017	Ongoing	Manufacturers have been contacted to provide information on feasibility, time-lines and cost. Current products/volumes inadequate for global stockpile. WHO is working with DAT monoclonal developers to review timelines, costs, and overcoming barriers to regulatory approval (existing plans are for expanded access use rather than formal approval).
Diphtheria	SAGE recommended that surveillance standards, guidelines for the investigation including diagnostics and reporting of diphtheria cases and outbreaks, be updated to improve the quality of data and to facilitate pooled analysis. The guidelines should include standard formats for reporting age with increased granularity and immunization status categorization.	Apr 2017	Ongoing	Work is ongoing to update the global vaccine-preventable disease (VPD) surveillance standards and will include a new and improved chapter on diphtheria surveillance. It will address the points recommended by SAGE and should be ready by early 2018.
Diphtheria	SAGE expressed its deep concern over the reported lack of diphtheria antitoxin and encouraged WHO to take on a strong leadership role in resolving this shortage globally.	Oct 2016	Completed	A session was held at the April 2017 SAGE meeting which tackled the issue of diphtheria antitoxin supply shortages.
Ebola vaccines	Noting WHO's unique position to coordinate the development of Ebola vaccines, SAGE stressed the importance of transparent and prompt sharing of information on the trial protocols and data from the phase 3 clinical trials, and the need for a greater role for WHO in facilitating the sharing of information so that results between studies will generate the greatest benefit for policy decision-making.	Apr 2015	Ongoing	SAGE established an Ebola working group (WG) in Nov 2014 which met regularly via teleconference as well as during a face-to-face meeting on the 9-10 Mar 2015. The WG reviewed the epidemiological data on Ebola Virus Disease (EVD), the preliminary results of the phase 1 trials, the status of the phase 2 and 3 trials, and the preparations for the large scale deployment of vaccines. They also identified the scope of the recommendations and the key questions and data for formulating recommendations. The framework was presented to SAGE at the Apr 2015 meeting. The WG met again on 19-20 Aug 2015 to review the available information and to start framing recommendations, based on the framework approved by SAGE in Apr 2015. The WG input was presented to SAGE at the Oct 2015 meeting. Now, that the final results of the Ring trial have been published in the Lancet in Dec 2016, a WG meeting took place 14-15 Mar 2017 to discuss the results. Regulatory evaluation of the vaccine is currently ongoing. There is information regarding a Russian developed vaccine that was licensed in Russia, but despite WHO requests no detailed data are available. The emerging data and draft recommendations were discussed during the face to face meeting of the WG which took place Mar 2017. The evidence was presented during the April 2017 SAGE meeting.

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Hepatitis A	Long-term protection from single or 2-dose schedules should be regularly monitored by countries and reviewed by SAGE.	Apr 2012	Ongoing	Post-market surveillance continues in Argentina and a detailed report on the recent epidemiological situation was provided to WHO in March 2017. The next active follow-up report will be requested ahead of the April 2018 SAGE meeting. In 2014, in the context of a localized outbreak in a border area, 8 potential breakthrough cases were identified. For 5 of them there is uncertainty about the vaccination status and/or conditions (cold chain) in which vaccination was administered. Seven of these cases are in the 5-9 age group (distributed throughout the period) and one in the 1-4 age group. This resulted in an enhanced vigilance in the country. As exemplified by the outbreak in San Martin, the risk persists in the population. 73% of of hepatitis A virus (HAV) acute infection cases reported occurred in individuals over >10 years. All cases reported occurred in unvaccinated individuals. After now 11 years of follow-up, there is currently still no evidence of waning immunity and the outbreak experienced in 2014 was compatible with very high vaccine effectiveness. Hepatitis A cases have remained low in 2014, 2015, and 2016. Although a reduction in hepatitis A rates was experienced in all age groups, there is an increasing proportion of the remaining cases occurring in persons > 14 years of age in the post vaccination period. Most of these represent non-vaccinated adolescents or adults that escaped HAV-infection in previous outbreaks. Both Colombia and Paraguay also introduced a single dose national immunization schedule for 1 year old children. Yearly review of the Argentinian surveillance data will continue as Argentina was the front runner country to introduce a 1 dose schedule with the inactivated vaccine. A third phase immunogenicity study is ongoing in Argentina, to assess long term protective antibodies in children more than 9 years following single dose vaccination. The results of the phase 2 study conducted in 2013 with a median post-vaccination interval of 7.7 years were quite reassuring with a prevalence of protective antibodies of 97.4% (95% CI: 96.3-98.3) still protected. More recent analysis (phase 3) indicates that the prevalence of protective antibodies in children > 9 years following a single dose of hepatitis A vaccine was still 87.6% but a decrease was observed in all centers with decreased GMCs. It is still unclear if different samples or differences in methodology or recall bias in seronegative individuals could actually account for the difference, but this requires continued follow up. For the time being epidemiologic surveillance continues to show very low infection rates in all regions and age groups with sporadic cases occurring mainly in frontier regions and non-vaccinated adolescents.

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Hepatitis B	SAGE recommended that the timely delivery of a birth dose of hepatitis B vaccine (that is, within 24 hours of birth) should be used as a performance measure for all immunization programmes. Reporting and monitoring systems should be strengthened to improve the quality of data on the birth dose.	Apr 2009	Ongoing	A new indicator for Hepatitis B birth dose has been added to the WHO /UNICEF Joint Reporting Form (JRF) 2017 - this new indicator will allow the distinction between timely (24 hours) and late birth dose administration. In Nov 2016, AFRO held consultation on hepatitis B control and included discussing barriers, actions and support needed towards hepatitis B birth dose introduction. This was part of joint meeting held with viral hepatitis counterparts. A consultation on implementation of a new universal birth dose recommendation was conducted in Dec 2010 with special focus on countries with a high percentage of home births. Outputs include a monograph documenting the systematic review and best practices from the consultation. Immunization Practices Advisory Committee (IPAC) reviewed this work in early 2011 and again in Apr 2012, and endorsed the 2013 publication of 'Practices to Improve Coverage of the Hepatitis B birth dose vaccine.' From this, work is ongoing to develop field guidelines for scaling up Hepatitis B birth dose. The JRF and associated materials have been revised to improve reporting of birth dose with a particular focus in Western Pacific Regional Office (WPRO). The WHO/UNICEF estimate process was piloted in 2012 in WPRO and was applied globally for the first time to the 2013 JRF birth dose data. Analysis of timely birth dose data for 2008 shows no significant changes from 2006 analysis and the major issue is lack of data quality. A study of the cost of scaling up the birth dose by country has been completed, based upon previously published methodology estimating the cost of implementing the Global Immunization Vision and Strategy (GIVS) goals. In 2012, WPRO convened Expanded Program on Immunization (EPI) and Maternal and Child Health (MCH) managers from the five priority countries to jointly propose actions towards improving birth dose uptake. In Jan 2015 the African Regional Office (AFRO), and in Mar 2015 WPRO, held Hepatitis B birth dose consultations to improve birth dose coverage. In Feb 2015, an AFRO workshop on birth dose introduction was conducted in Brazzaville; this workshop included guidance on birth dose monitoring. An assessment of birth dose implementation has taken place in Sao Tome Principe in July 2015 and Nigeria in September 2015 and in the Gambia in Dec 2015. Senegal held a Hepatitis B birth dose training workshop in Dec and introduced birth dose in Jan 2016. Guidance for hepatitis B birth dose introduction was published on June 2016 ('Preventing Perinatal Hepatitis B Virus Transmission: A Guide for Introducing Hepatitis B Birth Dose Vaccination', available from: http://www.who.int/immunization/documents/general/ISBN9789241509831/en/ in English, French and Spanish. An Arabic version is under development). The guidance includes a chapter on reporting and monitoring birth dose vaccination.
Hepatitis B	SAGE strongly urges all the pre-qualified vaccine manufacturers of monovalent hepatitis B vaccine to pursue regulatory approval for Controlled Temperature Chain (CTC) as soon as possible, given the available evidence of compatibility with CTC requirements.	Oct 2016	Ongoing	To date, WHO has not received any application from hepatitis B vaccine manufacturers to support the label change of prequalified hepatitis B vaccine.

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Hepatitis B	All regions and associated countries should develop goals for hepatitis B control appropriate to their epidemiologic situations. Serologic surveys of hepatitis B surface antigen (HBsAg) prevalence, representative of the target population, will serve as the primary tool to measure the impact of immunization and achievement of the control goals.	Nov 2008	Ongoing	In 2017, it was approved to collect an additional variable on hepatitis B birth dose to distinguish birth dose vaccine adminstered within 24 hours (TIMELY) and any birth dose administered (TOTAL) as part of the WHO/UNICEF Joint Reporting Form (JRF). Previoulsy only timely birth dose was requested. As of August 2017, all regions have had the regional committees (RCs) on immunization endorse hepatitis B control goals, except for the South East Asian Regional Office (SEARO) which as noted below had a 2016 ITAG recommendation to establish a goal. Regional goals slightly differ in target dates, threshold prevalence and specific ages in which to measure prevalence - but are largely similar nonetheless. In Sept 2016, the European Regional Office (EURO) held a consultation to discuss establishing a regional verification mechanism. In June 2016, the SEARO's ITAG recommended to establish a Regional control goal of less than or equal to 1% HBsAg sero prevalence by 2020 among children aged 5 years. In August 2015, an HQ mission took place to discuss HepB control targets. In August 2016, the The African Regional Office (AFRO) Regional Committee discussed adopting a viral hepatitis strategy in line with the Global Health Sector Strategy (GHHS) for viral hepatitis which includes a hepatitis B control target in-line (although more ambitious) with the target endorsed as part of the immunization strategy at the 2014 RC meeting. In April 2016, WHA Endorsed the GHHS for viral hepatitis that includes immunization-related 'elimination targets'; specifically to reduce chronic HBV infection rates (HBsAg prevalence) in children to at least 1% by 2020 and to at least 0.1% by 2030. In 2014, the AFRO RC meeting adopted resolution to reduce Hep B infection to <2% among children under 5 years of age by 2020 and adopted hepatitis B activities as part of the RVAP that was also endorsed at the same RC meeting. The Eastern Mediterranean Region (EMR) has a RC goal of reducing childhood hepatitis B prevalence to <1% among children <5 years by 2015. Its regional office, EMRO is working with Member States to ensure achievement of this goal. The Western Pacific Region (WPR) established a RC goal to reduce hepatitis B infection to <1% among children at least 5 years of age by 2017. The EURO will consider a regional hepatitis B control goal as proposed by ETAGE. The Pan American Health Organization (PAHO) has resolved to eliminate hepatitis B virus transmission and is formulating a regional strategy. Documenting the "Impact of Hepatitis B Immunization: best practices for conducting a serosurvey" (WHO/IVB/11.08) was published in 2011 by the department of Immunization, Vaccines and Biologicals. In 2012, WHO HQ has published a framework for global action to control viral hepatitis (http://www.who.int/csr/disease/hepatitis/Framework/en/index.html).
HIV	SAGE requested regular updates on the progress of HIV-vaccine research.	Apr 2010	Ongoing	The recent start of a phase 2b efficacy trial in South Africa constitutes an important progress in the HIV vaccine research and development area, building on the promising results from the RV144 Phase 3 trial in Thailand (which showed 31 % protection against new HIV infection during the 3.5 years after vaccination, 60 % during the first year), and favorable results from a preparatory study in South Africa. The vaccination regimen in the upcoming HVTN 702 trial in South Africa will, like RV144, be based on a canarypox-based vaccine called ALVAC-HIV and a bivalent gp120 protein subunit vaccine, but will also include a new adjuvant, target HIV subtype C and include the addition of booster doses. Other live-attenuated candidate vaccine constructs are under evaluation in early clinical development. Finally there are major, and promising, vaccine science initiatives underway to attempt to induce broadly neutralising antibodies through re-engineered antigens. These have a longer time frame, but raise the prospect of cross-clade protection. WHO IVR is preparing for the organizing of a consultation on preparation for success, downstream access and use.
Immunization schedules	SAGE requested that IVIR-AC assess optimal immunization schedules based on both direct and indirect effects and not only direct effects.	Oct 2015	Ongoing	As part of any vaccine impact evaluation, IVIR-AC reviews and encourages studies of optimal schedules on both direct and indirect effects. Study projects and meetings have been held and are planned on HPV, Hep B vaccines, rotavirus vaccines among others.

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Immunization schedules	SAGE requested a critical appraisal of alternative schedules for pneumococcal conjugate vaccine, rotavirus vaccine and Hib vaccine in 2011.	Nov 2010	Ongoing	The funding grant from Bill & Melinda Gates Foundation (BMGF) for schedules-related work to inform SAGE discussions on immunization schedules is now over. All delays in regard to this work were due to the Ebola outbreak and the R&D Blueprint on staff responsibilities. - Pneumococcal Conjugate Vaccine (PCV): evidence was reviewed by SAGE in November 2011. A new position paper was published in 2012. - Rotavirus: evidence was reviewed by an ad-hoc group of experts in February 2012 and presented to SAGE in April 2012. An updated vaccine position paper was published in February 2013. A new review of evidence is ongoing. - Haemophilus influenzae type b (Hib): The issue was revised during the April SAGE 2013 meeting. A new position paper was issued. - Pertussis: evidence was reviewed by SAGE in 2015. A new position paper was was published in August 2015. - Hepatitis B: evidence was reviewed by SAGE in Oct 2016. A new position paper was published in July 2017. - HPV: evidence was reviewed by SAGE in in Oct 2016. A new position paper was published in May 2017. - TT vaccine: evidence was reviewed by SAGE in Oct 2016. A new position paper was published in February 2017. - Diphtheria: evidence was reviewed by SAGE in Apr 2017. A new position paper was published in August 2017. A consultation to develop analytic tools to support countries with the selection and/or adjustment of vaccine schedules in different epidemiological and operational scenarios took place in December 2016. With support from the BMGF we are updating the review of the evidence (epidemiology, vaccine efficacy and effectiveness, safety, risk benefit, impact). A consultation will take place in the fall of 2017. The review will include the two new vaccines.
Implementation	SAGE recommended that WHO promote further progress in the area of implementation more actively, and that a preparatory team continue the dialogue and develop a more targeted agenda.	Apr 2016	Ongoing	The WHO is currently implementing multiple World Health Assembly (WHA) resolutions that mandate integration of disease-specific programs, using a Health Systems Strengthening (HSS) framework to achieve Universal Immunization coverage as part of Universal health Coverage (UHC). This fits well with the Sage proposal to make integration a 'third pillar' of immunization service provision. Within the Gavi sphere, the Alliance has committed to having HSS underpin the Country Engagement Framework (CEF), under which all Gavi grants will be aligned and managed as a single package of results-focused investments. WHO Health Systems and Innovation (HIS)/Health Sys Governance, Policy & Aid Effectiveness (HGS) has assisted the Gavi Alliance Partners and Gavi Secretariat in developing CEF. The WHO's Regional and Country Office HGS/HSS Focal Points are the organizational drivers for CEF engagement, providing technical Assistance on strategic, financial and operational integration of core immunization functions and systems.
Implementation research	The implementation research agenda should define equity beyond traditional economic money metrics such as social economic status gradients, to include other measures of inequity such as the multidimensional poverty index or impacts on marginalized populations. SAGE suggested that studies to examine the integration of immunization with other health interventions should be included in the implementation research agenda.	Nov 2013	Closed	This recommendation is part of the new Immunization and Vaccines related Implementation Research Advisory Committee (IVIR-AC) agenda under research to minimize barriers and improve coverage of vaccines currently in use. Since 2014 research topics on the non-specific effects of vaccines, missed opportunities and community vaccine acceptance have been part of the agenda of IVIR-AC.

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Implementation Research	SAGE identified the conditions necessary for pertussis resurgence and the effective strategies for prevention of resurgence as important topics for modelling research.	Apr 2014	Ongoing	The June 2015 meeting of the Immunization and Vaccines related Implementation Research Advisory Committee (IVIR-AC) meeting agreed on the plan for phase 1 of the comparison of pertussis models from Australia, England & Wales and the United States of America, which is meant to be a rapid assessment on the relative contributions of vaccine formulations, waning immunity, vaccine coverage and schedule to the observed pertussis resurgence in these countries. If successful, phase 2 offers further opportunities to test whether existing models are sufficiently robust to changes in factors such as demographics, spatial heterogeneity, immunity and contact matrices across multiple settings. In many countries using aP vaccine in the national immunization programme, aP vaccine is used in the private sector which represents a variable proportion of infant immunizations, so these complexities will need to be reflected when the models are extended to low and middle income settings. Phase 1 has been implemented and preparations are under development for Phase 2 and implementation will depend on funds being made available. Pertussis surveillance and laboratory capacity are still extremely poor in LMICs (particularly in Africa), and beyond the scope of the model comparison exercise to address. The committee noted that data are expected to be forthcoming through ongoing studies and follow-on analysis of maternal influenza trials, and strongly endorses the identification or further opportunities to add pertussis markers (primarily PCR on respiratory specimens) to studies such as Gavi– or the BMGF– supported vaccine impact studies. There were concerns that the opportunistic process by which the 3 models were identified may not have included all relevant parameters or modelling approaches. The feasibility of taking into account other models and parameters identified through a literature review and/or open call should be assessed, focusing on the main results of the different models for phase 1, and if they are interested to include them in phase 2. The work under Phase 1 has recently been completed by the modelers and will be shared with SAGE Chair soon for further follow up. Meanwhile the WHO burden of pertussis disease estimates have been updated by the WHO secretariat in collaboration with Hong Kong University. The global pertussis estimates for age under 5 have been published in Lancet Infect Dis. 2017 Jun 13. pii: S1473-3099(17)30390-0.
Implementation Research	SAGE outlined some considerations for IVIR-AC to include in their deliberations – assessment of the use of high quality randomized controlled trials where feasible (noting the substantial ethical and methodological challenges involved), with sufficient power to explore sex differences, and a priori defined and standardized immunological endpoints designed to answer the specific question of non-specific effects– and emphasized that future research should draw on a broad investigator pool and from a wide range of geographic locations using a standardized protocol.	Apr 2014	Closed	During the Immunization and Vaccines related Implementation Research Advisory Committee (IVIR-AC) June 2015 meeting, IVIR-AC endorsed the designing of one or more protocols to assess the prospective non-specific effects (NSE) of immunization on mortality. The work of the WHO Secretariat needs to be completed in preparing the protocols for the questions identified and trials outlined during the ad-hoc expert consultation of Feb 2016. These generic protocols would enable harmonized implementation of the trials across multiple settings. While further development of all the proposed trial designs is important, IVIR-AC recognizes that full evaluation necessitates a complete protocol. IVIR-AC will help inform decisions on feasibility and the selection of designs, and formulate questions. At the February 2017 meeting, IVIR-AC reviewed the final proposals for 2 trial designs suggested by the ad-hoc Working Group on NSE. It was presented at the SAGE April 2017 meeting as part of the briefing of IVIR-AC by chair Rob Breiman.
Influenza	SAGE issued the recommendation to establish a Working Group on influenza vaccines.	Apr 2017	Ongoing	A call for nominations will be issued in September/October 2017 to solicit candidates interested in serving on the Working Group.

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Integration	WHO should discuss and develop guidelines on how to fully integrate vaccination (GVAP) into the operation of all aspects of the health-care system and to reduce missed opportunities to vaccinate.	Oct 2014	Ongoing	During the April 2016 SAGE meeting, SAGE members were successfully updated on the ongoing work in AFRO, PAHO and SEARO on using the missed opportunities for vaccination (MOV) strategy to facilitate the integration of immunization with other health services. Following the SAGE session, WHO received multiple requests from countries for technical assistance to implement the MOV strategy in additional countries. Based on MOV assessments conducted in Chad and Malawi in 2015 (draft manuscripts prepared for peer reviewed journal submission) and Kenya in 2016, WHO has developed a set of updated guidance documents and field tools that will be finalized and published in Q4-2017. These include: a planning guide, the assessment methodology (including the MOV protocol, sample questionnaires and generic field tools) and an intervention guidebook. In the meantime, WHO has launched a web page with the draft materials for easy access. Having strengthened the capacity of AFRO to implement MOV assessments (Chad, Malawi, Burkina Faso (led by partner AMP), Kenya, DRC and Nigeria completed; Mozambique and Zimbabwe in planning stages for Q4), collaboration is ongoing with SEARO (MOV assessment completed in Timor Leste; interventions are ongoing) and WPRO (MOV workshop is being planned and supported in Cambodia, in collaboration with CDC). A network of partners engaged in MOV has been established since March 2016 to provide regular briefings via teleconference on the process and outcomes of the recent country MOV assessments, share future plans and framework for implementation, exchange lessons learned, and achieve consensus on a coordination mechanism for all MOV work among all partners. The third partner coordination call took place on January 26, 2017, the next call will take place in Oct 2017. In May 2017, WHO held a training workshop in AFRO for partners and consultants on the MOV strategy with the objectives of training a pool of consultants to support countries in planning and conducting MOV assessments, to further strengthen the regional, subregional and country capacity for MOV work and to serve as a platform to discuss opportunities to address MOV and improve routine immunization coverage. The workshop was attended by 8 partner organizations (CDC, UNICEF, VillageReach, AMP, MSF, JSI, SA-MRC, CHAI), WHO-CO, partner and MOH staff from 8 countries (Cameroon, Ethiopia, Liberia, Mozambique, Nigeria, Uganda, South Sudan, Zimbabwe) and WHO colleagues from HQ, AFRO and IST-Eastern and Southern.
IVIR-AC	SAGE noted that a sub-group of IVIR-AC members and external subject experts should make recommendations on the types of prospective studies to assess the non-specific effects of vaccines.	Oct 2014	Closed	An ad-hoc consultation on clinical trials for non-specific effects of vaccines (NSE) was held on 16–17 February 2016. Eighteen experts (including 3 IVIR-AC members) contributed to this consultation, whose main objectives were to reach a consensus on priority trial questions and to propose trial designs for each of the priority questions. Protocol synopses for the six different trials that the experts proposed were prepared for review and discussion at June 2016's IVIR-AC meeting. At the February 2017 meeting IVIR-AC reviewed the final proposals for 2 trial designs suggested by the ad-hoc working group on NSE. It was presented at the SAGE April 2017 meeting as part of the briefing of IVIR-AC by the chair, Rob Breiman. Currently IVIR-AC will not further assess NSE.
IVIR-AC	IVIR-AC should seek linkages with the WHO Alliance for Health Policy and Health Systems Research as they might be useful in priority setting and discussions.	Oct 2014	Ongoing	The Immunization and Vaccines related Implementation Research Advisory Committee (IVIR-AC) secretariat have had initial discussions with WHO staff of the Alliance for Health Policy and Health Systems Research (HPSHR) to update on the IVIR-AC deliberations in September 2014. Discussions for concrete steps for their involvement in vaccine implementation research are ongoing. The WHO Alliance for HPHSR will have a seat in the WHO Secretariat of the IVIR-AC. In addition, Initiative for Vaccine Research (IVR) was involved in a call for proposals issued by the WHO Alliance with financial support from Gavi and UNICEF on implementation research studies in low and middle income countries (LMICs) in 2015. Seven proposals have been selected for funding and being implemented with a one year timeline until 2016. A new funding proposal was prepared for 2016-2017 with support from Gavi and UNICEF. New projects have been granted and a workshop on implementation research protocol development took place in August 2016.

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IVIR-AC	SAGE encouraged WHO to complete the public consultation and the publication and dissemination of the protocols on non-specific effects (NSE) of vaccines.	Apr 2017	Ongoing	WHO has solicited public comments on the draft protocol synopsis until 15 September 2017 and is currently finalizing these. Their formal publication is anticipated by the end of 2017. (www.who.int/immunization/research/implementation/nse_protocol_comments/en/).

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Lower middle-income countries: sustainable adoption and financing for new vaccines	SAGE requested that WHO facilitate the establishment of a partnership among all relevant stakeholders to consider: pooled procurement; tiered pricing; greater transparency of pricing; and exploring the role that UNICEF, the Pan American Health Organization and foundations can have in assisting these countries with procuring and financing vaccines.	Nov 2010	Ongoing	WHO set up a Middle Income Countries (MIC) Task Force in June 2014 with main immunization stakeholders (WHO, UNICEF, World Bank, Gavi Secretariat, BMGF, AMP, Sabin, Task Force for Global Health), which led to the creation of the "MIC strategy", presented at SAGE in April 2015. The strategy aims at improving sustainability of immunization programmes and access to vaccines in non-Gavi MICs. The MIC strategy is based on four pillars : i) Strengthening evidence-based decision-making; ii) Enhancing political commitment and ensuring financial sustainability of immunization programmes; iii) Enhancing demand for and equitable delivery of immunization services; and iv) Improving access to timely and affordable supply. The timeline for the strategy is up to 2020 to align with the GVAP timeframe and up to 2025 for a longer term horizon. In the longer term, the MIC strategy could provide a platform to ensure sustainability of Gavi's investments in fully self-financing countries. Following SAGE endorsement of the MIC Strategy in Apr 2015, the WHO-led MIC Task Force initiated a country engagement process: in collaboration with key immunization partners WHO started multi-partner dialogues with four countries struggling with raising or maintaining high immunization coverage and/or introducing new vaccines. With each of these countries, the MIC Task Force has identified obstacles to achieving and sustaining the immunization system performance and potential solutions to reaching GVAP targets through plans of action. The MIC Task Force selected four countries for the MIC strategy implementation based on potential for impact (birth cohort, coverage of traditional vaccines, status of new vaccines introduction) and feasibility of engagement. Selected countries are Romania, Swaziland, Jordan and Philippines. Countries are at different stages of implementation of their plan of actions, but concrete results are starting to show (e.g. Philippines formal decision to procure all vaccines through UNICEF in the mid term while strengthening procurement skills, and concrete steps towards creation of a functional NITAG,UNICEF SD support to Jordan for procurement fo PCV). Also, some efforts to support all MIC countries in the area of access to timely and affordable supply have been implemented. Notably, the creation of a mechanism for access to supply in humanitarian emergencies in MICs not supported by Gavi; set up of a peer platform and regional workshop to strengthen country procurement capacity; work on price transparency continues successfully with 85% of world (n. of countries) sharing vaccine product, price and procurement information since the beginning of WHO price transparency efforts. Despite these efforts, progress in implementation of the strategy accross its 4 pillars is very slow due to lack of funding. As discussed at the Apr 2015 SAGE meeting, the partners would require about US$20M per year to fully implement the strategy. In Oct 2016, a meeting of the MIC Task Force was held to review progress and discuss next steps. The TF determined having concluded its mandate through a review of the MIC issue and the development of a partner-shared MIC strategy. It was thus proposed that the TF comes to a close. As it close, the MIC TF made the following recommendations: 1- The TF expressed important concerns regarding funding for implementation of the MIC Strategy and called for fundraising efforts by its member organisations or other appropriate coalition of partners. For these purposes it proposed continued awareness raising on the MIC issue through: A- Development of an advocacy tool to be developed starting from technical background documents prepared for the SAGE April 2015 meeting. A time limited and informal Steering Committee of some TF members (WHO, UNICEF, TFGH and other as interested) could be set up to follow work by external consultants. Due to human resource constraints this has not been developed. B- Regular monitoring & reporting on MIC progress against GVAP as well as monitoring of implemented activities against intended activities under the MIC strategy (dashboard). For the first time the GVAP report this year includes a dedicated chapter for MICs to respond to this request. 2-The TF agreed on the importance to ensure completion of pending tasks and enhance smooth transitioning as the TF sunsets. 3- Anticipating that considerable time may be needed for funding to become available, the TF proposed that partners focus on i) regular normative/guidance work benefitting all countries including non Gavi MICs and ii) access to affordable and timely supply (continuing working on implementation of ongoing activities and potentially new one as possible). Partners committed to continue information sharing and collaborative spirit in these efforts.

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Malaria Vaccine	SAGE requested continued review of the planning of the pilot implementations and to receive regular updates on the results.	Oct 2015	Ongoing	Ghana, Kenya and Malawi were officially announced as the 3 pilot countries to participate in the Malaria Vaccine Implementation Programme (MVIP) by the WHO Regional Office for Africa on 24 April 2017. Progress has been made with the 3 funding agencies, Gavi, the Global Fund and Unitaid, to formalize the terms of the agreements expected to provide funding of up to US$49.2 million for phase 1 of the MVIP for the period July 2017 to December 2020. Finalization of the bilateral agreements is expected in Q3 2017. Interim funding provided by PATH to WHO through a grant from the Bill and Melinda Gates Foundation, together with the PATH's existing grants from the Gates Foundation, has so far allowed critical activities to proceed. All pilot countries have initiated the development of vaccine introduction plans, preparatory activities to strengthen pharmacovigilance and planning for communications activities. First vaccine introduction is currently still anticipated for mid-2018. WHO developed a master protocol for the pilot evaluations which was reviewed by the WHO Research Ethics Review Committee (ERC) on August 3, 2017 and submitted to the European Medicines Agency as part of GSK's risk management plan. Feedback from the ERC and EMA reviews will be addressed in a revised version of the master protocol. On 18 May 2017, WHO released a Request for Proposals (RFP) to identify research partners to conduct the pilot evaluations in the 3 pilot countries. Bids were opened on 30 June 2017 and submissions are currently under review by a Proposal Review Committee. Selection in principle of research partners in September 2017 will enable in-depth discussion of their technical and financial proposals to proceed and contracts to be awarded in the final quarter of 2017. Updates on the MVIP were provided to the AFRO RITAG and the Global Advisory Committee on Vaccine Safety (GACVS) in June 2017. GACVS recommended a set of pharmacovigilance readiness criteria for the 3 participating countries and will continue to provide advice and support to the pilot countries and to the planned MVIP Data Safety and Monitoring Board. GSK has committed to re-start the RTS,S bulk manufacturing site (which has been idle since 2015) in order to meet the needs of the pilots and lay the foundation for vaccine supply in the longer term should the vaccine be recommended for broader use based on the experience from the MVIP. The formal collaboration agreement between WHO, PATH and GSK to define roles and responsibilities in the MVIP, including a quantification of the required vaccine supply and longer term access provisions, has not yet been finalised.
Maternal immunization	SAGE recommended that WHO endorse the importance and ethical imperative of clinical trials in pregnant women for potentially life-saving interventions such as RSV vaccine (and future vaccines against other targets currently in development, such as group B streptococcal disease).	Apr 2016	Closed	WHO is promoting vaccine trials be conducted in pregnant women. Updated TRS guidance for vaccines includes a section on trials in pregnant women. WHO Draft Preferred Product Characteristics for Next Generation Influenza Vaccines includes advocacy for clinical trials in pregnant women. Also, IVR has supported two efforts evaluating the ethics of maternal immunization: 1) Beeler JA, Lambach P, Fulton TR, Narayanan D, Ortiz JR, Omer SB. A systematic review of ethical issues in vaccine studies involving pregnant women. Hum Vaccin Immunother. 2016 May 31:1-8. [Epub ahead of print] PubMed PMID: 7246403, and 2) Verweij M, Lambach P, Ortiz JR, Reis A. Maternal Immunisation: Ethical Issues. In press at Lancet Infectious Diseases. Both publications advocate for the ethical imperative of clinical trials in pregnant women.
Maternal Immunization	SAGE encouraged the Regional Office for the Americas to document the successful regional experience of delivering influenza vaccine to pregnant women.	Apr 2015	Ongoing	Regarding the Pan-American Health Organization's (PAHO) documentation of the successful regional experience of delivering influenza vaccines to pregnant women, PAHO has progressed with its in-depth survey to develop case-studies with key countries that have acquired a lot of experience in maternal immunization (currently ongoing in three countries). Also, PAHO has published its field guide for maternal immunization (in English and Spanish). It is available from http://www.paho.org/hq/index.php?option=com_content&view=article&id=13445%3Amaternal-and-neonatal-immunization-field-guide-for-latin-america-and-the-caribbean&catid=6774%3Aslide-show&Itemid=40557&lang=en.

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Maternal Immunization	SAGE concluded that the recommending bodies, including WHO, need to engage in a dialogue with regulators and manufacturers to review current regulatory practices against the evidence on risks and benefits and biological plausibility on product safety. SAGE requested WHO to develop a process and a plan to move this agenda forward in support of an increased alignment of data safety evidence, public health needs and regulatory processes.	Nov 2013	Ongoing	WHO has completed evaluations of product monograph language regarding safety and use during pregnancy, as well as a survey of health care provider's perceptions of the specific product monograph language regarding use in pregnancy. WHO has reviewed various regulatory approaches to labelling of the pregnancy and lactation sections of product inserts and has produced a document titled, "Labelling information of inactivated influenza vaccines for use in pregnant women." The document was reviewed and endorsed by Expert Committee on Biological Standardization (ECBS) in late 2016. Future vaccines intended for use by pregnant women will undergo phase III trials in pregnant women. Currently available vaccines recommended for use in pregnancy (influenza, tetanus, acellular pertussis) are unlikely to have phase III trials necessary for an indication for use during pregnancy, however, there is regulatory consensus that pregnant women are not contra-indicated from receiving vaccines merely because a product is not indicated for use in that group.
Maternal Immunization	SAGE encouraged WHO to promote more implementation research to generate generalizable data on the best ways to integrate maternal immunization into routine antenatal care in low resource settings	Apr 2015	Ongoing	WHO's Initiative for Vaccine Research (IVR) is in the process of producing many implementation research tools and guidance regarding: 1) assessment of vaccine confidence/hesitancy in pregnant women; 2) maternal influenza immunization program costing tool; 3) guidance document to estimate the influenza economic burden of a country (not pregnancy specific); 4) guidance document to estimate the cost effectiveness of influenza vaccines in a country (not pregnancy specific); 5) field guide for the evaluation of influenza vaccine effectiveness (not pregnancy specific); and 6) implementation guidance document. IVR is collaborating with several research and public health groups to pilot some of these tools in low and middle income countries.
Measles	SAGE recommended that the most expeditious clinical development and regulatory pathway to licensure of measles containing vaccines (MCV) micro-array patch (MAP) be determined, and that barriers to the development, licensure, and use of MAPs for measles and rubella vaccine delivery be identified and addressed urgently.	Oct 2016	Ongoing	Pending approval of financial support, a Measles and Rubella/ micro-array patch (MAP) Working Group (WG) will be set up in Q4 of 2017 to develop a clinical regulatory pathway. The outcomes and recommendations from this WG will be shared with SAGE in 2018.
Measles	SAGE supported the development by WHO of a standardized method to categorize countries based on their level of disease control and likelihood of achieving and sustaining measles and rubella elimination, and tailoring immunization and surveillance strategies to the country categorization.	Oct 2016	Ongoing	The categorization of countries was discussed by the Measles and Rubella SAGE Working Group as well as the regional verification commissions chairs and the measles and rubella regional focal points. The final categorization was agreed upon and will reported on at the October 2017 SAGE meeting.
Measles	SAGE stressed that the accumulation of susceptible persons at both the national and subnational level should continue to be monitored to identify and address immunity gaps. SAGE requested that the Measles and Rubella Working Group refine the recommendations as to when follow-up SIAs should be conducted.	Oct 2016	Ongoing	The updated measles position paper (published May 2017) stresses the importance of monitoring the accumulation of susceptible persons at both the national and subnational level to identify and address the immunity gaps. The SAGE MR Working Group is looking at refining recommendations as to when follow up supplementary immunization activities (SIAs) should be conducted. Initial modeling results and data analyses were discussed at the SAGE WG meeting in June 2017. However, further analysis is needed before the current recommendations can be refined.
Measles	SAGE requested evidence on the need for measles revaccination of HIV-infected adolescents and adults. Further research is needed to monitor the long-term immune responses to measles vaccine in HIV-infected children revaccinated after starting HAART and in HIV-infected children starting HAART prior to receiving their first dose of MCV.	Oct 2015	Ongoing	A systematic review of the evidence on the need for measles revaccination of HIV-infected adolescents and adults was completed and will be presented at the October 2017 SAGE meeting.

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Measles	SAGE recommended further clinical, immunological, epidemiological and modelling studies regarding the impact of different measles vaccination schedules.	Oct 2015	Ongoing	The RIVM in the Netherlands conducted a systematic review on the safety and effectiveness of MCV prior to 6 months of age. The findings from this review will be presented at the October 2017 SAGE meeting.
Meningococcal A conjugate vaccine	SAGE recommended that countries completing mass vaccination campaigns introduce meningococcal A conjugate vaccine into the routine childhood immunization programme within 1–5 years following campaign completion, along with a one-time catch-up campaign for birth cohorts born since the initial mass vaccination and which would not be within the age range targeted by the routine immunization programme.	Oct 2014	Ongoing	The recommendations from SAGE are reflected in an update to the WHO meningococcal vaccine position paper. The updated guidance has been published in the Weekly Epidemiological Record (WER) on 20 Feb 2015: http://www.who.int/wer/2015/wer9008/en/. Ten of the 26 meningitis belt countries have received approval from Gavi, the Vaccine Alliance for introduction of the meningococcal A conjugate vaccine into their routine immunization programme, with a single dose at 9, 15 or 18 months of age concomitantly with the administration of the first or second dose of Measles/Rubella vaccine. Among them, 6 countries have launched their introduction at the age of 9 months (Sudan, July 2016; Mali, Feb 2017; Central African Republic, June 2017; Chad, July 2017); at the age of 18 months (Ghana, November 2016) and at the age of 15 months (Burkina Faso, Mar 2017), respectively. The remaining four countries intend to do so in 2017 (Niger and The Gambia) or in 2018 (Côte d'Ivoire, Nigeria). Another 3 countries (Guinea; Guinea Bissau; Togo) have applied to Gavi through its new country engagement framework for an introduction in 2019. Other meningitis belt countries intend to apply for the introduction of the vaccine into their routine programme at the next Gavi application windows in Sep 2017, Jan 2018 and May 2018.
MNTE	Where feasible, the use of serosurveys to validate assessment of risk identified from other data sources should be considered to guide vaccination strategies, especially in high-risk districts. Close attention should be paid to sampling strategies and laboratory methods to ensure that results are valid and interpretable. WHO should provide guidance on: sampling methods; sample collection and testing; and analysis, interpretation and use of serosurvey data for monitoring. WHO should consider establishing reference laboratories and reference serum panels to support standardization and quality assurance of the laboratory methods used in serosurveys.	Oct 2016	Ongoing	This recommendation has not yet progressed much. WHO has, however, initiated discussions with the US CDC on the feasibility of combining some of the MNTE validation surveys with serosurveys.
MNTE	UNICEF, UNFPA, and WHO should make all efforts to secure timely supply of the available WHO prequalified TT vaccine in compact single-dose pre-filled auto-disable injection devices to facilitate vaccination of inaccessible populations by community workers. Should the supply of TT vaccine in this latter presentation be less than expected, a clear plan for prioritizing and allocating available doses should be established.	Oct 2016	Ongoing	Efforts are currently going on to submit a proposal to the Gavi Alliance Policy and Programme Committee to request for financial assistance to support the production and availability of this critical pre-filled device aimed at markedly increasing access to the Tetanus Toxoid vaccine to very remote parts of some selected countries where currently access is seriously compromised as a result of insecurity, active conflicts and lack of human resources. A concept note is being finalized in the context of using this initiative as a test case to assess the Total System Effectiveness (TSE) to support the use of TT in the uniject presentation to achieve public health objectives. The TSE in the context of innovation and markets is new and BMGF is actively involved in this effort.
MNTE	UNICEF, UNFPA, and WHO should urgently develop an MNTE investment case and resource mobilization strategy to secure predictable and timely funding support for the remaining 18 countries, if the 2020 elimination timeline is to be met.	Oct 2016	Ongoing	There is currently a collaborative work by WHO, UNICEF and The United Nations Population Fund (UNFPA) that has led to contracting the University of North Carolina to conduct the work on the investment case for MNTE. Work is progressing in earnest, and the first phase of the work focusing on the attainment of elimination by the 16 remaining priority countries is expected to be completed by the end of 2017.Discussions on the second phase of the investment case work on sustaining MNTE have started.

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MNTE	UNICEF, United Nations Population Fund (UNFPA), and WHO should support countries in securing the necessary resources to implement their national elimination plans, including procurement of Td vaccine and operational costs for SIAs.	Oct 2016	Ongoing	A stakeholder's meeting was convened at the end of Nov 2016 to follow up on this. Other efforts include the concept note produced to follow up on funding for Tetanus Toxoid Uniject from Gavi, the Vaccine Alliance, with active collaboration of the Bill and Melinda Gates Foundation and the work on the investment case that is anticipated to facilitate resource mobilization to help support countries to implement their elimination activities.
MNTE	UNICEF, UNFPA and WHO should work with countries to generate and sustain political commitment to maintaining elimination of MNT, in order to guard against complacency once a country has been declared to have achieved elimination.	Oct 2016	Ongoing	All opportunities including the Regional Immunization Technical Advisory Group (RITAG) meetings and Immunization Managers' meetings are being utilized to advocate for efforts by countries to sustain their Maternal and Neonatal Tetanus Elimination (MNTE) status. Update on the status of implementation of the AFR RITAG recommendations were presented at the annual meeting of the AFR RITAG in June. MNTE was one of the topics discussed at the SEAR and WPR TAG meetings in June 2017 as well. Additionally, efforts are being made to finalize the guidelines on sustaining MNTE to ensure that countries are guided through the appropriate steps to take to sustain their achievements.
Multiple injections	SAGE noted the need for further research on multiple injections during the same visit and recommended the following research topics and activities: (i) impact of multiple injections in the same visit on vaccine coverage, disease reduction, vaccine programme success and caregiver and provider experience; (ii) development of a standardized monitoring protocol for acceptance and acceptability by caregivers and providers and for prevalence of adverse events; (iii) development of optimal provider and infant caregiver communication approaches; (iv) optimal multiple injection administration techniques, and (v) development of new technologies, such as intradermal patches and new combination vaccines, which would decrease the number of vaccine injections in a single visit.	Apr 2015	Ongoing	Multiple injection studies have been conducted in collaboration with US CDC in South Africa, Gambia, and Albania, with studies ongoing in the Philippines, Sudan, and Columbia. Studies are primarily designed to evaluate healthcare provider and infant caregiver attitudes and practices regarding administration of multiple injectable vaccines in the same visit, in most cases following the introduction of IPV and PCV. A new time motion study is also being initiated in Uganda and another country in the African region. The findings of these studies will feed into the development of any further guidance required to address concerns related to multiple injections and pain.
National immunization programme management	SAGE welcomed the initiative and stressed the importance and urgency of developing guidance that can be tailored to each country's unique structure and needs. SAGE emphasized the importance of looking at functions and competencies from a health-system perspective whereby all the immunization functions are adequately addressed with competent staff, regardless of the country's health system structure. SAGE recommended sharing of experiences between countries and regions on immunization workforce planning. SAGE suggested creating tools to assist countries in different aspects of immunization human resources management including: staff turnover and rotation policies, performance evaluations, and design of training. SAGE recommended that this work be piloted in a range of countries.	Apr 2017	Ongoing	A joint meeting with the US CDC is planned for September 2017 to discuss ways forward. The US CDC had drafted an article on this topic for a peer-reviewed journal, which should be published by end of this year.

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National Immunization Technical Advisory Groups (NITAGs)	SAGE recommended that tailored guidance, tools, training, mentoring programmes and sharing of information are needed to assist NITAGs. Therefore, SAGE stressed that initiatives such as the Global NITAG Network and the NITAG Resource Centre are essential and that these would require dedicated financial and human resources. SAGE further noted that NITAG evaluations are important beyond the current process indicators and should be continued and supported by countries and partner institutions. NITAG evaluations need to focus on function, quality and integration.	Apr 2017	Ongoing	The second Global NITAG Network (GNN) meeting was successfully held from the 28th to 29th of June 2017 in Berlin, Germany. The meeting was attended by 38 NITAG country representatives (NITAG Chair, member or secretariat) from a total of 26 countries. During this meeting the GNN was formally established and its strategic document endorsed. A next meeting in 2018 is envisaged, likely to take place outside Europe. WHO is creating a post to ensure the secretariat of GNN and the sustaining of further development of the NITAG Resource Centre.
Pain mitigation	SAGE recommends that WHO: 1) includes pain mitigation recommendations with WHO immunization practice guidance materials; 2) disseminates pain/distress mitigation recommendations through the usual dissemination channels, immunization managers, National Immunization Technical Advisory Group (NITAG) and partner organizations; 3) monitors and evaluates the implementation success of pain mitigation measures; 4) works with industry, ECBS and regulatory agencies to advocate that grading of pain experienced during the vaccine injection be included in data for licensing and in the product monograph.	Apr 2015	Ongoing	Internal discussions have taken place on how to move forward across relevant WHO departments. A brief position paper was drafted based on the SAGE recommendations and published in the Weekly Epidemiological Record on 25 September 2015. This formed the basis for additional proactive communication activities. As example of actions in response to points 1 and 2, WHO ensured that information in WHO guidance on multiple injections and IPV was consistent with the SAGE recommendations on reducing pain, specifically in two documents: Practical considerations for the successful introduction of IPV, and Multiple Injections: Acceptability and Safety, both available on this web page. The WHO position paper on reducing pain was also added on the same web page. In relation to the training aspects for IPV introduction, we updated training modules for health workers, also to reflect the recommendations from the latest WHO position paper. The Immunization in Practice recently published has in module 5 ‘Managing immunization sessions’, recommendations on vaccine sequence (increasing pain- oral before injection, rota before OPV), positioning the recipient, no aspiration etc. IIP has been distributed to countries and the last edition was also translated into several local languages. Work is also ongoing to ensure appropriate incorporation of pain mitigation in WHO guidance documents when they get updated and to ensure that any recommendation posted on the web at odds with SAGE's guidance be adjusted/removed. The pain mitigation guidance has been included in the NITAG resource center. As a further example of use and integration in WHO documents, reference to the pain mitigation position paper has been made in the recently published updated tetanus position paper. PDVAC will consider pain mitigation within their preferred product characteristics to guide target product profiles. Steps have been taken and discussions started to also reflect the measurement of pain at time of injection in the updated Guidelines on clinical evaluation of vaccines were discussed and endorsed by ECBS in October 2016. They allude to pain mitigation. More specific activities still need to be implemented with respect to points 3 and 4.
Polio	SAGE requested that WHO review its tier classification of countries with respect to prioritization of IPV to take into account the size of the population with no IPV protection and the recent VDPV2 events.	Apr 2017	Ongoing	WHO, in collaboration with partners, is working on updating its tier classification of countries with respect to prioritization of IPV. It will be presented to the SAGE Working Group in September 2017 and to SAGE in October 2017.

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Polio	SAGE advised GPEI to accelerate implementation of the WHO Global Action Plan for containment (GAPIII) including: a) all countries completing phase I; b) regional focal points closely monitoring country activities and ensuring each country completes its inventories of facilities that hold or handle polioviruses, and destroys or commits to destroying WPV2 by end 2015 and any other type 2 containing materials including Sabin poliovirus by July 2016.	Oct 2015	Ongoing	As of 27 Jul 2017, all 223 countries and territories have completed their reports on the first part of Phase I. However, the release of mOPV2 in 8 countries for post-switch cVDPV-outbreak response will require these countries to repeat their surveys and inventories and revise their reports. 94 countries or territories have reported that they no longer retain any OPV2/Sabin2 materials. The completion of this second part of Phase I will follow the publication of WHO's 'Guidance for non-polio facilities to minimize risk of sample collections potentially infectious for polioviruses', pending endorsement by the Containment Advisory Group (CAG) planned for end-November 2017. For Phase II, 31 countries reported the intention to retain PV2 materials (WPV2 or OPV2/Sabin2) in 90 designated poliovirus-essential facilities (PEFs). 18 of these countries have nominated a national authority for containment (NAC).
Polio	SAGE urged WHO to facilitate discussions and decision-making by National Immunization Technical Advisory Groups (NITAGs) to introduce IPV intradermal fractional dose use by providing necessary technical information.	Oct 2016	Ongoing	WHO prepared the communication and technical materials to National Immunization Technical Advisory Groups (NITAGs). The WHO secretariat is advocating for the use of fractional dose IPV at both regional and country technical advisory group meetings (TAGs).
Polio	SAGE noted that the IPV supply situation is further deteriorating. Therefore, the programme should explore the possible use of devices facilitating intradermal administration (e.g. jet injectors, intradermal adapters).	Oct 2016	Ongoing	WHO is working on pre-qualification of both jet injectors and intradermal adapters. In addition, WHO is conducting several pilots of the use of these devices in immunization campaigns (e.g. Karachi, Pakistan).
Polio	SAGE requested WHO to complete the guidance on identification of potentially infectious materials (including stool and respiratory specimens) into 3 groups based on likelihood of being contaminated with VDPV2 or WPV2.	Oct 2016	Ongoing	A revised draft of the 'Guidance for non-polio facilities to minimize risk of sample collections potentially infectious for polioviruses' has been submitted to the Containment Advisory Group (CAG) at their first meeting of 19-20 June 2017, with a request to reconsider the handling and storage conditions for poliovirus genetic materials, currently requiring full containment according to GAPIII. The draft guidance is being revised based on CAG recommendations and comments from CAG meeting participants, and will then posted on the web for a period of public comments and pilot testing. Feedback collected will be included in the final version that is planned to be submitted to CAG at their second meeting of 28-30 November 2017 for endorsement and publication.
Polio	The documentation for 'legacy planning' should include contributions from communities and front-line health workers on their experiences with the polio programme, what it has meant for them and how lessons learnt could further improve the routine vaccine and health programme.	Apr 2013	Ongoing	Capturing this information is integrated into the country-level transition planning guidelines, and the work of the Transition Management Group of the Global Polio Eradication Initiative is emphasizing the importance of this. All Transition Planning consultants are briefed/ trained on the Transition Guidelines.
Polio	SAGE requested its Polio Working Group (WG) to provide urgent guidance on optimal management of IPV supply and mitigation of other risks in case the IPV supply is further reduced.	Oct 2015	Ongoing	The IPV supply situation is being closely monitored. An update from the September Polio Working Group meeting, including on discussions with vaccine producers, will be provided during the October 2017 SAGE meeting.

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Polio	SAGE encouraged further engagement of WHO regional offices in regard to the polio legacy planningto ensure adequate technical support to countries.	Oct 2015	Ongoing	Inter-Cluster Transition Steering Committees have been established in both WHO Regional Office for Africa (AFRO) and WHO Regional Office for the Eastern Mediterranean (EMRO). They are Chaired by the Directors Programme Management of the respective Regions. The Regional Offices are also members of the WHO Global Polio Transition Steering Committee established by the Director-General's Office. Headquarters (HQ) and Regional Colleagues are members of the Global HR Working Group that is planning for the effective and efficient reduction in the Polio Staffing levels in countries, regions and HQ. Guidance on Transition Planning, and Budget Rampdown figures for 2017 - 2019 have been provided to AFRO, EMRO and Regional Office for South-East Asia (SEARO), and the 16 polio priority transition countries by the Global Polio Eradication Initiative (GPEI) through the Transition Management Group (TMG) and all three Regions are Members of the TMG. Financing has also been provided through the TMG to support Consultants, vetted by the Regional Offices, who are assisting priority countries in developing transition plans. Both AFRO and EMRO are also involved in the development of a Business case for Immunization in the African continent as a follow-up to the Addis Declaration on Immunization. Polio transition and its consequences will inform this business case. AFRO, EMRO and SEARO all decided to hold a specific session/side meeting on transition planning in their Regional Committee meetings in 2017. EMRO Inter-cluster Steering Committee decided to review the country plans of the countries in the EMRO Region by an interdepartmental regional team.
Polio	SAGE advised GPEI to develop a targeted advocacy and communication plan to engage key countries and stakeholders to ensure completion of phase I and implementation of phase II, including establishment of national containment authority and national regulation for containment of poliovirus in designated essential poliovirus facilities.	Oct 2015	Ongoing	While a communications officer to focus on containment is currently being recruited and a communication plan is being finalized, articles providing details of global progress with containment have been published in June 2017 in MMWR and WER. The WHO Containment team is organizing advocacy in-country visits with NACs and PEFs to support the nomination of NACs and encourage the engagement of PEFs and NACs in containment certification activities, including the issuance of certificates of participation (CPs). Deadlines for CP applications and other containment measures will be discussed at the next GCC meeting of 23-25 Oct. WHO is training GAPIII auditors nominated by the NAC to assess PEFs against the implementation for GAPIII. Containment certificates will be delivered by NACs in consultation with GCC. So far however, GCC has not received any application yet.
Preferred Product Characteristics	SAGE noted the utility of Preferred Product Characteristics (PPCs) to developers and funders, and proposed that the opportunity for input into future PPCs at an early stage for any vaccine of public health importance could be included as part of SAGE's global public health mandate.	Apr 2013	Ongoing	Since this recommendation, the Product Development for Vaccines Advisory Committee (PDVAC) has been created, and identified as the WHO committee responsible for overseeing the PPC generation process and content. PDVAC has emphasized the need for several PPC documents to be developed by WHO IVR. PPCs for Group B streptococcus and RSV vaccines have been finalized. Target Product Profiles for emerging pathogens have been developed as part of the Blueprint initiative. PPCs for new tuberculosis vaccines, next-generation influenza vaccines influenza vaccines, Group A streptococcus, ETEC, Shigella and Herpes Simplex Virus 2 are under development. PPCs when finalized and ready for public circulation are posted on the WHO IVR website.
Private sector engagement with national immunization programmes	SAGE applauded the development of the draft guidance as an initial step in tackling this area of work and urged WHO to finalize a common framework starting with a set of core principles.	Apr 2017	Completed	As requested by SAGE the "WHO Guidance Note: Engagement of private providers in immunization service delivery. Considerations for National Immunization Programmes" has been revised and particularly shortened. The WHO Guidance Note was published in September 2017 and can be retrieved through the following link: http://www.who.int/immunization/programmes_systems/policies_strategies/Private_sector_immunization.pdf?ua=1

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Regulatory	SAGE recommended that the further development of the Emergency Use Assessment and Listing procedure being developed by WHO, which would allow use of a vaccine in the context of a Public Health Emergency of International Concern, be done in close consultation with relevant regulatory authorities, including those of the affected countries.	Apr 2015	Ongoing	Regarding the Emergency Use Assessment and Listing (EUAL) procedure, the WHO Prequalification Team took note of SAGE recommendation and further development of the EUAL will consider relevant regulatory authorities including those of impacted countries. Further, a document entitled, “Vaccine evaluation in public health emergencies – review of regulatory pathways in selected countries” was prepared and presented to SAGE working group (WG) on Ebola vaccines in Aug 2015. In Oct 2015, the document was submitted to the Expert Committee on Biological Standardization (ECBS) for review and advice. The Committee considered that a guidance document might be of value to National Regulatory Authorities (NRAs) and other public health organizations. However, it also recognized the complexity of emergency situations, each of which is essentially unique, and that decisions ultimately rest on a benefit/risk assessment. The ECBS reviewed the document's progress in 2016. Evaluation of vaccines for public health emergencies was discussed in the 3rd meeting of the WHO Collaborating Centers Network on Vaccines in Seoul, in July 2016. Lessons learned from the Ebola crisis in West Africa and the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in Korea were discussed and several activities of the CC network were proposed. In addition, new initiative called the Coalition for Epidemic Product Innovation (CEPI) was discussed as a framework in which a number of partners will work together to assure better preparedness for public health emergencies in future. The ECBS was also briefed about the CEPI in Oct 2016. The CEPI initiative led to the establishment of a Regulatory Working Group in 2017 with the focus on data requirements for product development in the absence of an outbreak, regulatory issues related to stockpiling and the use of stockpiled products during the outbreaks.
Reports from other advisory committees on immunization	SAGE recommended appointment of appropriate programmatic and implementation expertise to IVIR-AC membership including representation of experts from low and middle-income countries.	Nov 2011	Ongoing	Since 2013, Immunization and Vaccines related Implementation Research Advisory Committee (IVIR-AC) includes 2 programmatic and implementation research members from the African Region (AFR) and the South East Asian Region (SEAR). Since 2014, IVIR-AC includes a mathematical modeler/economist from SEAR and a medical anthropologist from AFR. There was a call for new members in 2015. Three potential candidates were selected to attend the June 2015 meeting. The mathematical modeler was selected to become a member but the two health economists were not selected as they did not meet the expectations. A new call for Committee Members was issued in Q3-Q4/2016. Five new members have been recruited with expertise in vaccinology, epidemiology, vaccine economics, modeling and social science.
Reports from other advisory committees on immunization	WHO and NIBSC should develop with other stakeholders, a business plan to assure long-term security of the development of WHO reference preparations as a global public health resource and additional efforts should be undertaken to disseminate outcomes of the committees deliberations and to explain the relevance of its work to the broader immunization community.	Nov 2006	Pending	A network of WHO Collaborating Centres (CC) on the Standardization of Vaccines has been established. At its 3rd meeting, the network agreed to establish a “Core Expert Group (CEG)” to assist the Expert Committee on Biological Standardization (ECBS)to review selected proposals for measurements standards. Proposals for replacement measurement standards are usually straightforward, with few strategic or scientific issues, and they would be the initial focus of the CEG. The ECBS agreed that the CEG could pre-review selected measurement standards in the vaccines area and thus help to streamline the ECBS review process. A drafting group on Men B guidelines was established as a part of CEG activity on written standard and report will be submitted to ECBS for discussion. Review of measurement standards will be conducted in September and feedback from CEG will be submitted to the ECBS. Further discussion on the activities of the CEG is going to take place at the ECBS meeting from 17 to 20 October 2017.

Topic	Recommendations/Action item	Meeting Date	Status	Comments and Follow up
RSV	SAGE asked for preparations to be made to support global policy-making for respiratory syncytial virus (RSV) maternal immunization as well as passive immunization with long-acting mAb. SAGE emphasized the need to link maternal immunization platform strengthening with influenza, tetanus and pertussis vaccines along with preparations for potential country introductions of RSV vaccine.	Apr 2016	Ongoing	Further discussions have been held with the WHO Prequalifications (PQ) team with regard to prequalification processes for both respiratory syncytial virus (RSV) vaccines and monoclonal antibodies (mAbs). The ECBS Guidelines for RSV vaccines are planned for development and possible adoption at Expert Committee on Biological Standardization (ECBS) 2018, as these are a prequisite for consideration for PQ. The Essential Medicines and Health Products (EMP) department is considering an approach to PQ of mAbs. Intensive discussions continue about the most appropriate way to prepare for policy-making in Low and Middle Income Countries (LMICs), without any results yet available for efficacy trials in these settings. A Phase 3 trial of the Novavax RSV F Vaccine in 11,856 older adults (60 years of age and older, enrolled in the USA), did not meet the pre-specified primary or the secondary efficacy objectives, and did not demonstrate vaccine efficacy. Efficacy may differ between elderly and healthy pregnant women target groups. The Novavax Phase 3 trial in late 2nd/early 3rd trimester pregnant women continues with endpoints accruing in neonates and young infants. Public release of available results from a Medimmune candidate vaccine tested in adults are awaited. The RSV vaccine pipeline remains very robust and can be accessed at the IVR Vaccine Pipeline Tracker: http://who.int/immunization/research/clinicaltrials_newvaccinepipeline/en/ (open the page then navigate to the RSV tab of the spreadsheet). A WHO Preferred Product Characteristics for RSV vaccines document has been finalized under PDVAC oversight, soon to be made publically available on the WHO IVR website.
Second year of life (2YL)	A recommendation was made for consideration of a platform for immunization coverage in the 2nd year of life, in view of potential necessary booster doses and opportunities to catch up with incomplete vaccination, and removing the artificial barrier often experienced after the 1st birthday.	Apr 2014	Ongoing	Two country case studies (Zambia, presented to SAGE in April 2016, and Senegal) (WHO, JSI) and a global landscape analysis and literature review (UNICEF) have been conducted; learnings from these as well as country demonstration projects in Ghana and Malawi (CDC) have been used to inform the draft global guidance on Establishing and strengthening immunization in the second year of life: Practices for immunization beyond infancy. An advanced draft of the guidance document was shared reviewed by the Immunization Practices Advisory Committee (IPAC) in Feb 2017 and the document was circulated for a final round of review in September 2017. Advocacy and demand creation packages targeting decision makers, planners, health workers and caretakers are also under development and be ready by end of 2017. With the guidelines on track, WHO and UNICEF are moving ahead to develop training materials for country-level staff and for building a pool of consultants trained to identify gaps and facilitate actions needed to maximize coverage of vaccines scheduled in the second year of life.
Smallpox vaccines	SAGE recommended that WHO initiate discussions with countries in possession of smallpox vaccine to establish mechanisms for replenishment of the WHO stockpile in case of need.	Nov 2013	Ongoing	Discussion with the French Government is still ongoing to provide 5 million doses. WHO is waiting for the french regulatory authority to provide the technical information about the vaccine for evaluation. The negotiations with the Japanese Government for 10 000 doses have been put on hold until the Japanese NRA approve the manufacturer to restart production. WHO is working on smallpox vaccine prequalification for the emergency stockpile. WHO restarted the dialogue with the UK for the donation of 4 million doses. A WHO meeting took place in Geneva 7-8 Sep 2015 to discuss with the National Regulatory Authorities and vaccine manufacturers what would be the minimum criteria to pre-qualify smallpox vaccines in case of re-emergence of variola virus. The report is not yet published.
Strengthening of NITAGs	SAGE requested a regular update on the number of established National Immunization Technical Advisory Groups (NITAGs).	Apr 2016	Ongoing	This information is collected via the WHO/UNICEF joint reporting form and analyzed every year. The figures are included in the GVAP secretariat report, which is made available to the SAGE DoV working group and then to SAGE. By the end of 2016, 127 Member States reported the existence of a NITAG and 82 Member States (including 27 GAVI-eligible and 25 non GAVI supported Middle Income countries) the existence of a NITAG that meets all 6 basic process indicators included in the JRF and used as part of the GVAP indicator. These figures can also be included in the global report on a yearly basis. A specific NITAG session was held at the April 2017 SAGE meeting.

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Supply shortages	SAGE recommended that WHO could play a key role in setting up an “Exchange Forum”, helping to collect demand information from all Member States and to enhance dialogue between countries’ demand (including anticipation of schedule evolution and new introductions) and manufacturers’ supply availability and risks.	Apr 2016	Ongoing	Concerns about ongoing shortages of vaccines persist. This has been stressed throguh the SAGE session on vaccine shortages held in April 2016, resolution 69.25 on "Addressing the global shortage of medicines and vaccines", the fifth objective of the Global Vaccine Action Plan (GVAP), the Middle Income Country (MIC) Strategy endorsed by SAGE in April 2015 and the 68th World Health Assembly (WHA) resolution on the GVAP in May 2015. WHO IVB Department, in collaboration with Essential medicines and health products (EMP) and with support from Linksbridge consulting funded by the Bill & Melinda Gates Foundation and MMGH consulting, is leading a Vaccine Shortage Project. The aim of the project is to act upon the recommendations and requests of SAGE and WHA by providing concrete proposals on WHO’s role and actions to enhance information sharing for pre-empting and managing vaccine supply shortages. While all countries can benefit from this work, particular attention is paid to countries not supported by UNICEF Supply Division, PAHO, or Gavi. To ensure that any potential solution in this space builds on existing data, knowledge and processes, a first phase of the project, the Analysis of Assets, aimed to understand the extent of information available to WHO to be able to predict, pre-empt and act upon vaccine shortages. This includes both internal and external information. This phase also aimed to understand the extent of current project/mitigation work within WHO, vaccine by vaccine. This phase has been completed and a project report is available upon request. Based on the findings from Phase 1, Phase 2 of the project is focusing on development of concrete solutions to enhance WHO’s ability to address vaccine shortages with a focus on filling current gaps in information sharing and supporting self-procuring countries. Using Bacillus Calmette–Guérin (BCG) and D&T containing vaccines to prototype solutions, an informed proposal on WHO’s functions and operating model with regards to vaccine supply/demand/price data input, market analytics, output material and distribution will be developed. Draft Terms of Reference for the operating model -with related resource assumptions- will be made available by Q4 2017. In the interim, an assessment of the global BCG vaccine market has been completed and is available upon request.

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Surveillance	SAGE endorsed the recommendations of the ad hoc TAG for improving the quality of the IB-VPD surveillance network and urged that the objectives of this network be more clearly defined, that collaboration with other surveillance systems and laboratory networks (i.e. the polio/measles laboratory networks) be continued, and that, where feasible, activities be linked with other programmes enhancing country capacity, including implementation of the International Health Regulations. SAGE urged greater attention to integration of data systems, which would facilitate real-time analysis and performance monitoring. SAGE also noted the opportunities for integration by building upon the enhanced capacity developed by these networks to conduct surveillance for other diseases using a similar case-definition and personnel trained in applying and adhering to rigorous surveillance protocols. Both networks should continue to share experiences with the polio surveillance network. Integration efforts must be strategically designed in ways that are logical and synergistic.	Nov 2013	Ongoing	Since 2013, significant progress has been made to strengthen the Global IB-VPD and Rotavirus Surveillance Networks through recommendations from the 2013 global strategic review and annual meetings and consultations. By the end of 2016, we have made significant progress toward strengthening the Networks and meeting those goals. In 2016, the Global Rotavirus Surveillance Network comprised 133 sentinel surveillance sites in 58 countries and the Global IB-VPD Surveillance Network comprised 124 sentinel sites in 57 countries. This has continued through the first half of 2017. Data management processes continue to be improved toward a more systematic approach in reporting, cleaning, analysing and interpreting data. The reference laboratories are appropriately supporting sites and network laboratory performance has been successfully monitored by the global external quality assessment program as well as quality control programmes. Sentinel site and laboratory assessments are ongoing at priority sites. The most recent complete year of data available is from 2016, and it reflects the strength of the data and the network. Network data has contributed to vaccine introduction decisions, such as choice of pneumococcal conjugate vaccine (PCV) formulation, and the surveillance networks have been used as platforms for vaccine impact evaluations, particularly for rotavirus vaccines (RV). The surveillance platform has also been leveraged to monitor other VPDs, such as typhoid using the IB-VPD surveillance sites and other enteric pathogens such as norovirus, Shigella, and ETEC using the rotavirus network. Moving forward, the rapid introduction of PCV and RV by Member States now requires the surveillance networks to focus on improving baseline data for sites in non-vaccine using Member States and to ensure consistent surveillance practices to monitor impact for sites that meet inclusion criteria in vaccine-using Member States. A web-based data management tool is being rolled out in one Region (PAHO) and has great potential to improve data quality and sharing across the Network. We are discussing how to better integrate IB-VPD meningitis surveillance with existing meningococcal meningitis surveillance systems. We conducted a meeting in December 2016 to evaluate the cost of surveillance to help countries and funders develop sustainable surveillance plans, including other VPDs such as measles. We also continue to support sites where PCV and/or RV vaccine impact evaluations may be feasible due to sufficient pre- and post-vaccine introduction data, including using secondary data sources such as hospital administrative data. We have an ongoing evaluation of what sites to include in the Network and how to incorporate countries conducting surveillance outside of the Network. Finally, one of our main activities is to work with countries on making surveillance sustainable in the long term.
Sustainable Development Goals	Approval of a vaccination coverage indicator under the child mortality target of the Sustainable Development Goals (SDGs) has not yet been obtained. SAGE urged WHO and countries to request an aspirational immunization indicator under the SDGs.	Apr 2016	Ongoing	Several immunization partners (Gavi, Unicef, BMGF, US-CDC, WHO, Center for Vaccine Ethics and Policy NYU) have worked together to explore possible indicators to be added to the SDGs monitoring framework in addition to the currently included ones (Target 3.8.1 Universal Health Coverage composite indicator, and the Hepatitis B control strategy, three doses of Hep B vaccine). It was agreed to propose Global Vaccine Action Plan (GVAP) G2 Indicator Coverage for all vaccines in national schedule to be included for SDGs sustainability and access to health and essential medicines & vaccines goal (3.b).1. The choice of this indicator has been validated by the SAGE Decade of Vaccine Working Group. In November 2016, at the 4th meeting of the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDG), the new accepted immunization indicator was defined as 3.b.1 Proportion of the target population covered by all vaccines included in their national programme. WHO and UNICEF were identified as co-custodians for this indicator. The definition of the indicator and the proposed measurement needs to be developed and validated by SAGE Decade of Vaccine working group. Measles second dose was chosen as a proxy indicator by the SAGE working group. The indicator will be presented at the October 2017 SAGE meeting for final decision. The definition needs to finalized or IAEG meeting scheduled for fall 2017 in order to include the indicator to 2018 SDG report.

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Tuberculosis vaccines	SAGE endorsed the establishment of a WHO TB vaccine technical expert group with representation from SAGE. An annual written report on TB vaccine developments should be provided to SAGE. SAGE would be provided with two-page summaries of progress every year. TB would only be included on the agenda of SAGE when there is a meaningful development of decision from SAGE required.	Nov 2011	Ongoing	Progress in TB vaccine development was reviewed by PDVAC in June 2016. Since the adolescent/adult population carry the heaviest disease burden, there is consensus within the TB vaccine community that prioritizing this target population will have the highest and most immediate public health impact from reduction in transmission. The most advanced vaccine candidates are GSK's M72/AS01E, the recombinant BCG VPM1002, M. VaccaeTM. M.vaccae is a heat killed homogenized lysate developed by Anhui Zhifei Longcom, China, which has been evaluated in Phase 3 for prevention of tuberculosis in healthy adults with latent TB infection, as well as as adjunctive immunotherapy with the aim to shorten TB treatment. Results have not been communicated. VPM 1002 is a recombinant BCG, originally developed by the Max Planck Institute; now licensed to the Serum Institute of India (SII) and being developed with Vakzine Projekt Management (VPM), Hannover, Germany. It is currently in Phase IIb/III trials, being compared to BCG in neonates in South Africa, as well as being tested for prevention of TB recurrence in adults in India. Discussions are ongoing about neonatal BCG comparison phase 3 study design to ensure appropriate data is generated, supporting robust policy decision on possible BCG replacement. M72/AS01E a GSK adjuvanted protein vaccine candidate in phase IIb evaluation in Southern Africa, being tested for prevention of pulmonary TB. Primary results are awaited in the coming months. Secondary endpoints include safety and immunogenicity. H4/IC31 is an adjuvanted recombinant protein under development by Sanofi Pasteur, SSI and Aeras, currently in a Phase II prevention of infection study in adolescents (Phase II) with data expected by the end of 2017. Upon PDVAC recommendation, WHO IVR is driving an effort to generate guidance on preferred product characteristics for TB vaccines targeted to adults and adolescents, with support from the Bill and Melinda Gates Foundation.
Typhoid	Establish a SAGE working group on typhoid conjugate vaccines in 2016 to prepare for a SAGE review of the evidence in 2017.	Oct 2015	Ongoing	The SAGE Working Group (WG) on Typhoid Vaccines was established in Mar 2016 and will report its evidence review and draft policy recommendations for typhoid vaccines to SAGE at the Oct 2017 meeting. Data on the safety of typhoid vaccines was reviewed by the Global Advisory Committee on Vaccine Safety (GACVS) in Dec 2016. New modelling data on the dynamics of diseases transmission and economic evaluation of typhoid burden and of vaccination strategies have also been reviewed by the Immunization and Vaccines Related Implementation Research Advisory Committee (IVIR-AC) in Feb and Sept 2017. Important new data have also been generated in recent and ongoing studies on areas such as the epidemiology and burden of typhoid fever; trends in antimicrobial resistance of S. Typhi and implications for typhoid control. These data have provided critical information to inform the SAGE Working Group's evidence review, or are anticipated to provide data in the next few years to support country level decisions on typhoid control. Currently, one licensed typhoid conjugate vaccine is undergoing WHO prequalification review.
Un/under-immunized children	SAGE requested that WHO quickly roll out tools so that other countries can address low coverage of vaccination.	Nov 2010	Ongoing	Work is ongoing on the tool to assess "Missed Opportunities for Vaccination" (see item 284). On a broader level, a companion document to the Global Vaccine Action Plan (GVAP) focusing on Routine Immunization entitled "Global Routine Immunization Strategies and Practices" (GRISP) has been presented to the SAGE WG on DoV twice, and in Aug 2016 was published. Additionally, a range of additional guidance materials are under development and close to finalization. These include a health worker 'knowledge, attitudes, and practices' (KAP) tool, training materials for health workers on conversations with hesitant parents/caregivers, and addressing concerns regarding multiple injections and pain. A global field guide for 'Tailoring immunization programmes', based on the original guide from EURO, is being finalized. General guidance is also being developed to outline the range of interventions that may be considered when identifying and working to address hesitant populations.
Vaccination during humanitarian emergencies	SAGE also suggested that the framework approach to vaccine decision-making could be considered for other health interventions in emergencies.	Apr 2012	Ongoing	Possibilities of using the SAGE framework in other public health areas and emergency settings are being explored.

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Vaccination during humanitarian emergencies	SAGE emphasized the need to advance work on refining guidance in delivering continuous immunization services during humanitarian conflicts. A session on human emergencies will tentatively be slotted at the April 2016 SAGE meeting.	Oct 2015	Ongoing	A WHO meeting on implementation of vaccination during humanitarian emergency situations was convened in Cairo from 12-14 January 2016. The objectives were to: -reflect on the experience of EMR countries in implementing vaccination in humanitarian emergencies and the issues, challenges, best approaches and existing country guidance documents to ensure satisfactory vaccination of the target populations. -reflect on countries experience using vaccination in acute humanitarian emergencies: a framework for decision making. -build on countries experience to initiate development of a draft guidance document on the implementation of vaccination in humanitarian emergency situations. A draft guidance document on implementation issues was initially produced by EMRO, adjusted some as a result of limited preliminary peer-review, and then distributed for a much broader peer review. 'Vaccination in acute humanitarian emergencies: a framework for decision making' has also been adjusted/updated based on the feedback received during the Cairo meeting and a draft operational manual is being developed. Finally, although there was no separate specific session during the Apr 2016 SAGE meeting an update was featured in the IVB Director's global report at this meeting. A meeting was jointly organized with MSF on 20 June to tackle the issue of supply and procurement obstacles in humanitarian emergencies: a. Discuss/map the obstacles to necessary access to affordable vaccines in a timely manner in emergency and humanitarian crisis situations. b. Discuss proposed solutions for addressing the key barriers to timely provision of affordable vaccines in humanitarian crisis situations. c. Agree upon a set of priority issues to be addressed by partners with a proposed plan of action/timeframe for follow up. A follow-up meeting took place on 10-11 Oct to develop consensus on the various guidance and priorities mentioned above and discuss how to best communicate and advocate for their implementation. Feedback form the meeting included that the envisaged operational manual missed important features while still being too long. Therefore the participants concluded that with having the revised and edited framework for decision-making along with the web-based tools, the operational manual was obsolete. The updated framework for decision-making has been published and is available at http://apps.who.int/iris/bitstream/10665/255575/1/WHO-IVB-17.03-eng.pdf and implementation guide was finalized and is available at http://apps.who.int/iris/bitstream/10665/258719/1/WHO-IVB-17.13-eng.pdf. Work is ongoing with UNICEF for the development of web based interactive tools to support its use and facilitate further updating. These tools should be available by Q3 2017. Attempts are currently being made to have a proactive dissemination and communication plan to ensure adequate distribution of the tools.

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Vaccine coverage	SAGE recommended that WHO explore alternative survey methods to improve the precision, reduce the cost and improve the usefulness of survey results to national and local immunization programmes.	Nov 2011	Ongoing	To improve the quality, precision and usefulness of survey results and to reduce the cost of surveys, the Global Immunization Monitoring and Surveillance Group (GIMS) explored recent advances in sampling methodology; new technologies for constructing sampling frames, supervision of field work, data collection, and analysis; and alternative content, collection, analysis, presentation and linkages An initial meeting was convened of the Department of Immunization Vaccines and Biologicals (IVB) Informal Advisory Group on Monitoring Immunization Programme Performance through Household and Community Surveys. The first meeting addressed the need to modify Demographic and Health Surveys (DHS) implemented by ICF International; and the UNICEF Multiple Indicator Cluster Surveys (MICS) and the WHO Immunization Cluster Survey to accommodate changes in immunization system strategies. In 2012, following a meeting with representatives of ICF and the MICS team, WHO and UNICEF provided written recommendation to these agencies to propose modifications to their standard recommendations on data collection, analysis and presentation of immunization coverage data. An informal working group was created to review and revise WHO guidance on measuring immunization coverage through household and community surveys. In 2013, the working group met to agree on the scope of work, to identify initial products, and establish a plan of document production, review, pilot testing, and clearance. Draft guideline was circulated to external reviews in 2014-2015. The proposed methods were reviewed in September 2014 by Immunization and Vaccines Related Implementation Research Advisory Committee (IVIR-AC). IVIR-AC agreed that the revised method for coverage surveys is the proper way forward, but that statistical expertise will be required to implement the survey in the field and provided other considerations, including the importance of using GPS technology, the need for qualitative studies and piloting of surveys in hard-to-reach settings. IVIR also noted that difficulties in monitoring progress and comparing cross-sectional data across methods and time must be addressed. Protocol for pilot testing was used in Bangladesh. In mid-2015, a working draft of the WHO Vaccination Coverage Survey Reference Manual was distributed and posted on the departmental website. Between 2015 and 2016, all or some aspects of the recommendations included in the new Survey Manual were used in Burkina Faso, Lao PDR, and to a lesser extent in Lebanon and for surveys following supplementary immunization activities (SIA) in Kenya, Swaziland, to name a few. Nigeria combined a MICS with a vaccination coverage survey and Pakistan planed its 2017 Vaccination Coverage Survey using the new Manual. In Dec 2015, a briefing workshop on the methodology for regional focal points and consultants was conducted. In 2016, countries in the African and Eastern Mediterranean regions were briefed. Between 2016 and early 2017, WHO in collaboration with UNICEF and CDC conducted trainings that brought together statisticians from developing countries (one Anglophone and one Francophone training), along with immunization program officers and consultants were conducted for countries from all regions, except EUR. A separate training was done in China for all provinces. It is expected that the WHO Vaccination Coverage Survey Reference Manual will be finalized by the end of 2017, after experiences and lessons learned are shared and discussed. The revised recommendations will likely improve accuracy, by decreasing selection bias and reliance on maternal recall, and should also increase likelihood for adequate power, increase rigor and quality. The cost of the various trade-offs needs to be further explored.
Vaccine coverage	WHO to identify appropriate methods and develop guidelines for collecting, analysing, and interpreting biomarkers for validating coverage.	Nov 2011	Ongoing	Currently, WHO is developing global guidelines on conducting serosurvey studies on measles and rubella to identify immunity gaps in the population. An expert working group has been assembled, based on the expertise in the various fields of each of the members needed to conduct such studies, including statisticians, epidemiologists, laboratory experts, and program experts, given sub-tasks in developing parts of these guidelines that pertain to their respective expertise. A working draft has been circulated for comments and was finished by the end of 2015. It was tested subsequently in pilot studies in two different settings (post campaign/post outbreak in Mongolia, and at elimination in Bhutan). The data collection part of a pilot study has been conducted in Mongolia in 2016; analysis of the survey results is underway. The data collection has been completed in Bhutan and laboratory testing is ongoing; this study was an integrated study alongside hepatitis B/C. Based on the field work, the working draft guidelines are being adjusted, amended and corrected where needed. The final document is planned to be ready and published by end of 2017 and to be rolled out as a tool to evaluate the immune status of the target or targeted population.

Topic	Recommendations/Action item	Meeting Date	Status	Comments and Follow up
Vaccine coverage	SAGE recommended that WHO support new research for biological specimen collection including rapid on-site diagnostics that could improve coverage and susceptibility estimates. Improved serological surveillance techniques could be integrated with existing population-based surveys such as DHS or MICS. These research topics should be included on the QUIVER (now IVIR-AC) agenda.	Nov 2011	Ongoing	With the support from the Bill and Melinda Gates Foundation (BMGF), a point-of-care testing (POCT) prototype sample Oralight collection device and POCT test system based on lateral flow and a reader combined with mobile phone, has been developed for the detection of measles specific antibodies in serum and oral fluid. The prototype showed high sensitivity and specificity (91 and 94% respectively for serum and 90 and 96% for OF). On top of that, measles virus genome could be reliably detected in the POCT strips and used for genotyping, even after prolonged storage for more than a month at 20-25°C. The added advantage was that the POCT was highly thermostable and the results showed high concordance with gold standard assay used in the Global Measles Rubella Laboratory Network (GMLRN). The assay is particularly useful in endemic settings as well as in settings near elimination of even post elimination and re-introduction. During a recent meeting of the Measles Rubella Initiative on Research and Innovation POCT came out as one of the top research priorities. It will allow monitoring disease using effective surveillance and evaluate programmatic efforts to ensure progress. It will also aid in developing and maintaining outbreak preparedness, and respond rapidly to outbreaks and manage cases. Field studies are now in phase 2 in different epidemiological and health care settings, including countries in different phases of measles control and with different health care infrastructures (Africa and South East Asia). Particularly the operational feasibility of using POCT/OF in a field setting needs to be determined. Currently, besides the measles IgM assay for oral fluid, capillary blood and serum, a POCT for rubella IgM is being developed. POCT for measles and tetanus IgG are being evaluated for the use on oral fluid and dried blood spots on filter paper.
Vaccine delivery research	SAGE requested that IVIR-AC explore research studies and methods including behavioural science studies for ranking reasons behind lack of vaccine delivery and other 'barriers to access'.	Oct 2015	Ongoing	IVIR-AC reviewed methods, and encourages studies on vaccine delivery costing and financing (human papillomavirus (HPV), influenza and oral cholera vaccine (OCV)) and vaccine uptake/hesitancy. Non-specific effects (NSE) of vaccination and missed opportunities for vaccination sessions were on the IVIR-AC agenda in 2016 and 2017. Economic tools for influenza vaccines were presented at the June 2016 meeting. A malaria costing tool to help countries cost and plan RTS,S vaccine in their country will be reviewed at the Sep 2017 meeting.
Vaccine Hesitancy	SAGE encourages validation of the developed compendium of survey questions on vaccine hesitancy, which have been assessed and validated only in some high-income countries or not at all.	Oct 2014	Ongoing	Discussions with various stakeholders are ongoing (Centre for Disease Control CDC, WHO EURO, Middle Income Countries MIC task force) on the ways forward to identify partners to take on the validation of the survey quesions. The MIC task force framework was presented to SAGE during the April 2014 meeting, which highlighted the importance to advance this initiative. Currently, how to secure funding from donors in support of the listed activities and advance validation of the questions in LMIC settings is being explored. The survey questions have been translated in Arab and French and are available on the WHO hesitancy website: http://www.who.int/immunization/programmes_systems/vaccine_hesitancy/en/ The promotion of their use and necessity to validate the research questions will be discussed further internally at WHO.

Topic	Recommendations/Action item	Meeting Date	Status	Comments and Follow up
Vaccine Hesitancy	SAGE acknowledged the necessity to develop core capacities at headquarters and regional level for gaining behavioural insights that can be applied in an integrated fashion for prevention of many communicable and non-communicable diseases, as well as vaccine hesitancy. This will require the involvement of sociologists, psychologists, anthropologists, experts in social marketing, communication experts, and specific disease and vaccine experts.	Oct 2014	Ongoing	A range of activities are now ongoing in this area. The in-depth tool, "A Guide to Tailoring Immunization Programmes (TIP)" is being used in at least 6 countries by WHO-EURO (European Regional office), with at least 3 additional countries starting TIP projects in 2017, one of which in the Western Pacific Region. An evaluation of TIP implementation in the European Region from 2013-2016 was conducted in the second half of 2016. Findings will inform development of a new updated version of TIP in 2017. Additionally, the Univ. of Witwatersrand in South Africa has been contracted to adapt the TIP method for developing countries, with less intensive consultant-based inputs. This is being finalized and will be published in 2017. Lastly, in 2017 a range of new activities and materials are planned, with a focus on building capacity among regional staff, sharing lessons learned and experiences, and promoting and scaling up use globally of the various tools and guidance developed by EURO on boosting acceptance and addressing hesitancy. Collaborations in this field are also being fostered with a number of experts and researchers from a diverse range of disciplinary backgrounds to informally help support WHO efforts in this area. Coordination with UNICEF, CDC, and other partners is also taking place to ensure alignment of efforts.
Vaccine Hesitancy	SAGE underlined the importance of distributing the matrix of determinants, the definition of hesitancy and the other deliverables to countries and partners.	Oct 2014	Closed	Discussions and presentations were held in the context of the immunization managers' meeting in the Eastern Mediterranean Region (EMR) and the African Region (AFR) Task force on immunization(TFI) meetings in 2014 and 2015. A Special Issue on Vaccine Hesitancy has been published in Aug 2015 in the journal Vaccine with a series of 10 full papers plus one editorial. In conjunction, a WHO press briefing was held on 18 Aug 2015 to emphasize WHO initiatives addressing vaccine hesitancy. This generated much positive media coverage. A compilation of centers to assist countries in addressing vaccine hesitancy has been finalized and sent to WHO regions to disseminate to countries. A paper which outlines the results of the 2015 Joint Reporting Form (JRF) indicators on vaccine hesitancy and contains the matrix of determinants and the definition of vaccine hesitancy was published open access on 1 Mar 2017: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0172310.
Yellow Fever	SAGE prioritized head to head non-inferiority studies of all 4 WHO prequalified Yellow Fever vaccines, as well non-inferiority studies in special populations. Of particular importance, given the consequences for international travel involving IHR requirements is the duration of protection with fractional dosing, including the potential need for revaccination. Safety and effectiveness assessments should be put in place when minimal effective doses are used.	Oct 2016	Ongoing	IVR actively promotes the research agenda, and several relevant studies are in planning or execution phase. A technical consultation is planned for Q4/2017. Fractional dose non-inferiority studies for all 4 prequalified vaccines will be conducted (funded, Africa), and long term immunogenicity will be assessed in a Brazilian cohort (funded). Immunogenicity study in DRC is on track, and satisfactory interim immunogenicity data are available.