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## Coronavirus Pandemic in Germany: Challenges and Options for Intervention

**Measures taken by the German Federal Government and the German Federal States (Länder) to curb the ongoing coronavirus pandemic are urgently required at present and correspond to the threat posed by the pandemic. They consist of three elements: (1) containment of the epidemic, (2) protection of vulnerable population groups, and (3) capacity increase in the public healthcare system and in the public supply of critical goods and services. There is scientific evidence for the effectiveness and necessity of selected measures, while others are proposed on the basis of projections and political considerations. Top priority must be given to the development of drugs and vaccines. With this, medical ethics must be considered. The German National Academy of Sciences Leopoldina will support and accompany the readjustment and design of measures within the coming weeks in close exchange with the international scientific community.**

The pandemic of the respiratory disease COVID-19, caused by the novel SARS-CoV-2 coronavirus, is progressing at a very dynamic rate worldwide<sup>1</sup>. Much is already known about this viral disease and its expected further spread. A key characteristic is that this virus is highly contagious, which is shown by the exponential growth of infection rates in affected countries. Moreover, there is uncertainty about the effectiveness of short-term political measures and compliance by individual citizens. Specific therapeutic agents and vaccines are not available yet; however, substantial efforts are being invested into their development<sup>2</sup>. The still very limited testing and laboratory capacities must be enhanced rapidly, which is possible in a country like Germany, with the appropriate technical capacities and clear political guidelines. Testing capacities could be co-ordinated optimally through a central data platform.

Efforts must focus on protecting people with a higher risk of developing serious forms of the COVID-19 disease, as they are dependent on a functioning healthcare system. The aim must therefore be to prevent – or at least mitigate – in the best possible way a massive capacity overload of the German healthcare system. Furthermore, necessary intensive medical care must be guaranteed. The highest priority must be given to maintaining the capacity for acute medical treatment in all occurring cases, while at the same time ensuring appropriate care for all other patients.

In order to optimise clinical care, coordinated clinical studies are required, which must be planned now so that promising active substances can be tested quickly. Since no therapeutic agents are available to date, short- and medium-term measures must be implemented to protect particularly vulnerable population groups and to ensure public life can continue until SARS-CoV-2 vaccines and drugs become widely available. For the time being, it is assumed that at least 4 to 6 months<sup>3</sup> will be needed for the development of drugs and at least 9 to 12 months for vaccines. At the same time, it should be taken into consideration that the extensive shutdown of public life cannot be sustained over such a long period because of the expected, potentially serious, social and economic consequences and possible negative physical and psychological effects on health.

This highly dynamic and unprecedented situation causes uncertainty and requires unconventional solutions, whose impact and unintentional side effects cannot be fully anticipated. Hence, a scientific and

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<sup>1</sup> Cases registered worldwide by the Johns Hopkins University survey can be found at <https://bit.ly/2U9njdU>.

<sup>2</sup> Numerous clinical studies have already started worldwide, including in Germany.

<sup>3</sup> If the use of existing drugs for other indications (already approved or about to be approved) proves to be promising in the clinical trials currently being carried out, especially in China.

coordinated approach is continuously required. As the knowledge base is changing constantly, options for interventions must be continuously adapted in light of new evidence.

From a scientific point of view, a Germany-wide temporary shutdown (of approx. 3 weeks) with consistent physical distancing seems advisable at this time. Necessary and health-preserving activities must remain possible. All efforts in the next weeks and months should be directed towards making pharmaceutical interventions and protective measures available for the public, and towards assuring testing capacities for cases suspected of infection and for those persons entering the country. During the shutdown period, preparations must be made for the controlled and selective restart of public and economic life.

Independent of the choices of comprehensive measures, the German National Academy of Sciences Leopoldina recommends the following health policies for the coming months:

### **1. Protection of particularly vulnerable and systemically relevant population groups**

- Safeguard healthcare services for people dependent on ambulatory or stationary care (access to medication despite isolation, preventing congestion in healthcare etc.);
- Maintain the functioning of ambulatory and stationary care facilities (long-term care services, dialysis centres, patient transport etc.): ensure the availability of system-critical materials, possibly creating substantial incentives for their production in other industrial sectors and for their import;
- Improve self-protection: raise awareness of the individual need for protection, provide information about self-protection measures and disease trajectory;
- Provide telephone hotlines and digital advice and support services, promote social and physical activities with low infection risk in order to prevent negative effects of physical distancing and quarantine.

### **2. Diagnostics**

- Develop a central data platform for targeted and coordinated testing;
- Use PCR diagnostics in a targeted manner, develop virus quick tests and serological tests for individual diagnostics;
- Collect epidemiological data extensively and use it as a basis for efficient, precise and widely accepted measures;
- Extend testing procedures in order to avoid unnecessary, repetitive quarantine measures in the case of non-infectious or immune individuals, especially systemically relevant persons;
- Collect representative samples that allow reliable conclusions about the mortality rate, specificity and sensitivity of testing procedures and improve the accuracy of central model parameters.

### **3. Development of drugs and vaccines**

- Intensify research to collect molecular data on the respective virus type, disease pattern and adapted therapy;
- Accelerate the development of vaccines and drugs, substantially support clinical trials to examine their effectiveness and compatibility while ensuring ethical standards; cooperate closely with the authorities;
- Speed-up pharmaceutical approval processes with accompanying quality assurance monitoring of effectiveness and negative side effects.

### **4. Information and education**

- Start broad and age group-centred information campaigns in the media (including direct mail) about the disease and its propagation path, warnings for physical distancing and measures to interrupt the chain of infection;

- Use expertise from behavioural science to facilitate the acceptance and implementation of measures to mitigate the expected negative psychological-physical consequences of a temporary shutdown and of physical distancing;
- On a personal level, encourage openness about infection or illness, and avoid stigmatisation.

The coronavirus pandemic has fundamentally changed the world as we know it in a very short time. If society, economy, politics and science now pull together and are open for unconventional solutions, we will meet this challenge as well. The German National Academy of Sciences Leopoldina will support this process actively.

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