

# The investment needed in our healthcare systems

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## Intro

There is no question we could have been better prepared for the covid-19 pandemic, and avoided much of the cost. First and foremost, the human cost has been incalculable as healthcare systems have been found wanting. The associated economic cost has also been heart-wrenching as unemployment has skyrocketed around the world. The financial cost is forcing leaders to make impossible trade-offs, particularly in developing countries. In developed countries, the numbers are startling. Stimulus programmes in the US alone have blown past \$2tn. In Europe, many countries with already-shakey finances will run record deficits this year.

To be better prepared for the next pandemic, additional health funding is key. Indeed, the World Bank and WHO have estimated that countries need to spend just \$1-2 per person per year to reach an acceptable level of pandemic preparedness, and that a yearly investment of \$1.9–3.4bn is required..

But it is the allocation of that funding that will determine how well a country is prepared. In this piece, we look at the level of funding that needs to be allocated to various areas of the healthcare system and its value chain. We also provide a framework for how countries should allocate resources to build a more robust healthcare system that can better cope with future disease crises.

## Deutsche Bank analysis of required investments in pandemic preparedness

Factor	Investment per annum for G10	Investment per capita/ annum	Basis
Diagnostics R&D	€ 300m	€ 0.3	Equal to the R&D budget for a mid size diagnostics company for each of the developed economies
Diagnostic testing capacity	€ 7,722m	€ 9.0	Analysis of industry capex. Annual investment required to maintain specific capacity for one test per person for pandemic purposes
Pharma active ingredient supply chain	€ 5,000m	€ 5.8	Analysis of industry capex. Assumes reliance on India & China is reduced to 20 per cent of global API supply from 60 per cent
Increased R&D investment in infectious disease	€ 1,000m	€ 1.2	Equivalent to R&D spend of a mid size pharmaceutical company

Source: Deutsche Bank

## Where American and European healthcare systems failed

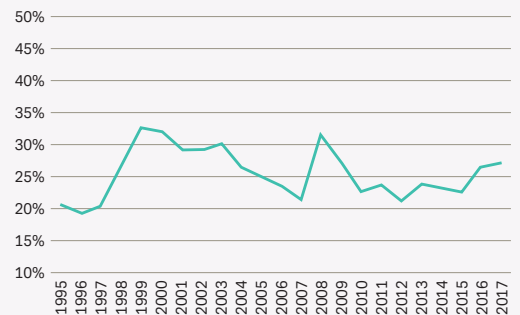
The failure of many countries to effectively deal covid-19 has stemmed from a combination of inadequate health systems and the public awareness of the risks. Indeed, countries that have dealt with several pandemics over recent years have been more successful in dealing with covid-19. As we prepare for the next wave or a future pandemic, we need to be critical to our failures in several areas, including testing, treatments, personal protective equipment stocks, staffing, and protocols.

## The drive for efficiency

The global trend for the last couple decades has been for countries to reduce healthcare costs through more efficient care. Typically, that involves taking patients out of expensive settings such as hospitals and caring for them in lower acuity settings. Technological innovations have aided this transformation as surgeries that were once done in a hospital setting are now done in an outpatient setting, and surgeries once done in outpatient settings are now done in physician offices.

The unintended side effect of this policy has been for hospitals to reallocate capital to less capex intensive services like outpatient. In the US in particular, the effect has been compounded by an increasing gap in the level of government payments versus costs. Correspondingly, the proportion of US hospitals with negative margins is increasing, up from around 20 per cent to 27 per cent since 1995 in a normal economic environment, with further spikes during recessions.

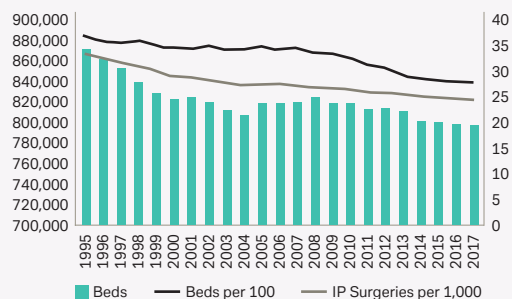
## % of Hospitals with Negative Total Margins



Source: MedPAC

The result is that hospitals have been adapting and expanding into higher acuity surgical procedures to offset lower reimbursement. This has resulted in hospitals that are more tied to surgical procedures versus medical procedures, because that is where the economic incentives have moved. Consequently, beds per capita and inpatient surgeries have both declined by about a quarter over the last two decades, while there has been underinvestment in critical infrastructure to address emergencies such as covid-19.

### US Hospital Capacity



Source: MedPac

### A framework for future pandemics

While no amount of preparation can completely 'solve' a future pandemic, the effects can be greatly minimised by targeted investment. The following is a framework for countries as they consider future healthcare investment allocation. It comprises six components: Testing, hospitals, PPE, staffing, protocols, and equipment and drug development.

### Testing

Some of the countries that have best dealt with covid-19 are those that had the best testing systems in place. The bulk of centralised laboratory testing occurs on high throughput machines, although there are lower volume laboratory developed tests (LDTs). The first tests built to detect covid-19 were the LDTs, which have a hard time scaling. The second was PCRs, which are dependent on manufacturers sending kits to the labs. The force multiplier is antibody tests, which are far simpler to run on equipment that is more widespread and can provide test results in minutes versus hours or days as with PCR tests. The lack of antibody tests available has been a serious bottleneck.

Planning for the next pandemic involves accepting that PCR tests simply cannot scale during pandemics. Rather, point-of-care testing is needed. This gives a patient and healthcare workers a

15-minute read. Ideally, a patient can then validate positive reads with centralised PCR tests.

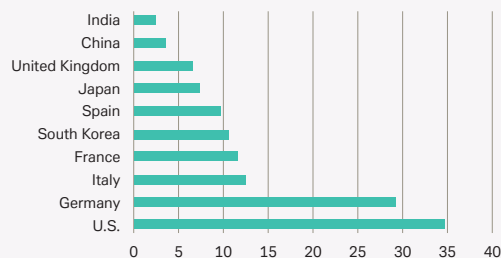
Point-of-care, rapid turnaround tests may be platform-based or self-administered like an at-home pregnancy test. Home tests also have the advantage of minimising exposure to clinicians and are widely deployable. Capacity for both exists globally, however, most of the current commercial clinical tests for covid-19 come from China-based manufacturers with mixed results reported in western countries.

### Hospitals

The focus on efficiency within the current global reimbursement models have pushed hospitals to reduce staffing and capital investments to be as lean as possible. If countries are going to prepare for another pandemic, there must be an influx of capital to buy the necessary equipment and then additional money to ensure there are enough healthcare workers to deal with an influx of patients.

*Pandemic surge beds.* It is relatively simple to equip every bed to handle covid-19 patients. While the focus today is on the bottleneck of ICUs, governments should be thinking of more realistic solutions. As we move through the crisis it will become clear what proportion of all beds must be able to handle these patients. For now we will simply assume they all should. Upgrading these beds requires investments in key areas of capital equipment: (1) Mechanical ventilators; (2) ICU advanced monitoring systems; (3) Continuous replacement therapy (CRRT); (4) Infusion pumps; (5) Negative pressure environment; (6) Additional consumables. For US hospitals, renovating these beds to handle the next pandemic will cost between \$200,000 and \$250,000 per bed. Assuming all non-ICU beds are upgraded to pandemic surge beds, the cost to the US healthcare system is \$175bn – relatively cheap relative to the overall economic cost of covid-19.

### Critical Care Beds per 100,000 inhabitants



Source: Society of Critical Care Medicine

*Additional hospital beds.* There are several ways to prepare for surges from pandemics. The easiest is to have excess capacity of hospital beds and to add surge capabilities on top. While the cost to build a hospital bed is different in each country, to simplify we assume about \$1m per bed which is the ballpark price tag for a bed in the US. As the pandemic is still with us, it is unclear exactly what is the gold standard for hospital beds per country. For now we assume that the US bed capacity is the right one, but as the pandemic evolves we will have better information.

Governments also need to recognise that the vast amount of hospital revenues (depending on the country) come from deferrable surgeries. When hospitals cancel these procedures and wait for covid-19 patients, the government must step in to replace the lost cash flows. From a process perspective, the US government has already passed a \$100bn bailout to hospitals.

After hospital beds, there are a number of methods to prepare for additional surge capacity which require minimal economic investments, but rather require preparation and legal authorisation. For example, operating rooms at Ambulatory Surgical Centers (of which there are 17,000 in the US) can be converted into surge capacity with almost no effort. Surge capacity can also be organised with a combination of temporary military hospital units and other resources such as hospital ships. What is really needed is predetermined coordination between to handle the hot zones.

### Personal protective equipment

Prior to covid-19, hospitals had stockpiled PPE based on standard utilisation behavior, which provided PPE to clinical staff involved in surgeries or those working with infectious diseases. PPE stockpiles that were supposed to last months now last just weeks, as most workers at a hospital need to be wearing PPE to protect themselves.

PPE is a relatively cheap investment as it helps prevent clinical staff becoming sick who are then unable to care for patients. The easiest fix for governments is to invest in large stockpiles to prepare for the next pandemic. If 10m patients are hospitalised for an average of 14 days, the cost to the US would be only \$19bn.

### Staffing

While national stockpiles of PPE will reduce the infection rates of healthcare workers, excess capacity also needs to be built into the system.

As there are many different methods of dealing with hot zones, and staffing within those areas, different countries may take different paths on staffing. What is certain, though, is that because frontline healthcare workers are severely impacted by covid-19, the system must be built where staff can handle the large percentage of workers that become sick.

There are two main ways to solve staffing issues. The first is the easiest fix, namely, to cross-train clinicians from other specialties into respiratory, and intentionally create excess staffing capacity in the system. The second is to create excess capacity in the system. This is less efficient and increases annual operating costs and so must be supported by governments.

### Protocols

Protocols are the fastest, cheapest and most effective process to prepare for the next pandemic. In general, we place protocol development into two main buckets: health systems, and individual responsibility.

*Health systems.* Depending on the country, individual hospitals and health systems often compete against each other for patients, doctors and referral sources. This can lead to a situation where there is no process in place for hospitals to share information on capacity, staffing and best practices. What is needed are additional layers of government control and systems to share information on a real-time basis. This includes sharing data with ambulance drivers, fireman, and all physicians in the area, to direct patients to the proper hospital.

*Individual responsibility.* It is important the lessons of this pandemic are not forgotten. Now they have experience, Americans and Europeans will likely be more involved in preparing their homes for the next pandemic. This includes stockpiling individual PPE and long-term storage food. The next time the government calls for a lockdown, citizens should be more aware of how to act and protect themselves.

### Insourcing of essential equipment / drugs

It seems obvious that uninterrupted drug supply is critical. It is not wonder that countries with an established diagnostics industry have been better placed to implement large scale testing since the covid-19 pandemic began.

Yet economies need to bolster infectious disease research and development. That is because

poor historical returns on investment in this area have left the industry without the incentive to invest in this research. This is partly a question of technological knowledge which would simply require governments to bolster existing investment in Life Sciences R&D. The economic cost of this is likely to be modest.

The global lack of testing capacity has been exacerbated by shortages of raw materials including swabs, laboratory reagents, specialty chemicals and plastic components. Going forward, countries must maintain surge capacity for these consumables and for assay production.

To estimate the cost, take the commercially marketed diagnostic assays are priced at around €90 per test in developed markets, with cost of goods in the 30 to 50 per cent range. Industry capital expenditure levels are also in the range of ten per cent of sales. This suggests that investments to maintain manufacturing capacity for pandemic preparedness for the G10 economies could be more than adequately covered with an investment of €8bn. That allows for surge capacity testing for every head of population (equal to €9 per capita per annum). This cost could largely be offset by efforts to incentivise regional diagnostics industry investment with mandated surge capacity requirements for companies receiving government subsidies.

#### Pharmaceutical supply chains are dependent on Chinese and Indian manufacturers

In recent years, Western markets have become increasingly dependent on Indian and Chinese manufacturers for production of active pharmaceutical ingredients (APIs) and generic drugs. This has led to concerns that covid-19 could lead to global shortages of generic medicines.

The reliance on Asian manufacturers has been a concern for regulators for some time. In August 2019, the FDA estimated that only 28 per cent of the manufacturing facilities making APIs to supply the US market were domestically located.

Reasons for this include the need for a large factory and low-cost labour. Existing firms are also embedded in a network of raw materials and intermediary suppliers and face fewer environmental regulations. Because these issues are hurdles for Western countries, governments must step in to incentive change.

The global API manufacturing market is currently worth €120bn with annual growth of six per cent. The industry is highly fragmented which makes estimates challenging, however, the European Medicines and Healthcare products agency suggests that India and China currently supply 60 per cent of the volume of active pharmaceutical ingredients globally.

In order to estimate the cost of redressing the global imbalance in manufacturing, we refer to the current cost structure of one of the largest API manufacturers, Sanofi. The company's API business is expected to generate revenues of €1bn by 2022 supported by annual capex of just under €100m (or ten per cent of sales), according to DB estimates. As a result, about €12bn is needed per annum to sustain this global industry. Thus, reducing the reliance on India and China for API manufacture from 60 per cent currently to 20 per cent, will cost just €5bn each year. For G10 economies, this equates to just €6 per person each year. The incremental cost of incentivising multinational pharma companies to source locally would likely be a magnitude lower than this.

#### Research and development in infectious disease needs to be strengthened

As globalisation has increased the risk of pandemics, research and development must be bolstered. Unfortunately, the incentive structure currently undermines investment in infectious disease. That is despite the fact that an additional investment of just \$1bn per year is needed for research and development into pandemic and epidemic disease, according to the Commission on a Global Health Risk Framework. This is equivalent to the R&D budget of a medium-sized pharmaceutical company.

All the factors in the framework we have laid out have a financial costs. But that cost is far below not only the economic cost of dealing with the current pandemic, but also, and more importantly, far below the cost of the human tragedy we have seen unfold this year. If governments take heed of the lessons of covid-19, the silver lining to the disaster may be that the world is better prepared for the next one.