20th Meeting of the
European Technical Advisory Group of Experts on Immunization (ETAGE)

Virtual meeting, hosted in Copenhagen, Denmark
11-12 November 2020
Abstract

The 20th meeting of the European Technical Advisory Group of Experts on Immunization (ETAGE) took place virtually on 11 and 12 November 2020 to review and discuss immunization activities and developments in the WHO European Region and provide advice to the WHO Regional Office for Europe on appropriate activities. Advice and guidance from ETAGE were sought on the regionalization of the WHO SAGE Roadmap for prioritizing population groups for vaccines against COVID-19 based on available information and published preliminary recommendations of selected national immunization technical advisory groups (NITAG) in the Region. Guidance was also sought on regional focus areas for the European Immunization Agenda 2030 based on national priorities identified by the national immunization programmes. Planned support for NITAGs in lower- and upper middle-income countries in developing national strategies for deployment of COVID-19 vaccine and vaccination was also discussed.

Document number: WHO/EURO:2021-1808-41559-56715

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Abbreviations

CDC United States Centers for Disease Control and Prevention
ECDC European Center for Disease Prevention and Control
EIA 2030 European Immunization Agenda 2030
ETAGE European Technical Advisory Group of Experts on Immunization
NITAG National Immunization Technical Advisory Group
SAGE Strategic Advisory Group of Experts on Immunization
SIVAC Supporting Independent Immunization and Vaccine Advisory Committees
VPI Vaccine-preventable Diseases and Immunization Programme of the WHO Regional Office for Europe
WHA World Health Assembly
Executive summary

The 20th meeting of the European Technical Advisory Group of Experts on Immunization (ETAGE) was held virtually on 11 and 12 November 2020 to review and discuss immunization activities and developments in the WHO European Region and provide advice to the WHO Regional Office on appropriate actions.

Advice and guidance from ETAGE were sought on regionalization of the WHO Strategic Advisory Group of Experts on immunization (SAGE) Roadmap for prioritizing population groups for vaccines against COVID-19 based on available information and published preliminary recommendations of selected national immunization technical advisory groups (NITAG) in the Region. Guidance was also sought on regional focus areas for the European Immunization Agenda 2030 based on national priorities identified by the national immunization programmes. Planned support for NITAGs in lower and upper middle-income countries in developing national strategies for deployment of COVID-19 vaccine and vaccination was also discussed.

Among its conclusions and recommendations, ETAGE concurred with the recommendations laid out in the WHO SAGE Roadmap for prioritizing uses of COVID-19 vaccines in the context of limited supply, and acknowledged the need to provide more detailed guidance on how to adapt the Roadmap to the context of the countries of the WHO European Region. Recognizing the heterogeneity present within the Region, ETAGE accepted that depending on vaccine availability, disease epidemiology and the size and proportion of each priority group, countries may adapt regional recommendations on prioritization to suit their own circumstances and needs.

ETAGE noted that the current Regional recommendations will be subject to review and revision as additional information and evidence on virus transmission, disease epidemiology and vaccine characteristics and supply become available.

ETAGE recommended that NITAGs take into consideration the vaccine supply situation, local epidemiology and the size and proportion of each eligible population group in their countries for developing recommendations on prioritizing populations for vaccination under conditions of ongoing community transmission of infection.

ETAGE recommended that during the initial stage of very limited vaccine availability (1-10% of national population), to maintain the most critical essential services and maximize the impact of available vaccines in reducing severe disease and deaths, health workers at high and very high risk of acquiring infection, transmitting infection or developing severe disease themselves should be prioritized. To maximize the impact of available vaccines in reducing severe disease and deaths, older adults should also be prioritized. ETAGE also encouraged countries to consider including all residents and staff of long-term care facilities for elderly as a priority group for COVID-19 vaccination.

ETAGE concurred with SAGE recommendations that groups with comorbidities determined to be at significantly higher risk of severe disease or death should be prioritized for COVID-19 vaccination in the second stage of limited vaccine availability (11-20% of national population). To further reduce severe disease and deaths, ETAGE recommended that countries should prioritize individuals <60 years of age with underlying conditions considered to put them at risk of infection or severe disease.

Introduction

ETAGE meets annually to review the progress of the Vaccine-preventable Diseases and Immunization Programme (VPI) towards the European Regional vaccine-preventable disease prevention and control goals. The 20th meeting of ETAGE was conducted virtually on 11-12 November, hosted from...
Copenhagen, Denmark. The chairman of SAGE, Dr Alejandro Cravioto, representatives from selected NITAGs together with representatives from immunization partner agencies and organizations attended the meeting. Chairman for the meeting was Professor Adam Finn, chair of ETAGE; Dr Ray Sanders was rapporteur.

Objectives of the meeting were to request advice and guidance from ETAGE members on the following key topics and issues:

- regionalization of the SAGE Roadmap for prioritizing population groups for vaccines against COVID-19 based on regional COVID-19 epidemiology, available literature, vaccine impact modelling, and published preliminary recommendations of selected NITAGs in the Region;
- regional focus areas for the European Immunization Agenda 2030 based on the national priorities and discussion with the national immunization programmes.

Opportunity was taken to brief ETAGE members on the planned support to NITAGs in lower- and upper middle-income countries in developing national strategies for deployment of COVID-19 vaccine and vaccination.

**Opening remarks**

The meeting was opened by Professor Adam Finn. Meeting participants were welcomed on behalf of the WHO Regional Office by Dr Nino Berdzuli, Director, Division of Country Health Programmes. In attempting to deal with the global and regional challenges presented by COVID-19, technical advice and guidance provided by ETAGE, other WHO oversight and advisory groups, together with cooperation and collaboration with international partners, has become of even greater importance. Supporting Member States in developing and implementing their national responses to tackling the pandemic and strengthening national systems remains among the highest priorities for WHO. While COVID-19 presents a major focus for attention, routine immunization systems must also be maintained and strengthened to continue current levels of control and prevent future resurgence of vaccine-preventable diseases.

**Session 1: Global update on COVID-19 vaccination and Immunization Agenda 2030**

Dr Ann Lindstrand, Immunization, Vaccines and Biologicals (IVB), WHO headquarters, provided a global update on COVID-19 vaccination activities and an outline of the Immunization Agenda 2030. Against a backdrop of increasing rates of COVID-19 transmission in many Member States the European Region has been at the centre of efforts to develop a variety of tools to end the pandemic. This has involved unprecedented levels of collaboration and cooperation between many different agencies, institutions and governments, resulting in very rapid development of therapeutics and vaccines. Despite the scale and complexity of the undertaking, it is expected that effective COVID-19 vaccines will be made available for distribution to all countries in 2021. Instrumental in ensuring fair and equitable simultaneous distribution of vaccines to all countries has been establishment of the COVAX Facility.

Very recent (at the time of the meeting) preliminary data from interim phase 2 clinical trials provided evidence that lead candidate vaccines are not only safe but are also effective against COVID-19. Preliminary results on additional candidate vaccines were expected very soon, and WHO together with the COVAX Facility were considering technical requirements, costs and logistical arrangements for delivery that will be necessary for the rollout of these different potential vaccines. It was expected that licencing of the first of these vaccines would take place as early as the end of December 2020. There is a strong international collaboration in place to support countries,
particularly lower- and middle-income countries, in development of guidance, operational tools, capacity strengthening and training in delivery of these vaccines. Guidance on developing National Deployment and Vaccination Plans for COVID-19 was expected to be available by mid-November, as well as training modules with detailed guidance to match this plan. Efforts were also being made to develop innovative methods to monitor vaccines and their distribution in real time.

The Immunization Agenda 2030 sets a unifying vision for the decade aligned with the UN Sustainable Development Goals and translated into clear impact goals. The monitoring and evaluation framework, together with the ownership and accountability framework are being developed in parallel with the Regional frameworks, and it is expected that operational guidance for these components will be presented for endorsement by the World Health Assembly (WHA) in May 2021.

Session 2: Regional update: Looking back since 19th ETAGE and forward to COVID-19 vaccination

Dr Siddhartha Datta, VPI, WHO Regional Office for Europe, provided an update on activities and events that have taken place since the 19th ETAGE meeting and introduced the main topic of the 20th ETAGE meeting, being development of guidance on prioritizing population groups for vaccination against COVID-19. The 19th meeting was held before the start of the pandemic, and ETAGE recommendations reflected concerns and aspirations at that time. Experience gained through tackling the pandemic has demonstrated the need for the immunization programme to be restructured in a way that makes it more resilient to events of this nature and scale. The European Region became the epicentre for transmission early in the COVID-19 pandemic, with many countries introducing non-pharmaceutical interventions to curb virus transmission. These interventions, in addition to decreasing the rate of virus spread, also caused interruptions to routine immunization services in some Member States, particularly at sub-national levels. However, following efforts to maintain essential public health services, by mid-year routine immunization services had largely been restored throughout the Region. While routine immunization coverage levels have largely been restored, the impact of the pandemic on routine surveillance for vaccine-preventable diseases was not immediately clear. Declines in the reported rates of measles and rubella have been noted, but the reasons for the declines are not clear and efforts are underway to determine how the effects of interventions against the pandemic have influenced measles and rubella transmission and routine case reporting. ETAGE has been instrumental in developing regional operational guidelines for conducting catch-up vaccination campaigns, strengthening health systems and mitigating the effects of the COVID-19 pandemic on routine immunization services.

Efforts to develop a coordinated system for COVID-19 vaccine deployment in the Region are underway, utilizing a multitiered approach previously endorsed by ETAGE. The regional vaccination mechanism includes the Regional coordination group, composed of international partners, chairs of technical focus groups and ETAGE members. The mechanism also includes a COVID-19 vaccine working group and five technical focus groups. The technical focus groups include national public health experts from many Member States within the Region. At the time of the meeting, regional guidance developed through the framework included publication of high-level strategic considerations on COVID-19 vaccine deployment and vaccination strategy, listing critical programme areas that ministries of health and immunization programmes need to consider for in-country stakeholder dialogue. A regional online monitoring mechanism to measure national

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preparedness for vaccine rollout has also been developed to guide vaccine deployment and vaccination plans. The online platform is accessible to all Member States and ministries of health are invited to provide monthly reporting of progress in meeting 15 critical indicators. Forty-six (87%) of countries in the WHO European Region had ensured access to COVID-19 vaccine or committed through the COVAX Facility; additional bilateral and multi-lateral negotiations with vaccine developers, manufacturers and countries were ongoing.

Discussion

ETAGE congratulated the Secretariat on the quality and extent of the work reported.

Session 3: Regionalization of the SAGE Roadmap for prioritizing population groups for vaccines against COVID-19

Dr Joachim Maria Hombach, IVB, WHO headquarters, provided a summary of the SAGE recommendations for priority use of COVID-19 vaccines. Policy development began with the establishment of a values framework for allocation and prioritization of COVID-19 vaccination, including the principles, objectives and definitions of target groups. This framework was endorsed by SAGE and published in September 2020. Guidance on prioritization of target populations under supply constrained situations, including development of case scenarios of limited vaccine under different epidemiological settings, was endorsed by SAGE at its plenary meeting in October. The main considerations when developing the guidance included the epidemiology and phase of the pandemic, information on the burden of disease and risk groups, and preliminary findings from mathematical modelling. Efforts were made to build on the principles and priorities from the values framework and on the population subgroups identified.

To support country planning, the SAGE Roadmap presents public health strategies and target priority groups for different levels of vaccine availability in different epidemiologic settings. Most Member States were experiencing community transmission of the infection, and the overall public health strategy for this epidemiologic setting is to place the initial focus on direct reduction of mortality and morbidity, and to support maintenance of the most critical essential services. During development of the Roadmap key assumptions, including availability of licensed vaccines meeting the criteria of the WHO target product profile, and vaccines having efficacy in all age groups, including older age groups, were made. No account was taken of seroprevalence and the possible degree of population protection already established through virus transmission. The purpose of the Roadmap is to provide countries with an orientation to consider and adapt to their own circumstances.

The Roadmap considers three stages or phases of prioritization of vaccination from initial launch, when vaccine availability is expected to be sufficient to cover between 1 and 10% of the population, through a second stage (11-20% of the population) to a third stage when sufficient vaccine is available to vaccinate up to 50% of the population. These stages are expected to follow sequentially, as global vaccine supply increases, but will not necessarily be of equal duration in different countries. The initial focus will be on direct reduction of morbidity and mortality and maintenance of most critical essential services, so the initial stage will include prioritization of health and social care workers deemed to be at very high risk of acquiring and transmitting infection, together with older adults defined by age-based risk assessment that will be specific to the country. The second stage will prioritize older adults not included in stage one, other health and social care workers deemed to be at significant risk, individuals with comorbidities placing them at higher risk, and sociodemographic groups considered to be at higher risk of severe disease or death. Stage three will

2https://www.who.int/immunization/policy/sage/en/
prioritize groups with the aim of reducing transmission to reduce further disruption of social and economic functions. Significant contextualization will be required by countries, such as the precise definitions of at-risk health and social workers and the different population groups, particularly specific age cut-offs. Within stage prioritization may need to be designed by countries to meet their specific circumstances.

A number of additional aspects need to be taken into consideration, including the effect of gender on risk of disease, risk of exposure and access to services, the representation of pregnant women in prioritized populations and their risk for adverse health outcomes, the role of children in transmission of infection, and the importance of comorbidities in increasing risks for serious morbidity and death. Information on many of these aspects is becoming available as greater experience is acquired, and guidance may require modification in light of new information arising.

Dr Richard Pebody, Team Lead and Chair of technical focus group 2, WHO Regional Office for Europe, provided an overview of the regionalization of the SAGE recommendations. A number of key caveats exist within the SAGE Roadmap, including the absence of significant differences in vaccine efficacy by age and for different population sub-groups, and that Member States have all implemented non-pharmaceutical interventions to impede virus transmission. The Roadmap does not take into account the possibility of existing protection in a population due to prior infection or exposure, or the existence of severe disease or long-term morbidity. The prioritization Roadmap, during a period of community transmission, is determined by vaccine availability, with stage 1a prioritizing health workers at high to very high risk of acquiring and transmitting infection, and stage 1b prioritizing older adults defined by age-based risk specific to the country or region. Stage 2 prioritizes older adults not covered in stage 1, groups with comorbidities, socioeconomic groups considered to be at significantly higher risk of severe disease or death than the general population, and a range of public sector staff whose jobs bring them into daily contact with the general public.

ETAGE was requested for guidance on specific aspects of the SAGE Roadmap with respect to applicability in the European Region. Specific questions included the applicability of Stage 1 and 2 prioritizations in a region as heterogenous as Europe; the linking of priority to virus transmission level; definitions and rationale of health worker stratification; definition and examples of older adult age cut-offs; and importance of specific risk factors. To provide evidence and documentation for ETAGE to consider, the Region engaged in enhanced surveillance of the first cases and their close contacts, seroepidemiology studies in general population and among health workers, reviews of individual-level case and death report data, reviews of aggregate reporting data and excess mortality monitoring data. Mathematical modelling of projected impact of a range of vaccine interventions using the SAGE Roadmap recommendations was conducted, together with a rapid literature review.

Results of enhanced surveillance in Europe have demonstrated that adults over 60 years of age are at increased risk of serious disease/death, and the risk increases with age. There are a number of independent risk factors for hospitalization and death, including cancer and immunosuppression, chronic kidney disease, diabetes, obesity, chronic respiratory disease and several other comorbidities. Risk of serious disease is positively associated with increasing levels of deprivation and with certain ethnicities. The health and social care workforce are at increased risk of infection and severe disease if they have underlying conditions, and potentially at greater risk of transmitting infection to their patients.

Several modelling groups have been engaged to predict outcomes of different vaccination strategies based around the SAGE roadmap, these include groups at Imperial College London, the London School of Hygiene and Tropical Medicine, Public Health England, and the Dutch National Institute of
Public Health. While posing slightly different questions, and assessing different data, the modelling exercises provided reasonably consistent support for an optimum prioritization strategy for the Region that targets health workers and care home workers first, then targets the older adults, then targets the younger adults and groups with comorbidities.

In light of the work conducted the Technical Focus group have proposed that very high- and high-risk health workers be prioritized in stage 1a, and older adults in order of descending age, be prioritized in stage 1b. Stage 2 should prioritize groups <60 years of age at significantly higher risk of severe disease including a range of specified comorbidities, with age cut-offs and prioritization of risk groups by comorbidity determined based on local epidemiology when available.

Discussion

In extensive discussions on the proposed prioritization strategy, ETAGE raised concerns over the feasibility of developing a single strategy that would be relevant and applicable to all Member States in a Region as diverse as Europe. Recommendations from ETAGE cannot be too prescriptive, but need to provide Member States sufficient latitude to adapt a common strategy to meet their own circumstances and needs. ETAGE also expressed concerns over the current absence of information relevant to developing a common strategy, including epidemiologic information in some countries, the impact of potential vaccines on virus transmission and the likely duration of protection provided by potential vaccines.

Considerable discussion centred around the definition and relative risks faced by health workers employed in different areas of the health care services. Relative risk for health workers was recognized as a composite of three risk factors: risk of infection; risk of severe outcome; and risk of transmission of infection to patients and the community. For the purposes of developing recommendations, health workers facing all three risk factors should be defined as very high risk; health workers facing two of these risks could be defined as high risk.

Recommendations for prioritizing older adults and individuals with comorbidities were also extensively discussed. Again, the heterogeneity of the WHO European Region, particularly in terms of population demographics, health infrastructures, and availability of accurate epidemiological and demographic information made it very difficult to develop specific detailed recommendations that would be relevant and applicable to all Member States. During the initial stage of vaccination, when vaccine availability is expected to be sufficient to cover less than 10% of the national population, coverage should be prioritized to reduce mortality and severe morbidity and maintain critical essential services. In all settings, the population group at highest risk of mortality and severe morbidity resulting from infection are the elderly, with risk of severe outcome increasing with age.

ETAGE considered it useful to follow the WHO SAGE prioritization structure of stages 1a, 1b, 2 and 3, and made the following comments:

Stage 1a should target health workers facing the highest risks, but consideration should be given to the specific risks faced, particularly if undertaking aerosol-generating procedures or having contact with COVID-19 patients. Vaccination of residential home workers should be included in this stage.

Stage 1b should target the elderly, with the oldest being the highest priority for vaccination followed by younger ages in an age-banded approach. Specific age cut-offs and age bands will be decided by Member States to suit their own circumstances. Residents of long-term residential homes should be included in this stage.
ETAGE endorsed the principle of targeting individuals belonging to broad risk groups as outlined in Sage 2, but was concerned over the absence of detailed information in some Member States. It is likely that individual Member States will require more detailed recommendations applicable to their circumstances when vaccine availability begins to increase, and the Secretariat and ETAGE should be ready to provide this support.

Session 4: Regional support to NITAGs from lower- and upper middle-income countries in developing national COVID-19 vaccination strategies

Dr Liudmila Mosina and Dr Wiebe Kulper-Schiek, VPI, WHO Regional Office for Europe, provided an overview of activities undertaken to strengthen NITAGs in middle-income countries of the WHO European Region. Whilst information and guidance on prioritization of potential COVID-19 vaccine target groups will be provided by WHO global and regional technical advisory bodies, the NITAGs will be responsible for the final recommendations at country level. This task can be challenging for NITAGs due to limited available evidence on the characteristics of potential vaccines, local epidemiology of COVID-19 and on relative risks for different population groups. NITAGs will also be required to link their recommendations to vaccine supply, which currently remains uncertain. For these reasons WHO established 3 Regional webinars for NITAG members and immunization programme managers for all 53 Member States in October 2020.

These webinars were used to share and discuss the SAGE recommendations on prioritization, and to share the experience of NITAGs that had already developed interim national recommendations. NITAGs were informed of the technical resources available to them for developing recommendations, and encouraged to identify their needs for support from WHO and international partner agencies. As an interim measure, NITAGs were recommended to identify and quantify potential target groups for priority vaccination and review their vaccine delivery systems to ensure that potential COVID-19 vaccines could be delivered effectively in the country. NITAGs were also advised to consider how they are going to monitor vaccine use and coverage achieved, and to review the national vaccine safety monitoring systems. Behavioural research may be required to develop tailored communications strategies to ensure high coverage. When vaccines do become available, NITAGs will be required to make vaccine-specific recommendations based on vaccine efficacy, delivery and licencing characteristics.

A joint WHO/Robert Koch Institute webinar was to be held in November to present and discuss the recommendations from this ETAGE meeting, and how NITAGs can use these recommendations to develop their own national recommendations on prioritization. The opportunity will also to be taken to provide the NITAGs with the latest available information on development of potential COVID-19 vaccines. Another webinar was planned for December to discuss use of a systematic approach to developing recommendations and how to communicate these recommendations to national decision-makers and to the public. These webinars are a result of close collaboration with the EU/EEA NITAG Network, and continued close collaboration was expected through the running of joint webinars. Provision of direct technical support from WHO to individual countries has continued throughout this process and is expected to continue.

The joint WHO/Robert Koch Institute project, started in 2020, provides tailored support aimed at strengthening NITAGs in middle-income countries. A steering committee provides operational technical support and monitors project implementation, and financial support is provided by the German Ministry of Health. The project was established because in 2019 only 31 of 53 Member States in the Region had NITAGs in place that met all six WHO NITAG criteria, a large proportion of middle-income countries without donor support had suboptimal coverage for the third dose of...
diphtheria-tetanus-polio vaccine (DTP3) and the first dose of measles-containing vaccine (MCV1), and several of these had still not introduced vaccines against pneumococcus, rotavirus or human papillomavirus (HPV).

The project has been structured in 2 phases. In the first phase (2020-2021) NITAGs are evaluated by the project team to identify strengths, weaknesses and challenges. Based on the outcome of the evaluations, tailored recommendations for improvements are provided to each NITAG. These evaluations, together with results of previous evaluations, are used to establish baselines for monitoring progress in strengthening NITAG performance. Improvement plans developed by the NITAGs will be used at the start of the second phase of the project (2021-2024) to provide tailored support to the NITAGs in implementing their improvement plans.

A standardized questionnaire, combining and extending the existing Supporting Independent Immunization and Vaccine Advisory Committees (SIVAC) and United States Centers for Disease Control and Prevention (CDC) evaluation tools, was developed to evaluate NITAGs. The evaluation process examines functionality, quality of process and outputs, and degree of integration of NITAGs into the policy-making process. A total of 16 NITAGs were selected for evaluation through a process of external evaluation (Azerbaijan, Belarus, Bosnia and Herzegovina, Serbia, Turkey, Uzbekistan), or self-evaluation (Albania, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, Republic of Moldova, Tajikistan, Turkmenistan, Ukraine).

The COVID-19 pandemic delayed implementation of some aspects of the first phase of the project, and adaptations were made to accommodate the restrictions. External evaluation was being conducted via virtual meetings and the Regional meeting planned for 2020 was postponed to the middle of 2021.

Discussion

ETAGE congratulated the Secretariat in successfully pulling together the various strands of work on supporting NITAGs into a comprehensive whole. Despite the COVID-19 pandemic there is strong evidence that Member States remain engaged in the process of NITAG strengthening and are actively participating in the NITAG evaluation process.

Session 5: Regional focus areas of the European Immunization Agenda 2030

Dr Siddhartha Datta outlined the focus areas of the European Immunization Agenda 2030\(^3\) (EIA 2030), the Regional component of the global vision and strategy for vaccines and immunization (Immunization Strategy 2030\(^4\)). The EIA 2030 hinges on innovative programming and targeted local-level interventions for demonstrable impact through a robust results-based monitoring framework. This requires a detailed roadmap that takes into account not only the specific priorities, needs, capacities and characteristics of the programmes in each country, but also the necessary transparency and solidarity to ensure equitable access to, and distribution of, vaccines.

The process for developing the EIA 2030 has utilized a truly bottom-up approach that engaged Member States in defining and detailing their own national priorities. 31 Member States had so far responded to an online survey on national priorities, based on wide stakeholder consultations.

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When national priorities were mapped against the seven strategic priorities of the global Immunization Agenda 2030, it became apparent that rather than grouping disease-specific priorities within a single priority, as in the Immunization Agenda 2030, Member States preferred to define individual disease-specific priorities. The disease-specific priorities, which cut across multiple strategic priorities, fall into four main categories:

- **control/elimination/eradication**: measles-rubella, hepatitis B and poliomyelitis - diseases for which the WHO European Region has elimination or eradication goals;
- **coverage and equity**: diphtheria, influenza, HPV, pneumococcal disease, varicella, meningitis - diseases for which the WHO European Region does not have specific elimination or eradication goals;
- **introduction focus**: varicella, HPV, hepatitis A – diseases which are still not part of the national immunization schedule of all Member States;
- **life course entity**: influenza, pertussis – diseases for which vaccine is being used currently in certain age groups only, but could be expanded to additional age groups.

Moving forward with developing the regional focus areas it will be necessary to ensure that these disease-specific priorities are given recognition, rather than being embedded within a more general primary health care and universal health coverage priority.

It has previously been demonstrated that middle-income countries without donor support are lagging behind in achieving Regional vaccine-related goals and that corrective measures were necessary to prevent decline or stagnation in their performance. Fourteen of the 16 middle-income countries in the Region responded to the national priorities survey and most indicated that priorities included primary health care and universal health coverage, disease-specific priorities, and also vaccine supply and financial sustainability.

The next steps in developing the EIA 2030 is to align the Regional priorities and strategies with the global vision of the Immunization Agenda 2030, and to finalize the Regional focus areas. Existing Regional goals, particularly disease elimination and control goals, need to be incorporated into the regional framework, while maintaining integrity with the global framework. Global strategic priorities will be retained, but the objectives and focus areas will be modified to suit Regional priorities and context. There will be specific Regional needs, and it is possible that global priorities that are of less relevance to the Region will be modified, and guidance from ETAGE will be sought on this.

The proposed structure of the EIA 2030 has been developed as a guidance document for Member States to use in assessing national priorities and developing solutions. It is recognized that the COVID-19 pandemic may have caused Member States to reassess their national priorities and highlight the necessity for introducing resilience into their immunization systems. Country consultations have provided a list of potential Regional focus areas and priority actions, and these have been aligned against the global strategic priorities. These potential focus areas and priority actions now need to be discussed with ETAGE and partner agencies to identify any missing elements not identified by Member States.

The governance mechanism for the next 10 years will include oversight by the Regional Committee, core groups, including ETAGE, the Member States, and regional immunization partners, together with independent commissions. It is considered that a high-level Immunization Board, to provide high-level political engagement, will be necessary. In addition, a consultative council, composed of non-state actors, academics, and representatives from research and public health institutes will be
required to broaden the technical basis of the Agenda. An independent monitoring observatory has been proposed as a means of independently monitoring implementation.

The next steps in developing the regional focus areas will be consultation with national immunization programme managers, non-state actors, academic, public health and research institutes on the regional focus areas and on finalizing the priority actions and the monitoring and evaluation framework. The final draft will be submitted to the Regional Committee for endorsement in September 2021.

Discussion

ETAGE recognizes that a different perspective is required in developing long-term vaccine plans, with the emphasis on a bottom-up approach that caters more effectively to local requirements. ETAGE fully appreciates and endorsed the new approach, but also recognises the challenges faced in communicating this change in approach to the decision-makers at national and international levels. The COVID-19 pandemic has focused political attention on outbreak detection and control, infectious diseases and immunization, and that may be of longer-term benefit to disease control and prevention services generally. There is also, however, a risk that available resources that would have been available for immunization and public health will be expended on tackling COVID-19 rather than on strengthening more general vaccine-preventable disease control systems. Recent experience with the pandemic should be understood as evidence of the need for enhanced investment in public health and immunization services and the development of structures that effectively communicate the importance of immunization to populations.

Conclusions and recommendations

Regionalization of the WHO SAGE Roadmap for prioritizing population groups for COVID-19 vaccination

Conclusions

Based on current understanding of the epidemiology of COVID-19 in the WHO European Region and the findings from modelling studies, ETAGE concurs with the recommendations laid out in the WHO SAGE Roadmap for prioritizing uses of COVID-19 vaccines in the context of limited supply.

ETAGE appreciates the need to provide more detailed guidance on how to adapt the WHO SAGE Roadmap to the context of the countries of the WHO European Region.

ETAGE acknowledges the importance of NITAGs to the development of interim recommendations on prioritizing population groups to facilitate national planning and preparedness for COVID-19 vaccines deployment and vaccination.

Recognizing the heterogeneity present within the Region, ETAGE accepts that depending on vaccine availability, disease epidemiology and the size and proportion of each priority group, countries may decide, during the initial stage of immunization, to prioritize health workers or may choose to commence immunization of both health workers and older age groups simultaneously. ETAGE notes that the population groups proposed for prioritization may not necessarily be mutually exclusive.

ETAGE notes that the current recommendations will be subject to review and revision as additional information and evidence on virus transmission, disease epidemiology and vaccine characteristics and supply become available.
Recommendations

1. The WHO SAGE Roadmap provides recommendations on prioritizing population groups for different stages of vaccine availability and for different epidemiological settings, namely either no cases, sporadic or clusters of cases, or community transmission. Since it is envisioned that most countries in the Region will experience COVID-19 community transmission for the foreseeable future, ETAGE recommends that NITAGs develop national recommendations applicable to the community transmission setting.

2. ETAGE recommends that NITAGs take into consideration the vaccine supply situation, local epidemiology and the size and proportion of each eligible population group in their country for developing recommendations on prioritizing populations for vaccination. Based on these data they may consider both 1a and 1b priorities alongside each other as they make their policy decisions.

3. ETAGE concurs with SAGE recommendations that in the initial stage of very limited vaccine availability (1-10% of national population):
   - to maintain the most critical essential services, maximize the impact of available vaccines in reducing severe disease and deaths and in line with the principle of reciprocity, health workers\(^5\) at high and very high risk\(^6\) of acquiring infection, transmitting infection to vulnerable persons with high risk for severe disease outcome or developing severe disease themselves should be prioritized for COVID-19 vaccination (stage 1a);
   - to maximize the impact of available vaccines in reducing severe disease and deaths, older adults should be prioritized for COVID-19 vaccination (stage 1b).

   Additionally, ETAGE encourages countries to consider including all residents and staff of long-term care facilities for the elderly as a priority group for COVID-19 vaccination in stage 1.

4. ETAGE recommends categorizing health workers as very high risk according to the following criteria:
   - Health workers at very high risk of acquiring infection:
     - because they undertake aerosol-generating procedures and/or are in direct contact with COVID-19 patients;
   - Health workers considered very high risk because they can transmit infection to vulnerable persons:
     - because they have direct contact with patients that are at high risk for severe disease outcomes from COVID-19 (e.g. patients in intensive care units, patients in oncology wards, patients in older age groups, residents of long-term care facilities).

   ETAGE recommends that health workers considered at high risk of developing severe disease because they are aged ≥60 years or are aged <60 years with underlying clinical risk factor, should be prioritized for COVID-19 vaccination (stage 1a). The specific age cut-off should be adapted according to local epidemiology.

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\(^5\) For the purposes of these recommendations, health workers include care workers, in hospitals and long-term care facilities (e.g., nursing homes, residential facilities, etc.)

\(^6\) For further reading refer to the updated Version 1.1. of SAGE Roadmap for prioritizing uses of COVID-19 vaccines in the context of limited supply. Annex 3 Definition of health workers.

5. ETAGE recommends that to maximize the impact of available COVID-19 vaccines in reducing severe disease and deaths, countries should prioritize individuals ≥60 years of age for COVID-19 vaccination. The specific age-related strategy should be designed according to local epidemiology, the size and proportion of each age category. Countries should begin by vaccinating the oldest individuals first, who are at the highest risk of severe disease, progressing to younger age categories in this group as sufficient vaccine doses become available.

6. ETAGE concurs with SAGE recommendations that groups with comorbidities determined to be at significantly higher risk of severe disease or death should be further prioritized by for COVID-19 vaccination in the stage 2 of limited vaccine availability (11-20% of national population).

To further reduce severe disease and deaths, ETAGE recommends that countries should prioritize individuals <60 years of age with the following underlying conditions (as feasible and in no particular order):

– cancer
– chronic cardiac disease
– chronic kidney disease
– chronic liver disease
– chronic respiratory disease
– diabetes
– immunocompromised, including solid organ transplant
– neurological disease including cerebrovascular disease
– obesity

The specific age cut-off should be adapted according to local epidemiology. Based on data availability and programmatic feasibility, countries may further define the above comorbidity groups.
APPENDIX:
Regionalization of WHO SAGE Roadmap for prioritizing population groups for COVID-19 vaccination

1. Issue for consideration

*ETAGE is asked to consider the draft recommendations proposed by the WHO Regional Office for Europe to regionalize the prioritization of target groups as defined by the global SAGE Roadmap for prioritizing population groups for vaccines against COVID-19.*

2. Background: Global SAGE roadmap recommendations

2.1 The SAGE Roadmap supports countries in planning for the introduction of COVID-19 vaccines following their licensure. The Roadmap outlines public health strategies and target priority groups for different levels of vaccine availability and disease transmission.

2.2 Although priority groups are identified, questions remain on specific issues such as the definition of health worker (HW); the older age cut-off and specific higher risk groups.

2.3 This paper lays out the epidemiology of COVID-19, the projected impact of a range of vaccine interventions in a number of European settings and recommendations for prioritizing target groups for COVID-19 vaccines in the circumstances of limited supply.

3. Regional demographics, COVID-19 epidemiology and response

3.1 The WHO European Region is very diverse: although the majority of countries (and populations) are defined as high income by the World Bank (2019) (HIC, n=31), in the Eastern part of the Region the distribution is more mixed with a range of upper middle-income (UMIC, n=15), lower middle-income (LMIC, n=3, Kyrgyzstan, Ukraine, Uzbekistan) and low income (LIC, n=1, Tajikistan) countries.

3.2 The demographics are very different by country income grouping. The proportion of the population over 65 years of age ranges from 20.3% in HICs to 3.2% in the LIC; the proportion of those over 75 years of age ranges from 9.6% in HICs to 0.9% in the LIC country.

3.3 Similarly, the prevalence of major underlying clinical risk factors in the general population varies by country as outlined by Clark et. al (26-35%)\(^7\).

3.4 The proportion of the population made up of health and social care workers in the Region is also estimated from ILO data (2019) to vary by country income level from a median of 5.1% in HICs (range 2.1 to 10.4%) and 2.1% in LMICs (range 1.5-2.8%) to 0.9% in the LIC.

3.5 The newly emerged SARS-CoV-2 virus responsible for COVID-19 infection was first identified in January 2020 in China where it was associated with a cluster of acute pneumonia cases that presented in December 2019 linked to a food market \(^8\).

\(^8\) Zhu et al. N Eng J Med 2020 Feb
3.6 A range of special studies and surveillance systems was established by countries globally and across the WHO European Region to initially rapidly understand the epidemiological and virological characteristics of this novel virus. These systems have been used to monitor and track the spread of the virus by time, place and person; to understand the impact of the virus on health systems and the general population and to evaluate the impact of intervention measures.

3.7 Investigation of the first cases and their close contacts rapidly determined that SARS-CoV-2 could lead to sustained person-to-person transmission, with an effective reproductive number higher than seasonal influenza.

3.8 Bayesian modelling by the MRC Cambridge Biostatistics team show that estimates of the infection-fatality ratio (IFR) in the United Kingdom, taking into account a range of factors including serologic evidence of infection, show that the risk of death following an infection was 0.89% in the first 6 months of the year; declining in more months to 0.68% including by age group. The reasons for the reduction in infection fatality rate (IFR) over time are likely to be multifactorial – though may be linked to improved hospital and clinical management e.g. availability of interventions such as dexamethasone, which have been shown to reduce inhospital COVID-19 related mortality.

3.9 There is a very clear relationship of increasing IFR with age, increasing to 12-16% in those more than 75 years of age.

3.10 The WHO Regional Office for Europe together with the European Centre for Disease Prevention and Control (ECDC) is undertaking a meta-analysis of published and unpublished sero-epidemiological studies in Europe. Though sero-positivity is not clearly linked to susceptibility, standardized sero-epidemiological studies undertaken in the general population in the early stages of the pandemic in a large number of countries demonstrated low levels of SARS-CoV-2 IgG positivity (median 3.5%, n=29). Areas with higher population attack rates, e.g. Spain and northern Italy, only saw moderately high antibody levels (median 20.4%, range 10% - 42.4%, n=14). HW populations, which are also potentially highly exposed, only saw median sero-positivity of 11.8% (range from 1 -31%, n=33).

3.11 The virus soon spread rapidly globally including to almost all countries within the WHO European Region, as shown in the WHO COVID-19 daily dashboard. Following a surge in cases in the spring across the Region and a lull over the summer following the implementation of “lockdown” measures, the majority of countries in the Region are now seeing a rapid increase in case numbers. Almost all countries are now in the WHO community transmission phase.

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13 WHO Europe Daily COVID-19 dashboard [https://who.maps.arcgis.com/apps/opsdashboard/index.html#/ead3c6475654481ca51c248d52ab9c61](https://who.maps.arcgis.com/apps/opsdashboard/index.html#/ead3c6475654481ca51c248d52ab9c61)
3.12 As shown in the WHO Regional Office for Europe COVID-19 daily dashboard, by 30 October 2020, the pandemic resulted in a total of over 10.5 million reported laboratory confirmed cases with almost 280 000 deaths across the European Region. The rate of transmission accelerated in the weeks prior to the ETAGE meeting, with an 18% increase in case numbers in the previous week alone. As of November 2, the Region was responsible for 49% of the global cases reported in the previous week.

3.13 Primary care influenza sentinel surveillance systems were repurposed in many countries to also monitor COVID-19 as shown in the WHO Regional Office for Europe weekly surveillance COVID-19 report. Although this refashioning proved challenging for a variety of reasons, these systems have demonstrated community transmission in participating countries and demonstrated a resurgence of activity in the autumn.

3.14 Monitoring of COVID-19 hospitalizations has demonstrated impact on health care systems across Member States of the Region. A large increase in case numbers during the spring was followed by a reduction in reports over the summer; at the time of the meeting many countries across the Region were seeing increases in hospital and ICU admissions due to COVID-19 in the autumn.

3.15 An upsurge in laboratory-confirmed COVID-19 fatalities was also observed across the Region in the spring as shown in the WHO weekly surveillance COVID-19 report. Following the summer lull, many countries started to see increases in laboratory-confirmed deaths in the autumn. Of the laboratory-confirmed deaths in Europe prior to the meeting, the vast majority were over 50 years of age, with 88% of fatalities over the age of 65 years.

3.16 96% of fatalities had at least one underlying medical condition, with the top-3 conditions being cardiovascular disease (83%); diabetes (64%) and lung disease (23%).

3.17 Between week 10 and 41, there were almost 200 000 excess all-cause deaths in the 24 countries participating in the European Mortality Monitoring network (EuroMoMo). Countries with the highest excess mortality in the spring were the United Kingdom, Spain, Italy, France, Germany and the Netherlands. By early October 2020, excess mortality was again recorded in Spain, Italy, England, Netherlands and Belgium. Over this period, relative cumulative excess mortality increased dramatically with increasing age compared to 15-44 year-olds.

3.18 A large number of studies have been published on risk factors for hospitalization and death. A study from the United States reported that COVID-19 hospitalization rates were higher among adults with ≥3 underlying conditions of severe obesity, chronic kidney disease, diabetes, hypertension and asthma, after adjusting for age, sex, and race/ethnicity. A United Kingdom study found that COVID-19 related mortality rates were significantly higher with

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16 European Mortality Monitoring network https://www.euromomo.eu/
17 Ko et al. CI Sept 2020
18 Williamson et al. Nature July 2020
increasing age, male sex, deprivation, non-white ethnicity, immunosuppression, chronic kidney disease, chronic neurological disease, obesity, diabetes, chronic respiratory disease, chronic liver disease and chronic cardiac disease.

3.19 The rate of mutation in the SARS-CoV-2 virus was very low at the time of the meeting. Though no phenotype had definitively been shown to be associated with changes in infectivity or severity – emergence of widespread D614G mutation in spike protein had been linked to increased transmissibility.

3.20 Several studies have shown higher risk of infection among HWs with direct patient contact and COVID-19 patients. One study has shown higher risk of infection among HWs involved in aerosol-generating procedures and two studies suggest higher risk of mortality and morbidity for HWs with underlying conditions and ≥65 years of age.

3.21 In the absence of licensed vaccines, countries have relied on measures such as case detection and isolation; contact tracing and quarantine and a range of wider public health and social measures (PHSM) to slow the spread of the virus and limit its impact on the population and health systems. An analysis of time-varying changes in PHSM in 131 countries found a decreasing trend over time in the R ratio following introduction of measures such as school closure, workplace closure, public events ban, requirements to stay at home, and internal movement limits, with a 1–3 week delay before impact was apparent.

4. Modelling and economic evaluation

4.1 The WHO Regional Office for Europe convened a modelling subgroup consisting of teams from Public Health England (PHE), Imperial College, London, London School of Hygiene and Tropical Medicine (LSHTM), Dutch National Institute of Public Health (RIVM) and ECDC. The teams employed a range of models to predict the future health and economic impact in terms of infections, deaths and quality-adjusted life years (QALYs) for a range of COVID-19 vaccine scenarios.

4.2 A set of standard assumptions and parameters were used for the characteristics of the virus, the population and the vaccine. The teams modelled three main prioritization strategies – an age-targeted approach, WHO/SAGE strategy (HWs first) and a transmission reduction strategy (targeting working age). Vaccine supply was based on 3% availability in June 2021, reaching 20% by end 2021.

4.3 Imperial College employed an age-structured SEIR compartmental model with a health-care component in a range of geographical settings in selected countries of the Region: Albania, Georgia, North Macedonia, Tajikistan, Turkey and Ukraine. They found even a partially effective vaccine can have substantial public health benefit. With a dose supply of <20% of the population, targeting older adults first was more efficient than a herd approach of vaccinating younger persons. The WHO/SAGE strategy to vaccinate HWs first performed similarly to targeting the elderly first in the six country settings and scenarios.

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19 Korber et al. MedRix May 2020
20 You et al. The Lancet. Oct 2020
4.4 LSHTM used CovidM a transmission dynamic model in the 53 countries of the Region. Four scenarios were explored: (a) no-vaccination (labelled with “nV”) vs. vaccinating adults aged 20+ in the following order: (b) 75+ years, then 70+ years, then 65+ years, then 60+ years, then all others (“V75”), (c) proportionally among 60+ years, then proportionally all others (“V60”), (d) all age groups at the same time (“V20”). Reductions in cases were greatest with strategy V20, but reductions in deaths, life years, QALYs and total economic benefits (measured using the value of statistical life measure) were greatest with strategy V60 in most countries. Generally, the absolute number of prevented cases was higher in the eastern countries of the WHO Europe Region, while the absolute number of prevented deaths was higher in western countries of the Region.

4.5 PHE also used a SEIR transmission model based on United Kingdom population stratified by age, risk group, care homes and health workers. The impact of different vaccination strategies was explored with results based on effect on disease transmission. End-points examined included infections, mortality (and associated QALY). The paper found that to reduce infection initial targets should be care home workers and HWs followed by young age groups, though this latter finding relied on indirect protection. To reduce mortality (and QALY) with lower R₀, then care home workers and HWs are important but also care home patients (CHP) and 75+. With higher R₀, then CHP and 65+ are more important than HWs.

4.6 RIVM used a data-driven model. The team compared various strategies vaccinating older age-groups first to vaccinating younger age-groups first. They looked at vaccine scenarios protecting against disease transmission and those just against cases with disease and found that if a vaccine was effective against transmission it could be better to allocate to young adults first, whereas vaccinating elderly first was optimal if a vaccine protects only against disease.

4.7 In summary, key, consistent findings are that vaccinating HWs and care home workers first has the largest impact; vaccinating older age-groups has the next-largest impact in a range of geographical settings, particularly for vaccines which may only protect against disease.

Prioritizing target groups for COVID-19 vaccine: Supplemental guidance to the SAGE Roadmap for Member States of the WHO Region for Europe

Background

As part of an effort to help countries prepare to implement their respective COVID-19 vaccination programmes, SAGE undertook a three-step process to provide guidance for overall programme strategy and vaccine-specific recommendations. SAGE published the first two steps, a Values framework (Step 1) [1], outlining general principles and objectives for COVID-19 prioritization and a Roadmap for prioritizing use of COVID-19 vaccines in the context of limited supply (Step 2) [2].

In the Roadmap, SAGE describes a number of target groups that should be prioritized during the anticipated three stages of the vaccine rollout in countries. However, certain target populations were not defined in detail in the document. First, in Stage 1a (initial launch), when very limited vaccine is available, SAGE recommends targeting health workers (HWs) at “high to very high risk of acquiring and transmitting infection” citing health and equity objectives related to well-being and
reciprocity. These two subcategories of HWs, which were grouped together, were not defined in the document.

In Stage Ib, SAGE recommends prioritizing “older adults defined by age-based risk specific to country/region; specific age cut-off to be decided at the country level,” and in Stage II, when limited vaccine is available, the SAGE guidelines call for continued vaccination of “older adults not covered in Stage I.” However, the guidelines do not specify a cut-off age for older adults.

In addition, in Stage II, SAGE recommends targeting “groups with comorbidities or health states determined to be at significantly higher risk of severe disease or death.” SAGE cites well-being and equity as the underlying objectives for this priority group, and also recommends that “efforts should be made to ensure that disadvantaged groups where there is underdiagnosis of comorbidities are equitably included in this category.” The specific risk groups, however, are not defined in the document.

In October 2020, the WHO Regional Office for Europe conducted a series of webinars to present and discuss SAGE recommendations on COVID-19 vaccination prioritization with NITAGs and national immunization programme managers of Member States. Many national experts requested further guidance in defining health workers at high risk of acquiring and transmitting SARS-CoV-2 and specifying age cut-offs for the vaccine prioritization approach for older adults.

In order to address this request and to provide additional guidance to countries in these three areas of the SAGE recommendations that were not addressed in detail in the Roadmap, we conducted a brief literature review, performed a review of already published NITAG recommendations for prioritization of COVID-19 vaccine, and published WHO documents relevant for further defining the target groups. Based on findings from this review, along with findings from modelling studies (detailed in papers 3-6), we have suggested additional guidance. In addition, based on existing definitions in published WHO documents, we have suggested a definition for health workers.

**Literature review to inform recommendations about HW stratification**

To investigate relative risk of HWs, we identified two relevant articles published in October 2020 [3,4], and reviewed relevant articles from peer-reviewed journals and Metrix listed in the reference lists of the two articles. Overall, we reviewed 16 studies from Europe, China and North America, of which nine had relevant findings on the risk of infection for HWs. Five studies showed higher risk of infection (determined by serology and/or PCR) among HWs with direct patient contact in general [4–7] and, in some studies, among HWs specifically with direct contact with COVID-19 patients or patient-wards [4,6,8].

Three studies showed that infection with SARS-CoV-2 was likely linked with inadequate or improper PPE, which was associated with increased risk of infection relative to HWs who had direct contact with COVID-19 patients but used adequate PPE [7–9]. However, one of these studies showed that even among HWs who used adequate PPE, risk was higher among HWs working with COVID-19 patients compared with those who were not working with COVID-19 patients[7].

One study found an association between HW infection and work departments where aerosol-generating procedures frequently occurred [10].

Two United States studies found that SARS-CoV-2-positive HWs who had severe outcomes, including hospitalization, intensive care unit (ICU) admission and death, were older[3,11]. In one of the studies, 89.8% of hospitalized HWs had at least one comorbidity [3]. An analysis of COVID-19 deaths
in the WHO European Region found that 94% of deaths occurred in individuals with at least one underlying comorbidity.

**Review of NITAG recommendations about HW stratification for prioritization for COVID-19 vaccine**

We reviewed existing recommendations of NITAGs that have already issued guidance about priority groups for COVID-19 vaccination. Of countries where we found existing NITAG recommendations – Belgium (Superior Health Council), France (Commission technique des vaccinations), the United States (Advisory Committee on Immunization Practices - ACIP), the United Kingdom (Joint Committee on Vaccination and Immunisation - JCVI), and Chile (Consejo Asesor de Vacunas e Inmunización - CAVEI) – only the United Kingdom had issued a stratified recommendation for HWs. In JCVI’s “provisional ranking of prioritisation for persons at-risk,” “care home workers” are listed in the first group, while “health and social care workers” are in the second group. JCVI based this decision on evidence that “infection rates are higher in residential care home staff than in those providing domiciliary care or in healthcare workers [12].”

**Review of existing WHO documents on differential risk status of HWs**

WHO documents on risk stratification of HWs to inform exposure risk focus primarily on proper use of PPE and compliance with infection prevention and control measures. However, the recent guidance published by WHO on “Prevention, identification and management of health workers’ infection in the context of COVID-19” [13] provides the following observations:

- SARS-CoV-2 infections have been observed in various hospital departments and HWs in various roles, including HWs without direct patient contact.
- Certain exposures (e.g., performing intubations, direct patient contact, and contact with bodily secretions) and inconsistent/incomplete use of PPE are associated with increased risk of coronavirus infections in health workers.

**Literature review to inform guidance on age cutoffs and specific comorbidities for Stage I and II prioritization**

A brief literature review revealed relative consistent patterns of risk of severe outcomes by age and comorbidity group. The largest study to date, an evaluation of primary care records from over 17 million adults in the United Kingdom using the “OpenSafely” platform, found that risk of death from COVID-19 infection increased with increasing age, particularly from age 60 [14]. In addition, data from Euromomo (www.euromomo.eu/) and England have shown high levels of excess death in all adults, but most strikingly in older age groups [15,16]. Finally, an analysis of COVID-19 mortality data from the WHO European Region found increased mortality in older age groups; mortality is considerably elevated among persons older than 60 years.

The OpenSafely study found a statistically significant risk of mortality among individuals with diabetes, hematological malignancy, non-hematologic cancer diagnosed in the previous 5 years, reduced kidney function, chronic respiratory disease, chronic cardiac disease, organ transplant, chronic liver disease, stroke or dementia, chronic liver disease, other neurologic diseases, autoimmune diseases (rheumatic arthritis, lupus or psoriasis) and other immunosuppressive conditions. In addition, male sex, obesity, deprivation/low socio-economic status, and non-white ethnicity were associated with increased risk for death[14]. Nearly all of these conditions are mentioned by the United States’ ACIP, the United Kingdom’ JCVI and Chile’s CAVEI as risk factors for severe illness from COVID-19 infection [12,17,18]
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