

# COVID-19 Vaccine Roll-out by Local Authorities in Norway

## Challenges to decision-making


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### Abstract

- Based on interviews with 14 local decision makers, we identify seven challenges to decision making in local authorities rolling out COVID-19 vaccine in Norway in the period from January to September 2021.
- The main challenges were in deciding how many doses to extract from each vaccine vial, how to cope with changes to recommended dose intervals, and how to prioritize borderline patients and health personnel for vaccination.
- We speculate on ways in which decision making at local level could be supported in future situations involving emergency vaccine roll-out.
- We identify sixteen functions local authorities need to carry out successfully to achieve the goals for vaccine roll-out. These functions might be used in preparedness activities or in the design of system improvements.

At the start of 2021, over 350 local authorities in Norway were charged with rolling out COVID-19 vaccine to their populations in line with national criteria and goals. This report focuses on system purposes, functions and challenges in local systems for vaccine roll-out. We describe how shared constraints set at national level shaped common goal-critical challenges for decision-makers across a sample of nine local authorities, and discuss mutual influences between national- and local-level decisions on vaccine roll-out.

The methodological approach we use is called cognitive systems engineering. According to this approach goal achievement results from people collaborating with each other and interacting with technology and infrastructure in order to make sense of situations, adapt, make decisions, plan, re-plan and perform other cognitive functions. A central tenet of cognitive systems engineering is that skilled people adapt in the face of complex challenges to produce successful outcomes in spite of those challenges. Ultimately success belies the challenges adapted to such that challenges may be poorly visible to outsiders who help shape them. Methods from cognitive systems engineer-



ing can be used to elicit knowledge about such challenges, such that future systems can be improved.

Based mainly on the analysis of transcripts of interviews with 14 people central to roll-out in the nine local authorities, we abstracted a common functional account of a local vaccine roll-out system. There was agreement among interviewees that critical goals for roll-out were to vaccinate as many people as fast as possible in line with priority and other national guidelines, while maintaining public trust. There was also agreement on seven important values to be upheld while achieving these goals (e.g. “vaccinate safely”, “don’t waste doses”). We abstracted sixteen system functions that the local authorities need to achieve their goals in line with the values identified. Examples of system functions are control over dose availability and viability, mapping of priority groups, control over dosage number and so on. The list of system functions may be interesting to those improving future roll-out systems or for use in preparedness activities.

The completed functional account of local vaccine roll-out was used to study interviewee responses on how constraints set by national authorities could shape goal-critical dilemmas and difficult decisions. Examples of external constraints are vaccine dose intervals, amounts of vaccine supplied, or infection containment measures.

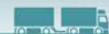
Our results indicate seven common areas with challenging decisions in the cognitive system organizing vaccine roll-out at local level:

- 1) Coordination of patients, vaccine and staff;
- 2) Extracting doses from vials;
- 3) Dealing with changing dose intervals;
- 4) Prioritizing patients;
- 5) Deciding whether to dispose of or use vaccine;
- 6) Balancing need for staff with need for training; and
- 7) Establishing data systems for calling in patients and distributing vaccines.

While local authorities already strive to align decisions and actions with the goals and shifting criteria of national authorities, challenges to local authorities might be eased by a more iterative, mutual process, in which the health authorities and Norwegian Institute of Public Health strive to ensure that the criteria and procedures that they set align with the strategies of local authorities, after they have been implemented in practice.

Coordination between national health authorities and manufacturers to generate standard guidelines could increase shared awareness among local authorities about how to safely extract as many doses as possible. Development of consensus on how to prioritize patients and health personnel at a more granular level could help avoid perceptions of unfairness by the public, as could full consideration by national authorities of the impact of frequent changes to guidelines. Development of generic but adaptable data systems to help organize patient and vaccine delivery logistics at local level could save local authorities valuable resources and time.

Accepting methodological limitations, our findings support the usefulness of cognitive systems engineering for visualizing hidden decision challenges, and for abstracting functions to be supported in attempts to improve future systems.



On considering findings, practitioners should bear in mind methodological limitations, the contexts and culture of Norwegian local authorities, and the early phase of vaccine roll-out studied. Methodological limitations concern the extent to which the study participants represent Norwegian municipalities involved in vaccine roll-out, and our ability to be explicit about the process used to generate insights on decision challenges and functional account of the local vaccine roll-out system. Ideas on decision support are also speculative and further research is also needed on how collaboration and communication can be changed to ease the decision bottlenecks identified.

Finally, we would like to stress that according to both the participants in our study and national evaluation reports, vaccine roll-out in Norway was successful. This was due to much hard work but also successful collaboration and communication between national and local authorities. Despite our attempt to identify areas for improvement, our findings are just as much about how the joint cognitive system adapted successfully as they are about the challenges adapted to.