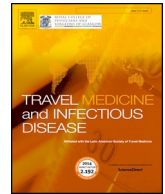




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## Strengthening screening for infectious diseases and vaccination among migrants in Europe: What is needed to close the implementation gaps?

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## ABSTRACT

Migration to the European Union (EU)/European Economic Area (EEA) affects the epidemiology of infectious diseases, including tuberculosis (TB), HIV, hepatitis B/C, and parasitic diseases. Some sub-populations of migrants are also considered to be an under-immunised group and thus at risk of vaccine-preventable diseases. Providing high-risk migrants access to timely and efficacious screening and vaccination, and understanding how best to implement more integrated screening and vaccination programmes into European health systems ensuring linkage to care and treatment, is key to improving the health of migrants and their communities, alongside meeting national and regional targets for infection surveillance, control, and elimination. The European Centre for Disease Prevention and Control (ECDC) has responded to calls to action to improve migrant health and strengthen universal health coverage by developing evidence-based guidance for policy makers, public health experts, and front-line healthcare professionals on how to approach screening and vaccination in newly arrived migrants within the EU/EEA. In this Commentary, we provide a perspective towards developing efficacious screening and vaccination of newly arrived migrants, with a focus on defining implementation challenges and evidence gaps in high-migrant receiving EU/EEA countries. There is a need now to leverage the increasing momentum around migrant health to both strengthen the evidence-base and to advocate for universal access to health care for all migrants in the EU/EEA, including undocumented migrants. This should include voluntary, confidential, and non-stigmatising screening and vaccination that should be free of charge and facilitate linkage to appropriate care and treatment.

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## 1. Introduction

Migration to and within the European Union/European Economic Area (EU/EEA) has increased and diversified in recent years, with migrants (defined as individuals living in a country outside of their country of origin) accounting for approximately 10% of the total population [1]. Although migration is on the whole healthy, migration is undoubtedly affecting the epidemiology of key infectious diseases in the region, with implications for health systems and the health-care professionals tasked with meeting their needs [2–4]. Although, historically, on-arrival migrant screening programmes have focused on TB, other infections are important to recognise in these populations including HIV, hepatitis B and C, parasitic infection, and vaccine-preventable diseases [5–11]. Better defining how we implement timely, effective, and more integrated screening and vaccination services and preventative healthcare – facilitating linkage to care and treatment where necessary in light of the barriers to healthcare migrants are known to face [12,13] – is key to improving the health of migrant communities, alongside meeting national and regional targets for infection surveillance and control. Importantly, EU governments are signatories to the UN's universal health coverage (UHC) agenda – which calls for “all people and communities to have access to the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship”. This global initiative merits greater consideration when discussing the health access needs of migrants residing in European countries.

Amid numerous calls for clear guidance on how to approach the screening and vaccination of newly arrived migrants within the EU/EEA, in 2018 the ECDC published evidence-based guidance on the screening and vaccination [14] with the aim of providing a perspective towards efficacious screening and vaccination. A summary of the ECDC evidence-based statements is outlined in Table 1; a detailed description of the methods and approach taken to generate these recommendations is outlined elsewhere [14]. In this Commentary, we define implementation challenge, evidence-gaps, and key obstacles to delivering a more integrated and coherent approach to screening and vaccination of newly arrived migrants within EU/EEA countries.

## 2. Key implementation challenges for migrant screening programmes

Screening coverage of the general migrant population in the EU/EEA is reported to be extremely low [15]. Improving coverage in migrant populations may require some innovative interventions that should be robustly tested, alongside ensuring they are acceptable to migrants [16]. Community-based approaches to screening for LTBI and other infectious diseases, alongside multi-disease screening approaches, have been tested in small studies, including in novel settings including mosques, bars, health promotion events, and Accident and Emergency departments [17–20]. It is acknowledged, too, that countries in the EU/EEA have varying levels of migration, so the policy response will need to be adapted accordingly. Improving the health of migrants, their communities, and the wider public is at the heart of any expansion and funding of screening and vaccination programmes, to align with national, regional, and international obligations to reduce the burden of communicable diseases. EU/EEA Member States need to ensure that screening and vaccination is voluntary, confidential, and non-stigmatising. Furthermore, screening and subsequent linkage to care for key infectious diseases and vaccination should be provided free of charge,

**Table 1**

Summary of evidence-based statements for approaches to screening and vaccination among newly arrived migrants [Reproduced from reference 14].

Active TB	Offer active TB screening using chest X-ray (CXR) soon after arrival for migrant populations from high-TB-incidence countries. Those with an abnormal CXR should be referred for assessment of active TB and have a sputum culture for <i>Mycobacterium tuberculosis</i>
Latent TB infection	Offer LTBI screening using a tuberculin skin test (TST) or an interferon-gamma release assay (IGRA) soon after arrival for all migrant populations from high-TB-incidence countries and link to care and treatment where indicated.
HIV	Offer HIV screening to migrants who have lived in communities with high HIV prevalence ( $\geq 1\%$ ). If HIV positive, link to care and treatment as per clinical guidelines. Offer testing for HIV to all adolescents and adult migrants at high risk for exposure to HIV. If HIV positive, link to care and treatment as per clinical guidelines.
Hepatitis B	Offer screening and treatment for hepatitis B (HBsAg and anti-HBc, anti-HBs) to migrants from intermediate ( $\geq 2\%$ ) or high ( $\geq 5\%$ ) HBsAg prevalence countries. Offer hepatitis B vaccination series to all migrant children and adolescents from intermediate ( $\geq 2\%$ ) or high ( $\geq 5\%$ ) HBsAg prevalence countries who do not have evidence of vaccination or immunity.
Hepatitis C	Offer hepatitis C screening to detect HCV antibodies to migrant populations from HCV-endemic countries ( $\geq 2\%$ ) and subsequent RNA testing to those found to have antibodies. Those found to be HCV RNA positive should be linked to care and treatment.
Schistosomiasis	Offer serological screening and treatment (for those found to be positive) to all migrants from countries of high endemicity in sub-Saharan Africa, and focal areas of transmission in Asia, South America and North Africa.
Strongyloidiasis	Offer serological screening and treatment (for those found to be positive) for strongyloidiasis to all migrants from countries of high endemicity in Asia, Africa, the Middle East, Oceania and Latin America.
Vaccine-preventable diseases	Offer vaccination against measles/mumps/rubella (MMR) to all migrant children and adolescents without immunisation records as a priority. Offer vaccination to all adult migrants without immunisation records with either one dose of MMR or in accordance with the MMR immunisation schedule of the host country. Offer vaccination against diphtheria, tetanus, pertussis, polio and <i>Haemophilus influenzae</i> type b/HiB (DTaP-IPV-Hib) <sup>a</sup> to all migrant children and adolescents without immunisation records as a priority. Offer vaccination to all adult migrants without immunisation records in accordance with the immunisation schedule of the host country. If this is not possible, adult migrants should be given a primary series of diphtheria, tetanus, and polio vaccines. For hepatitis B vaccination, please see evidence-based statement for hepatitis B.

<sup>a</sup> Vaccination against Hib is only recommended for children up to five years of age.

with proper steps taken to consider the unique needs of migrants in order to minimise loss to follow-up and treatment post-screening. 10 of 32 EU/EEA countries surveyed in one study, for example, found that certain groups of newly arrived adult migrants had to pay for required catch-up vaccination [21]. Table 2 includes important considerations that could be used as countries develop their migrant screening programmes going forward.

Countries across the EU/EEA adopt a wide variety of approaches to screening for infectious diseases among migrants, predominantly focused on TB, and increasingly LTBI. A systematic review of screening programmes across the EU/EEA reported that most countries focus on single diseases only, and specifically target asylum seekers and

**Table 2**

Important considerations when developing migrant screening and vaccination programmes.

- Programmes are developed in collaboration with front-line health professionals, public health experts and migrant communities
- Screening is voluntary and confidential, and not linked to immigration enforcement or employment opportunities
- Screening and vaccination is offered on arrival and throughout the settlement process
- Screening should be non-stigmatising and carried out for the benefit of the individual and the community
- Screening, treatment, and vaccination is free of charge
- Screening services are coordinated in a way that considers the unique needs and barriers to care faced by migrants, with a focus on ensuring linkage to care and treatment completion
- Tailored approaches may be most effective, including considering multi-disease testing, integrated care, and migrant-friendly services that address the linguistic and cultural context of migrant groups
- Front-line healthcare professionals require sufficient knowledge in epidemiology of infectious diseases, in particular from countries where migrants originate
- Community-based and primary care approaches may be the best approach to ensure high uptake to vaccination and screening
- Health care systems and policies need to be migrant friendly
- A universal medical record of screening and vaccination could be something to consider, with greater coordination required across Europe

refugees, potentially excluding other migrant groups [15]. We advocate for a wider group of at-risk migrants to be considered in screening and vaccination programmes in the EU/EEA, and for high-migrant receiving countries to better consider novel and more integrated multi-disease testing and catch-up vaccination approaches and to test interventions in larger studies. Where national guidelines do exist, such as those regarding vaccination, they have been poorly implemented in migrant populations [21,22]. In one study in UK primary care, only 9627 (12%) of 82,561 migrants eligible for hepatitis B screening in accordance with UK national guidelines were offered screening by clinicians [23]. Lack of awareness and lack of resources were cited by clinicians as key barriers. Screening programmes are more likely to meet their goals if they are appropriately resourced and staffed by front-line healthcare providers who are trained and supported in delivering such services. Issues that may be important for migrants, and which need to be better considered when screening programmes are designed, include stigma around diseases, fear of accessing care due to precarious immigration status, fear that seropositive status might jeopardise immigration eligibility, lack of entitlement to free healthcare, lack of knowledge about how to negotiate the host health system, and an inability to communicate effectively with healthcare professionals. Key implementation challenges are summarised in Table 3.

### 3. Evidence gaps for effective implementation

Research is needed to strengthen the evidence-base screening and vaccination for migrants to the EU/EEA to better inform future health policies and approach (Table 4). Importantly, there remains a lack of population-based data on the prevalence of infectious diseases and associated burden in migrants by key predictors such as country of origin, migration status, transit conditions. There are limited robust data on the yield and impact of infectious disease screening programmes for migrant populations in order to better target key risk groups and

develop more cost-effective approaches. In addition, there are a lack of data on the impact of interventions to ensure a continuum of care. Information on the effectiveness and cost-effectiveness of screening and vaccination programmes targeting migrants, and the practical implementation challenges facing these interventions, is limited. Furthermore, the perspectives of migrants themselves need to be better considered when designing programmes. Further community-based research and intervention research would be valuable in order to better understand the unique determinants of health among migrant populations and the perspectives of migrant communities toward specific infectious diseases and interventions, for example research evaluating acceptability and accessibility. Research in itself, however, will remain ineffective without renewed political commitment around improving the health of migrants in Europe, to ensure research findings are translated to effective policy changes.

### 4. Future directions

The inclusion of migrants in preventive health and vaccination services is a core component of the universal health coverage agenda within the context of the 2030 Agenda for Sustainable Development and its associated Goals [24]. This must include migrants residing in high-income countries in the EU/EEA and elsewhere. Regional targets for infectious diseases – as set out in, for example, the WHO End TB Strategy [25], the WHO Global Health Sector Strategy on Viral Hepatitis [26], and the European Vaccine Action Plan [27] – will not be met unless a renewed focus is placed on migrant populations. Public health programmes have a vital role in addressing social determinants of health for newly arrived migrant populations within the EU/EEA. The new ECDC guidance therefore represents a major international collaborative effort to generate the first evidence-based framework for countries to inform the development of new policies aimed at reducing the prevalence and burden of infectious diseases among migrants. While the approach taken by each country will vary due to its unique economic, political, and epidemiological circumstances, the increasingly globalised nature of migration and infectious diseases inherently requires a unified approach. It will therefore be important to learn from each other, and to facilitate cross-border initiatives and the sharing of data as EU/EEA countries work towards evaluating the effectiveness and uptake of new interventions as they are designed and implemented, and adapt to new challenges in the ever-changing landscape of infectious diseases and migration. There is a need now to leverage the increasing momentum around migrant health to strengthen the evidence-base around the health of migrants and to advocate for universal access to health care for all migrants in the EU/EEA, including undocumented migrants. This should include voluntary, confidential, and non-stigmatising screening and vaccination, which should be free of charge and facilitate linkage to meaningful care and treatment.

### Authors' contribution

TN, SH, and RTN wrote the first draft with subsequent input from all authors. All authors reviewed and approved the final version of the manuscript.

**Table 3**  
Key implementation challenges and considerations for migrant screening and vaccination in the EU/EEA.

Disease	Implementation challenges and considerations
Active TB and LTBI	<ul style="list-style-type: none"> <li>● Migrants face barriers to accessing and adhering to care, including low self-perceived risk of TB, stigma, and fear of discrimination at health services, which should be considered in the provision of services</li> <li>● Migrants without residency status may avoid care due to fear of immigration enforcement</li> <li>● Front-line health-care professionals should be trained to offer culturally sensitive services that are considerate of migrant's unique circumstances</li> <li>● Consider extending screening beyond refugees and asylum seekers to include other potentially high-risk migrant groups such as labour migrants, undocumented migrants, and internal EU/EEA migration</li> <li>● Communities should be involved in the development and implementation of active and latent TB screening programmes</li> <li>● Consider that migrants without symptoms are less likely to prioritise LTBI screening and treatment</li> </ul>
HIV	<ul style="list-style-type: none"> <li>● Stigma surrounding HIV should be minimised by screening in a culturally sensitive and confidential manner</li> <li>● Migrants are less likely to seek screening if they have low levels of knowledge of HIV and its risk factors, or if they face financial barriers to screening including missed work</li> <li>● Migrants may be concerned that results may negatively impact their residency status, and should be assured that results are unrelated to immigration enforcement</li> </ul>
Hepatitis B	<ul style="list-style-type: none"> <li>● Migrant communities may have lower levels of awareness of HBV and risk factors, which has been associated with lower rates of screening</li> <li>● Uptake of screening and vaccination is improved when it is recommended by culturally competent, trusted healthcare professionals</li> <li>● Perceived negative outcomes of HBV, such as discrimination, stigma, and loss of income or social status, may discourage screening and follow-up</li> <li>● Community-based approaches to screening and multi-disease testing should be considered, as screening uptake may be improved in programmes that involve community partners and are endorsed by local groups</li> <li>● Screening programmes for HBV will need to consider targeting migrants from intermediate and/or high endemic areas for HBV</li> </ul>
Hepatitis C	<ul style="list-style-type: none"> <li>● The tools to achieve HCV elimination in the EU/EEA are available; however, identifying all individuals at risk of HCV and linking those affected to care and treatment remain key challenges.</li> <li>● HCV screening uptake and linkage to care can be improved by implementing decentralised community-based screening strategies and working with community-based organisations to overcome cultural and language barriers, or using multi-disease testing approaches whereby HCV testing is offered as a blood test alongside HBV, HIV, and latent TB.</li> <li>● High rates of screening uptake and of treatment initiation and completion were observed in programmes using community-based screening strategies</li> <li>● Each country should assess its capacity to increase HCV testing in at-risk populations, link those living with chronic hepatitis B to care and provide access to HCV treatments.</li> </ul>
Strongyloidiasis and schistosomiasis	<ul style="list-style-type: none"> <li>● In the case of immunosuppressed patients, the recommendation for screening for strongyloidiasis is stronger because the risk of developing severe complications is substantial. Primary care physicians and specialists should be aware of this risk when prescribing corticosteroids or other immunosuppressants.</li> <li>● Considering the high efficacy and tolerability of ivermectin, it might be worth treating high-risk immunosuppressed patients pre-emptively if an appropriate test (stool culture or serology) is not available due to the substantial risk of developing a severe condition.</li> <li>● The use of serological tests, together with the availability of treatment, may influence the uptake of schistosomiasis and strongyloidiasis screening among migrants. In this regard, targeted screening for these infections could take place at the primary care level and/or specialist migrant health services, with referral to specialised infectious disease or tropical disease units for treatment and follow up, until the drugs of choice have become readily available.</li> </ul>
Vaccine-preventable diseases	<ul style="list-style-type: none"> <li>● Integrating catch-up vaccination into routine primary care services for migrants may reduce barriers to vaccination. Health systems should provide migrants with documentation of vaccines administered.</li> <li>● Multiple opportunities for vaccinations occur at different points in the migration trajectory and should be better considered and coordinated.</li> <li>● Information regarding the benefits of vaccination, and where to get catch-up vaccination on arrival, should be available in multiple languages</li> <li>● Consider wider groups of migrants beyond refugees and asylum seekers in catch-up vaccination programmes.</li> </ul>

#### The ad hoc scientific panel

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#### CRediT authorship contribution statement

**Teymur Noori:** Conceptualization, Supervision, Writing - original draft, Writing - review & editing. **Sally Hargreaves:** Conceptualization, Writing - original draft, Writing - review & editing. **Christina Greenaway:** Writing - review & editing. **Marieke van der Werf:** Writing - review & editing. **Matt Driedger:** Writing - review & editing. **Rachael L. Morton:** Writing - review & editing. **Charles Hui:** Writing -

**Table 4**  
A summary of the key evidence gaps.

Disease	Evidence gaps and further research
Active TB	<ul style="list-style-type: none"> <li>● Robust population-based studies are needed on the yield of active TB screening among migrants by age group and migrant type, determining both the timing of screening and the optimal threshold of incidence in countries of origin for which migrant screening will be conducted, as well as data on associated cost-effectiveness of these strategies.</li> <li>● Research is needed to determine the absolute and attributable impact of screening programmes for active TB on TB control in low-incidence EU/EEA countries and estimates of adherence to follow-up care and treatment.</li> <li>● Evidence on the comparative effectiveness and cost-effectiveness of different TB control strategies (active vs LTBI screening) is required to prioritise TB control efforts for migrant populations.</li> </ul>
LTBI	<ul style="list-style-type: none"> <li>● Better define the individual, combined and attributable population contribution of risk factors leading to progression from LTBI to active TB in migrants.</li> <li>● Intervention studies are needed that determine how to improve the identification of target populations and retain them in care, as well as economic evaluations that assess these interventions, in order to develop the highest impact programmes.</li> <li>● Better diagnostic tests that accurately predict those individuals who will develop active TB, and more effective interventions to promote adherence, will be needed to achieve TB elimination.</li> </ul>
HIV	<ul style="list-style-type: none"> <li>● Migrant-specific HIV screening and cost effectiveness studies are needed in the EU/EEA.</li> <li>● Data are needed on the effectiveness of testing in community and primary care settings for high-risk migrant populations.</li> <li>● More research is needed to understand better the determinants of risk and which migrant populations are particularly vulnerable to HIV acquisition post-arrival. This information is critical to inform and tailor testing, prevention, and policy programmes targeted to at-risk migrant populations.</li> </ul>
Hepatitis B	<ul style="list-style-type: none"> <li>● Community-based screening studies and related cost-effectiveness studies on migrant populations are required to determine the optimal approach to improve uptake and linkage to monitoring and care.</li> <li>● Research is needed on acceptability and feasibility of testing among various high-risk migrant groups are needed, to build trust and knowledge to improve the testing approach.</li> <li>● Improved strategies are needed to ensure that hepatitis B vaccination programmes reach all migrant children and adolescents.</li> </ul>
Hepatitis C	<ul style="list-style-type: none"> <li>● There is a need for specific data on the effectiveness and cost-effectiveness of screening and treating with new direct acting antivirals (DAA) regimens in migrants in the EU/EEA.</li> <li>● Data are needed on liver-related outcomes, deaths, and economic burden due to undetected/untreated HCV among migrants in the EU/EEA.</li> </ul>
Strongyloidiasis and schistosomiasis	<ul style="list-style-type: none"> <li>● High quality prevalence studies of migrants from highly endemic countries is needed.</li> <li>● Robust population-based studies are needed on schistosomiasis and strongyloidiasis screening among migrants by age group, risk groups, level of care, and timing of screening. Associated cost-effectiveness studies are required to design the most effective programmes.</li> </ul>
Vaccine-preventable diseases	<ul style="list-style-type: none"> <li>● Robust surveillance data on incidence of VPDs and vaccine coverage in migrant populations by age group, migration status, country of origin, and time since migration are required to inform policy and planning, with greater coordination required across EU/EEA countries.</li> <li>● Evidence on the effectiveness of different vaccination strategies to improve vaccine uptake is required in adult, adolescents, and child migrants to inform prioritisation and novel approaches.</li> </ul>

review & editing. **Ana Requena-Mendez:** Writing - review & editing. **Eric Agbata:** Writing - review & editing. **Daniel T. Myran:** Writing - review & editing. **Manish Pareek:** Writing - review & editing. **Ines Campos-Matos:** Conceptualization, Writing - original draft. **Rikke Thoft Nielsen:** Conceptualization, Writing - review & editing. **Jan Semenza:** Writing - review & editing. **Laura B. Nellums:** Writing - review & editing. **Kevin Pottie:** Conceptualization, Writing - review & editing.

#### Declaration of competing interest

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