

**Lessons from the United Kingdom’s Covid-19 Vaccination Strategy**

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The UK has been profoundly affected by the Covid-19 pandemic. In our population of over 66 million, to date we have had nearly 4.2 million confirmed infections (1) with over 123, 000 deaths (2). Vaccination has provided an opportunity to limit the impact of COVID-19 on our population, and hopefully reduce the risk of significant mortality in any third wave.

As other countries roll out their immunisation programmes what lessons are to be learnt from the UK experience? The Joint Committee on Vaccination and Immunisation (JCVI) advises the UK Government on vaccination policy. The Government asked the JCVI to advise on a programme that would lead to the greatest reduction in hospitalisations and deaths. The committee met regularly from May 2020 to examine data to decide which groups would most benefit from early vaccination.

Public Health England, primary care and other datasets determined that the predominant risk factor for severe disease and mortality was increasing age, with those over 50 years at the highest risk of mortality (3). Elderly care home elderly residents were disproportionately affected during wave 1 and were considered a very high priority for vaccination (4). Moreover, those with underlying health conditions, many of whom were in ethnic minority and socially disadvantaged groups were shown to be at risk (5).

So, in Phase 1 of the programme nine priority groups were advised in a programme predominantly structured by age, with the inclusion of those with certain underlying health conditions (3). JCVI also recognised front line health and social care workers had significant COVID exposure risk and were essential to keep a health service functioning during the COVID health crisis. In addition the exposure risk to multiple vulnerable people in their care was reflected in advice to prioritise this group. Front line health and social care workers were therefore placed at the top of the priority group list (3).

The UK Medicines and Healthcare products Regulatory Agency (MHRA) gave regulatory approval to the Pfizer-BioNTech on December 2 (6). The initial approval was for a two dose schedule, with the second dose administered after 3 weeks. JCVI's advice was published on the same day, allowing the

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vaccination programme to begin almost immediately in hospitals, with the first primary care vaccination sites opening on December 7.

On 30 December 2020 the MHRA approved the AstraZeneca vaccine for use in a two-dose schedule and again, JCVI advice was published on the same day. Given the rapid increase in confirmed COVID-19 infections in the UK in late 2020, JCVI advised that there was a need for rapid, high levels of vaccine uptake among vulnerable persons. Given data for the AstraZeneca vaccine indicated a longer interval between doses led to a stronger boost response and higher efficacy(7), and data from both vaccines indicated high vaccine efficacy from a single dose (7,8), JCVI advised that the AstraZeneca and Pfizer-BioNTech vaccines could be offered with an interval of up to 12 weeks (9). Prioritising delivery of the first vaccine dose was considered highly likely to have a greater public health impact in the short term and reduce the number of preventable deaths from COVID-19.

JCVI published interim advice on Phase 2 on 26 February 2021 (10), advising a continuation of the age-based strategy with vaccination of all adults aged 18 to 49 years, not eligible in the first phase of the programme. It is advised that vaccination in this group proceed in descending age order, given evidence that increasing age is the single most important factor in determining the risk of hospitalisation (10). An age-based programme is considered the fastest and most equitable way of delivering mass vaccination in order of risk, and modelling indicates that speed is the single most important factor in delivering benefits to the population.

There is evidence that some groups, including males, certain Black, Asian and minority ethnic groups, and those with a body mass index of 30 or more are at increased risk of hospitalisation (11). JCVI has therefore strongly advised that individuals in these groups promptly take up the offer of vaccination when they are offered, and that deployment teams should utilise the experience and understanding of local health systems and demographics, combined with clear communications and outreach activity by local clinical, community and faith leaders to promote vaccination in these groups (10).

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Primary care in the UK has been at the centre of the vaccine programme and teams have worked tirelessly in delivering vaccines at speed. Local Clinical Commissioning Groups have supported and coordinated the arrival of vaccines to practices. Primary Care network leads and practice managers have organised and facilitated the administration of vaccines within the practices. Vaccinators have included include GPs, nurses, practice pharmacists as well as recently retired doctors and nurses. Local patient participation groups have helped with signage, marshalling and attending car parking. One of the reasons that this has been so successful was the existing primary care infrastructure in the UK, which has experience in delivering 15 million influenza immunisations annually. A well-developed primary care structure with the majority of the population registered with a single practice has been important in identifying at risk patients and provided a quality platform to deliver the majority of the vaccinations to date.

The UK government have also developed mass vaccination centres, staffed by trained vaccinators including health care professionals, paramedics, and volunteers and in some centres members of the armed forces. Vaccines are also being delivered in local hospitals, pharmacies and community centres. In order to improve access in disadvantaged communities, there have been vaccination sites in religious buildings such as churches and mosques as well as ‘pop up’ and mobile sites.

The UK’s vaccine programme has been a huge success. Twenty six million vulnerable individuals have been vaccinated with their first dose of either the Pfizer-BioNTech or the Oxford Astra Zeneca vaccines (12), and we hope to offer at least a single dose to all adults before the end of July 2021. These vulnerable individuals include those over the age of 50 and those with underlying health conditions. Coverage has been very high amongst the elderly – a 90% coverage in the over 70s has been truly remarkable (13). However, there are some geographical and ethnic disparities – vaccine coverage is lower in London, amongst black and Asian minority groups and amongst white Eastern European groups (13,14). NHS England and the devolved national leaders are working hard at trying to address both concerns about vaccination and access to vaccination in these communities.

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Early data from Public Health England indicate that a single dose of either vaccine is approximately 80% effective at preventing hospitalisation and a single dose of the Pfizer-BioNTech vaccine is 85% effective at preventing death with COVID-19 (15, 16). This high vaccine effectiveness from a single dose justifies our approach to programme delivery, allowing the benefits of vaccination to be rapidly offered to a wider proportion of the population.

The key lesson is that a simple, predominantly age based structure to the vaccination programme has enabled a rapid programme delivery with high vaccine uptake. The aim of the programme has been clear – to prevent deaths by vaccinating those most at risk first. There has been a communication strategy from the start, including press conferences and media appearances to explain the rationale behind the prioritisation strategy. The public have understood when it was their ‘turn’ to be called and responded to invitations promptly. The bold decision to delay the second dose, allowing for more to be immunised with a first dose has proved highly effective.

However there remain many challenges. The widespread use of social media has contributed to vaccine hesitancy, enabling the rapid spread of unfounded claims about efficacy and safety – for example a recent claim about the vaccines causing infertility. Vaccine supply has been and will continue to be ‘lumpy’. Whilst the UK government have had the foresight to put in place vaccine contracts at an early stage, some European countries were later, which combined with a hesitancy over the administration of the Oxford-AZ vaccine to the elderly at the beginning of the year has in part led to lower vaccination rates in Europe and the emergence of a third wave in a number of countries. Higher infection rates lead to more transmission and the potential for the emergence of COVID-19 variants of concern. These variants could have an impact on the effectiveness of the vaccination programme and the length of immunity protection the vaccines offer. Future data on the effect of the vaccines on variants, mixed vaccine schedules, the prevention of transmission and the efficacy and safety in children will be important in determining future vaccination strategy including the possibility

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of an autumn booster campaign. The virus continues to evolve and we will ensure that our UK vaccination programme appropriately evolves to stay ahead of it.

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