of production, ability to encode complicated protein designs, and safety as immunogens, mRNA vaccines are an excellent platform for HIV vaccine development. In May, 2022, the International AIDS Vaccine Initiative and Moderna announced the first participant screenings for a phase 1 clinical trial (IAVI G003) of an mRNA HIV vaccine antigen (mRNA-1644) in Rwanda and South Africa, which is still underway, as each participant is to receive two doses of the eOD-GT8 60mer mRNA vaccine.

Owing to collaborative efforts between Rwanda, Ghana, Senegal, the African Union, WHO, and the EU, Rwanda will be the first African country to host an autonomous mRNA manufacturing facility.

In June, 2022, BioNTech started constructing its cutting-edge manufacturing facility in Kigali (Rwanda) for the production of mRNA-based drugs and product candidates. The facility is anticipated to be the first node in an extensive and decentralised end-to-end manufacturing network in Africa. It will initially house two sets of BioNTainers for the synthesis of bulk mRNA vaccines.[5] The Rwandan mRNA vaccine facility is made up of six bio-containers, which are mobile factories that use renewable energy to run climate-neutral operations and will be provided by the Rwandan company Izuba Energy. Each of the six containers make up one BioNTainer (module) for drug substances and drug products.[5] In March, 2023, the first of BioNTainer's six ISO-sized containers were transported by air to Kigali, which were finished in Europe in December, 2022.

Staff from BioNTech will first supervise and operate the facilities and, after training local personnel, ownership and expertise will eventually be handed to local companies, so they can take over the intricate process of creating vaccines. Other African Union member states will receive vaccines produced in the Rwanda-based mRNA vaccine manufacturing facility at a not-for-profit price. Moreover, BioNTech is working to build facilities in Senegal and South Africa.[1]

Currently, several mRNA vaccines require ultra-cold chain delivery and storage. Investments made in ultra-cold chains for COVID-19 vaccines in Africa can be repurposed into future research centres and facilities for storing new mRNA vaccines.[2,4] Building vaccine production capacities in Africa is still fraught with challenges, largely due to a scarcity of trained personnel, highly specialised equipment, cold chain infrastructure, power outages, and public health infrastructure.[1,4]

Apart from improving the cold chain system within the supply chain, one strategy for successfully stabilising mRNA vaccines is lyophilisation, which involves freeze-drying.[2] Making some vaccines thermostable would eliminate their need for a cold chain, increasing the capacity in the cold chain for vaccines that would still need cold or cooler temperatures.[2] Thermostable vaccines have been proposed as a possible way forward in managing these challenges and a feasible solution for increasing vaccination coverage in low-income and middle-income countries with fluctuating energy supplies.

In conclusion, the commencement of large-scale mRNA vaccine manufacturing in African countries is important for a real sustainable health-care system in Africa.[6] This manufacturing is a good opportunity for enhancing vaccine training opportunities in African countries, as the know-how is often learned in vaccine manufacturing facilities.

Rwanda has emerged as a pioneering country, hosting the first mRNA vaccine manufacturing facility in Africa. In the near future, Senegal, South Africa, and Kenya will be the other African countries to have mRNA vaccine manufacturing facilities in the continent.

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Universal newborn screening for spinal muscular atrophy in Ukraine

Spinal muscular atrophy is an autosomal recessive condition characterised by progressive muscle atrophy and weakness. Spinal muscular atrophy is caused by the deficit of SMN protein that results with homozygous deletion of *SMN1* in 96% of patients.[1] In its most frequent and severe form, untreated spinal muscular atrophy leads to death or permanent ventilation before the age of 2 years. Three drugs that increase SMN protein through *SMN2* splicing modification or *SMN* gene transfer are currently approved.[1] Several trials have shown the superior efficacy of early treatment, leading to newborn screening programmes in several countries[2] with a large reduction in disease management costs.[3] Because the screening is based on a genetic test, in contrast to traditional screening for metabolic and endocrine disorders, newborn screening for spinal muscular atrophy leads to logistical or ethical challenges in some countries.

Following successful pilots,[4] a large-scale reorganisation of newborn screening has been planned in Ukraine since 2021 to increase the number of screened disorders from four to 21, including spinal muscular atrophy. The national programme aimed to start on June 1, 2022, but could not be initiated in the context of the war.

Despite the partial occupation of Ukraine and the institution of martial law, a decision was made at the highest level of the state to introduce expanded neonatal screening at the earliest opportunity under the form of a pilot programme with free opt-in participation. The pilot started on Oct 17, 2022, in 12 northern (60 000 newborns per year before the war) and western (70 000 newborns per year before the war)[5] regions following the liberation of Kyiv's surrounding area. Samples were referred to two laboratories in Kyiv and Lviv. During the first 7 months of the programme, 65 880 newborns were screened and 11 were identified as patients (appendix), which is slightly above the incidence observed in other programmes.[3] The mean turnaround time between blood sampling and the results was 4 days (SD 1·7).

We think that the successful implementation of genetic newborn screening in Ukraine, despite the challenges introduced by the nation being in a state of war, illustrates that management and prevention of rare diseases is not only important, but also feasible even in circumstances that compromise state organisation. We hope that the Ukrainian experience might inspire physicians struggling to implement newborn screening for spinal muscular atrophy and other rare conditions in their own countries.

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Rehabilitation needs during disasters

Hamaiyal Sana and colleagues[1] rightly draw attention to the orthopaedic surgical needs in Türkiye and Syria after the earthquakes in the region in February, 2023. However, in addition to these requirements is the associated and indispensable need for rehabilitation services.

Over 117 000 earthquake-induced injuries were sustained in Türkiye and northwest Syria in February, the severity of which range from minor soft tissue to substantial head, chest, abdominal, crush, and amputation injuries.[2,3] Although many of these injuries require orthopaedic surgical care, an even larger number require rehabilitation services, especially those that will eventually need surgical intervention.

The importance of early, high-quality, long-term rehabilitation services to promote functional recovery, shorten hospital stays, and reduce the incidence of complications or disability after catastrophic earthquakes is well recognised.[4] Furthermore, the fundamental role of rehabilitation services in coordinated disaster responses has been widely established,[5] and the provision of surgical care by emergency medical teams in these contexts—such as those rightly advocated for by Sana and colleagues—activates an accompanying duty for high-quality rehabilitation services to also be made available to beneficiaries.

As such, in addition to the necessity to meet orthopaedic surgical needs in Türkiye and Syria, effective rehabilitation services are also urgently required to minimise the effects on the physical health, psychological wellbeing, social functioning, and economic prosperity of individuals injured by the earthquakes. At the same time, Sana and colleagues' call for improved forward-looking preparedness in earthquake-vulnerable countries to meet orthopaedic demand must also include the capacity to adequately provide essential rehabilitation services in mass-casualty disasters.

See **Online** for appendix

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