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Managing healthcare: the need for, and the difficulty of, a strategic approach

Abstract

The World Health Organization defines Health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. This discrete, binary, demanding formulation (to be, or not to be, in good health) leaves way to a very detailed, universally recognized segmentation of diseases, ICD-11, listing about 55'000 different pathological situations. Five priorities are listed by the institution but pertain to transverse issues.

Economists and policy-makers, for their part, look at health almost exclusively as an expenditure, whether collectively or privately funded. These expenditures are comprised of an extremely diverse basket of goods and services, the profitability of which is extremely heterogeneous, and which are only rarely mentioned as contributing positively to GDP formation. Few recognized KPIs exist to measure and compare the performance of various healthcare systems.

Industry players, whether care providers or suppliers of healthcare goods, receive little guidance from buyers and payers as to the possible or desirable type of services or goods that should be made available to serve the public in the future, except for a generalized, and mostly blind, request for overall cost-cutting. Hence, with a few exceptions, no consensual planning exists to orientate research, development and capacity-building investment. Hence innovation in the field is still mostly science and technology driven, a favorable feature to provide disruptive remedies to some major health issues, but which allows for no reasonable marketplace to reconcile demand with supply and rationalize economic flows.

The present paper calls for the emergence of a strategic body which would provide the public with a rationale analysis of health needs, sort out priorities in lien with the public's preferences, and provide guidance to industry players as to the expectations of healthcare systems, so that investment in R&D and in manufacturing could be progressively tailored to the expectations of the general population in a way that is financially sustainable for society.

1. Background

The World Health Organization (WHO) defines Health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'[1]. This comprehensive, and demanding, definition has not been amended since 1948. This discrete, binary formulation (to be, or not to be, in good health) leaves way to a very detailed, universally recognized segmentation of diseases, ICD 10[2], to be updated by the 11th version[3] as of Jan 1, 2022, listing about 55'000 different pathological situations. WHO on its website communicates about 177 different 'topics', ranging from the very general, e.g. 'cancer', to the very focused, e.g. 'Buruli ulcer' or 'Crimean-Congo hemorrhagic fever', with no rating of relative importance. Five priorities are listed by the institution but pertain to transverse issues[4].

Economists and policy-makers, for their part, look at health almost exclusively as an expenditure, whether collectively or privately funded. These expenditures are comprised of an extremely heterogeneous basket of goods and services, and are only rarely mentioned as contributing positively to GDP formation[5] [6], contrary to the vast majority of other value-creating human activities. Few recognized KPIs exist to measure and compare the performance of various healthcare systems. In purely financial terms, the difference in profitability between various contributors in the chain is abyssal.

Industry players, whether care providers or suppliers of healthcare goods, receive little guidance from buyers and payers as to the possible or desirable type of services or goods that should be made available to serve the public in the future, except for a generalized, and mostly blind, request for overall cost-cutting. Hence, with a few exceptions such as the US cancer plan or the Bill & Melinda Gates Foundation's plea for vaccination, no planning exists to orientate research, development and capacity-building investment. Hence innovation in the field is still mostly science and technology driven, a favorable feature to provide disruptive remedies to some major health issues, but which allows for no reasonable marketplace to reconcile demand with supply and rationalize economic flows.

The present paper calls for the emergence of a strategic body which would provide the public with a rationale analysis of health needs, sort out priorities in lien with the public's preferences, and provide guidance to industry players as to the expectations of healthcare systems, so that investment in R&D and in manufacturing could be progressively tailored to the expectations of the general population in a way that is financially sustainable for society.

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[1] Preamble to the Constitution of WHO as adopted by the International Health Conference, New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of WHO, no. 2, p. 100) and entered into force on 7 April 1948.

[2] International Classification of Diseases and Related Health Problems, 10th Revision, version 2019 ICD-10 Version:2019 (who.int) (accessed Nov 29, 2020)

[3] ICD-11 - Mortality and Morbidity Statistics (who.int) (accessed Nov 29, 2020)

[4] 'Health for all', 'Health emergencies', 'Women, children and adolescents', 'The health impact of climate and environmental change', 'A transformed WHO'

[5] Afsa, C. et al. (2008), "Survey of existing approaches to measuring socio-economic progress", background paper for the first meeting of the CMEPSP, Paris, April 2008..

[6] Stiglitz J. et al. The measurement of economic performance and social progress revisited: Reflections and Overview. 2009. ffhal-01069384

2. Management of healthcare: where do we start from?

Healthcare provision and health-product supply are currently scattered amongst innumerable players. Leading players in healthcare provision, whether expressed in number of beds, number of stays, or monetary units, are in majority public (governmental) systems such as the National Health System (NHS) in the UK, or its equivalents in other countries. By contrast the world-leader in for-profit health provision, HCA Healthcare[7], operates less than 200 hospitals among the 5500 facilities active in the US. In 2017, the top 10 US provider systems were responsible for only 18 % of all inpatient days in the country, with an additional 3,000+ operators accounting for the remaining 152 million inpatient days[8].

In the pharmaceutical industry, the current leader in ever-changing League tables, Pfizer[9], owns about 5% of the total prescription drug market[10]. In the medical technology industry, the top ten companies own only 40% global market share.

This comes in strong contrast to other similarly technology-intensive industries, such as the aerospace industry, or information and communication technology (ITC) industries, which over the years have become highly concentrated with two or three world leaders commanding most of the market. The same concentration is observed in more recent data-based activities, with the GAFAMs controlling quasi-monopolies in their respective fields, according to the now classical saying "the winner takes all".

On the buy side, the split of the customer function between the patient (consumer), the prescriber (decision maker) and the payer/insurer, makes it difficult to rationalize buying patterns as the three parties often display conflicting interests in front of care-suppliers. As a consequence, inefficiencies abound:

- Most patients get no benefit from the drugs they take – the number-needed-to-treat (NNT) is, for most drugs, extremely high[11],[12] (Note: which does not mean patients should stop taking their prescription medicines)

- Iatrogenesis exerts a considerable toll [13] . For illustrations, WHO estimates that the occurrence of adverse events due to unsafe care is likely one of the 10 leading causes of death and disability in the world, that in high-income countries, one in every 10 patients is harmed while receiving hospital care, or that in OECD countries, 15% of total hospital activity and expenditure is a direct result of adverse events

- Productivity is low. As an illustration, in the US between 2001 and 2016, healthcare delivery contributed 9 % of the growth in the economy in constant $ terms—but 29 % of new jobs[14]. McKinsey estimates that over this period, multifactor productivity in healthcare decreased

[7] Fortune 500 2020 #65

[8] Singhal S. et al. McKinsey on Healthcare: Best of 2019. ©McKinsey 2020. P. 11

[9] https://scrip.pharmaintelligence.informa.com/-/media/editorial/scrip-100/2018/league-table/s100- 2018_01scrip-100_league-table_online.pdf?la=en&hash=DEEA854FEE9CB726831AB413DA04645C353C9223 (Accessed November 23,2020)

[10] https://www.statista.com/statistics/309425/prescription-drugs-market-shares-by-top-companies-globally/#:~:text=Pfizer%20held%20five%20percent%20of,the%20global%20market%20until%202026. (Accessed Nov 23, 2020)

[11] https://sciencebasedmedicine.org/most-patients-get-no-benefit-from-most-drugs/ (Accessed Nov 23, 2020)

[12] https://www.thennt.com/thennt-explained/ (Accessed Nov 23,2020)

[13] https://www.who.int/news-room/fact-sheets/detail/patient-safety (accessed Nov 29, 2020)

[14] Singhal S. et al. McKinsey on Healthcare: Best of 2019. © McKinsey, January 2020. P. 7

by 420 basepoints per annum and had a negative contribution (13%) to the growth of the sector, which was mostly driven by job creations.

To tackle these inefficiencies, the market regulation is driven mostly by payers and/or insurers, mostly at a macro-level. While pricing and reimbursement regulations vary widely from one market to another in terms of bureaucratic refinement, the general trend leads to overall cost-cutting in old developed countries, with belated reallocation of resources[15] between diseases and types of care, taking place at a much slower pace than the pace of changes in the epidemiology or in health technology. The pattern may be different in emerging countries[16], such as Eastern Africa (e.g. Rwanda) or China, where the

Gross Domestic Product (GDP) growth, combined with a strong political will, has allowed a proactive switch from traditional medicine, i.e. almost from scratch, towards a 'rationale' health system.

Finally, the health industry is left without much clue, and with even less economic incentive, as to which domains should be prioritized to satisfy the future expectations of healthcare systems. The uncertainty as to what the social demand will be a few years down the road, combined with the considerable time and risk it takes to move a discovery from the bench to the market, pose a formidable challenge to those in charge of planning investments.

The next sections aim to identify more in detail the hurdles that should be overcome to allow for better management of healthcare.

3. Which metrics for health?

As was hinted in the introduction, enjoying 'good health' according to the WHO definition is almost unachievable. The major issue for decision makers at all levels is hence to define the optimal health status that can be achievable with available resources. This in turn can only rest on the existence of a consensual continuous metric allowing to measure and compare health status for individuals and for populations, keeping in mind that the health status is not an additive value. Another issue that will be discussed in further sections is the considerable hysteresis in resource allocation, which reduces the ability of decision makers to allocate resources in an optimized way at a micro economical level in accordance with the recommendations of health intervention assessment.

What should be reminded is that there are about 55'000 different diseases according to the ICD (International Classification of Diseases)[17]. Within each of these diseases, a gradation of severity is most often likely to occur. The evolution of any given pathology over time, even at the same grade of severity, is often different from one individual to the other. For a given disease, the pattern of symptoms may also vary from one patient to the other, leading to a perception of disability which is very subjective. Actually, only mortality is a readily quantifiable data – and even so, the age at which death happens is not indifferent and there is no equivalence between a death at birth, during childhood or adolescence, young adulthood, or old age.

Epidemiologists, whose task is to reckon the number of patients in various boxes of similar disease and severity, clinical investigators, whose task is to assess and quantify the efficacy and safety of health interventions, especially innovative ones, and health economists, whose task is to assess in a

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[15] E.g. see US https://www.cms.gov/files/zip/nhe-tables.zip Table 02
[16] Global spending on health: a world in transition. Geneva: World Health Organization; 2019 (WHO/HIS/HGF/HFWorkingPaper/19.4)
[17] International Classification of Diseases (ICD-11), WHO

comparative way the amount of resources needed for such interventions and to establish cost- efficiency comparisons between different interventions, are thus left with extremely heterogeneous data to deal with. In order to be able to compare the burden of diseases[18] on populations and on individuals, health economists have developed the concepts of aggregate indicators such as Disability Adjusted Lifeyears (DALYs) lost, and Quality Adjusted LifeYears (QALYs).

However, these indicators are potentially flawed because they are based on human preferences, assessed by samples of patients, and there is ample literature[19] pointing to the ethical, methodological and contextual limitations of such ratings.

4. **Which metrics for the value of interventions?**

The gold standard to demonstrate that a novel health intervention is safe and efficacious is the so- called RCT (Randomized Clinical Trial)[20], in which two samples of patient population, carefully selected to be standardized and absolutely identical to each other at entry, are exposed in a double-blinded way[21] to two (or more) different treatments (typically placebo vs. active, or active A vs. active B if a reference treatment is already available). Typically, major determinants of a RCT are the size and homogeneous definition of the study population, the designation of the primary endpoint considered as the marker for success, and the expected size of effect on this particular outcome.

While the choice of primary endpoints for a given, well studied disease is usually fairly consensual within the relevant clinicians' community, many debates arise down the road, especially as investigators are led, in many chronic, slowly evolving diseases, to rely on so-called surrogate endpoints[22], because it would not make sense to wait for a difference in clinically material endpoints (typically overall survival) which may take many years to emerge with statistical significance.

Health technology assessment agencies, which have to rate the utility of a novel intervention in order to guide government and insurance reimbursement and pricing decisions, are thus confronted to a major dilemma:

- On the one hand, they are amongst the staunchest defenders of the RCT concept, because they view this as the only statistically valid method of comparing interventions

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[18] GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020 Oct 17;396(10258):1204-1222. doi: 10.1016/S0140-6736(20)30925-9. Erratum in: Lancet. 2020 Nov 14;396(10262):1562. PMID: 33069326; PMCID: PMC7567026.

[19] Pettitt DA, Raza S, Naughton B, Roscoe A, Ramakrishnan A, et al. (2016) The Limitations of QALY: A Literature Review. J Stem Cell Res Ther 6: 334. doi:10.4172/2157-7633.1000334

[20] Kendall JM. Designing a research project: randomised controlled trials and their principles. Emerg Med J. 2003 Mar;20(2):164-8. doi: 10.1136/emj.20.2.164. PMID: 12642531; PMCID: PMC1726034.

[21] i.e. where neither the patient nor the clinician are aware of who gets which treatment. Amendments to this rule may be made in certain cases where the blinding may not be maintained for various reasons, subject to a number of additional methodological precautions.

[22] Clinical or biological markers which don't by themselves incur functional disability but are considered as good predictors of disease evolution

- On another hand, they express a number of reservations[2324] once they are presented with the outcomes of a study:

    o They – rightly – claim that the study population is not identical to the real-world target population and hence study outcomes may not be extrapolated to a use in the general population

    o They often challenge the clinical relevance of clinical endpoints chosen to demonstrate efficacy, and tend to devalue the 'size of effect' even when the analysis does carry statistical significance.

As a consequence, the very constraints that innovative investigators have to follow to expedite conclusive clinical trials and to secure a fast registration process, backfire once submitted to health technology assessment agencies.

Independently of these methodological considerations, any lay person looking at global market access procedures, however refined regulations may be to try to ensure some consistency in the assessment of novel interventions, will recognize that the process of clinical trials, while totally unavoidable and scientifically undisputable, does not provide any clue, nor intends to provide any, on the preferability of addressing disease A rather than disease B, if resources are restricted and do not allow to treat both.

This is why health economists in some countries resort to QALYs, in order to turn highly heterogeneous clinical endpoints into a universal metric which, in their view, would allow to compare the efficacy and the efficiency of health interventions across the board. However, as mentioned and referenced in section 3, the consistency of QALYs is subject to caution.

Finally, the number of clinical trials has to be taken into consideration. As of end-2019, more than 350,000 trials were on course in the world[25] (Figure 1), of which (Table 1) more than 280,000 are interventional i.e. aim to measure the effect of a given intervention, of which more than 150'000 pertain to drugs or biologics and 60,000 to medical technologies. This number has grown from hardly more than 2,000 studies back in 2000.

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[23] Ramagopalan SV, Simpson A, Sammon C. Can real-world data really replace randomised clinical trials? BMC Med. 2020 Jan 15;**18**(1):13. doi: 10.1186/s12916-019-1481-8. PMID: 31937304; PMCID: PMC6961357.

[24] Mielke D, Rohde V. Randomized controlled trials-a critical re-appraisal. Neurosurg Rev. 2020 Oct 6. doi: 10.1007/s10143-020-01401-4. Epub ahead of print. PMID: 33025186.

[25] https://clinicaltrials.gov/ct2/resources/trends (Accessed 2020/11/28) 46'000 as of 2019.
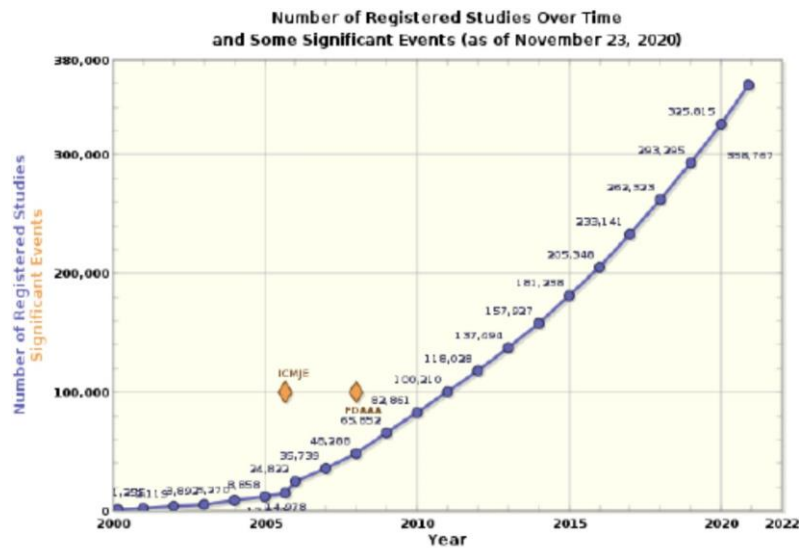
Figure 1: Number of registered studies

Study and Intervention Type (as of November 23, 2020)		Number of Registered Studies and Percentage of Total	Number of Studies With Posted Results and Percentage of Total***
Total		358,767	46,119
Interventional		280,551 (78%)	43,337 (94%)
Type of Intervention*	Drug or biologic	154,481	33,247
	Behavioral, other	92,233	8,462
	Surgical procedure	29,373	2,341
	Device**	36,410	5,987
Observational		76,663 (21%)	2,782 (6%)
Expanded Access		704	N/A

Table 1: Type of studies

Actually, just a proportion of all clinical studies end up with the publication of their outcomes, namely 46,000 as of 2019. However, this still generates a wealth of micro-information which is obviously essential to guide individual care but is in no way aimed at guiding an overall health strategy.

5. Which preference for governments?

The French President's recent stance on COVID-19, stating that France would fight the virus 'whatever the price', echoes the common wisdom in the French opinion that "*La santé n'a pas de prix*" which, rather than qualifying health as 'priceless', which could be ambiguous, would better be translated by 'health is invaluable'. This dogma is of course contradicted daily by public decisions which, in many

domains not limited to health management[26], have a bearing on citizens' health, have a cost and as such carry an underlying valuation of human life and disability.

In contradiction with the idealistic French view, all governments are bound to recognize, and try to control, the cost of health care, albeit at varying levels and with varying success. Relative growth of healthcare budgets is a universal feature[27], with global healthcare spending growing at a compounded pace of 3.9% p.a. from 2000 to 2017 while GDP grew 3.0% p.a. Overall the public contribution to health expenditures reaches 60%, ranging from only 24% in low-income countries up to 69% in high income countries, although the pace of growth was higher in low- and middle-low-income countries (Figure 2).

Focusing on OECD countries[28], 71% of health spending is from public sources, with one outlier country, Switzerland, where coverage by private insurance is mandatory. The weight of healthcare expenses within total government expenditure is in average 15%, ranging from 9% to 23%. In absolute terms, spending for health from all sources amounts to about $4000 per capita in average in OECD countries, varying from hardly more than $1,000 in Mexico to more than $10,000 in the US.

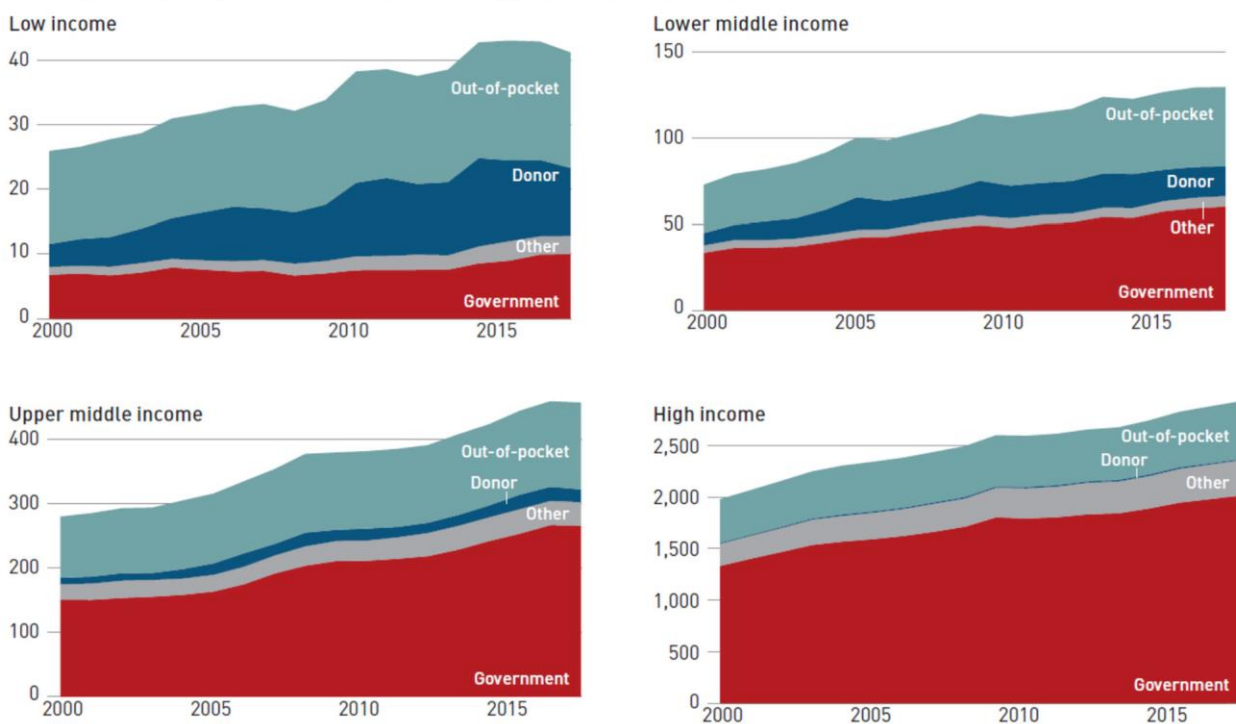Health spending per capita by source and income group, 2000–2017 (constant 2017 US$)

Figure 2: Global spending on healthcare

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[26] E.g. transportation, food taxation, agriculture policy, environment, energy policy etc.

[27] Global spending on health: a world in transition. Geneva: World Health Organization; 2019 (WHO/HIS/HGF/HFWorkingPaper/19.4)

[28] OECD (Feb 2020). Public funding of healthcare.

In contrast to ever-growing health expenditures, health outcomes, as measured on existing indicators[29], are stalling in many developed countries. The crudest indicator of all, life expectancy, has declined in 2015 in 19 countries. Detailed indicators vary widely from one country to the other, even within the relatively homogeneous group of OECD countries – a mirror of widely varying approaches to healthcare management[30].

Governments, and private health-insurance organizations, where relevant, have long struggled to curb the growth of health expenses, and in some cases to make them more efficient for a given amount of spending. To this purpose, potential levers are not many, and payers face a number of constraints to exert control. Foremost, considerable hysteresis exists in terms of human resources. It takes about 12 years to train a medical doctor, hence the doctors' demography of today is driven by Medical School recruitment of more than one decade ago. Inside this population, the break-down between respective disciplines is inherited from cumulative interns' choices years and decades ago. Hospitals carry huge tangible assets, which heavy technology tends to inflate, thus weighing on future amortizations. Closing beds or restructuring care provision is a social, political and financial conundrum. Actually, the only short-term variable on which payers have an immediate say are healthcare goods, whether drugs or disposable medical equipment.

To face this challenge, payers oscillate between various schemes[31] [32] resorting to global budgets, activity-based payments, or payments by result. In many cases, funds are still allocated within silos, thus limiting the ability to funnel savings from one branch to another. Prevention is often underprioritized because its expected benefits are harvested on the long term, not in line with political horizons.

As regards the procurement of healthcare goods, the British have long taken a position which restrains the coverage of drugs or medical technologies only to those which, based on QALYs gained according to clinical study outcomes, stay within a range of 20'000-30'000£/QALY gained. In consequence this leads to coverage denial for a number of expensive interventions aimed at small populations suffering from specific cancers or rare diseases, leading to vocal patient dissatisfaction within the ranks of related families[33] [34]. Although devoid of a similar rationale threshold, the French authorities temporarily or definitively disallow the reimbursement of many innovative drugs in the field of cancer (e.g. immunotherapy in dermatological cancers), or transplantation, or in some orphan diseases.

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[29] OECD (2019), Health at a Glance 2019: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/4dd50c09-en.

[30] OECD (2016) Expenditure by disease, age and gender.

[31] Mathauer I, Dale E, Jowett M, Kutzin J. Purchasing of health services for universal health coverage: How to make it more strategic? Policy Brief, Department of Health Systems Governance and Financing, Geneva: World Health Organization; 2019 (WHO/UHC/HGF/PolicyBrief/19.6).

[32] Barber S. et al. Price setting and regulation in health services. Geneva: World Health Organization; 2020 (Health Financing Policy Brief, No. 7). ISBN 978-92-4-000498-6

[33] Neumann PJ et al. Should A Drug's Value Depend On The Disease Or Population It Treats? Insights From ICER's Value Assessments Health Affairs blog Nov 6,2018 10.1377/hblog20181105.38350 https://www.healthaffairs.org/do/10.1377/hblog20181105.38350/full/ (Accessed November 29, 2020)

[34] Smith W. Limitations of QALYs in Cost-Effectiveness Reviews. ASGCT Pre-Meeting Workshop April 28, 2019
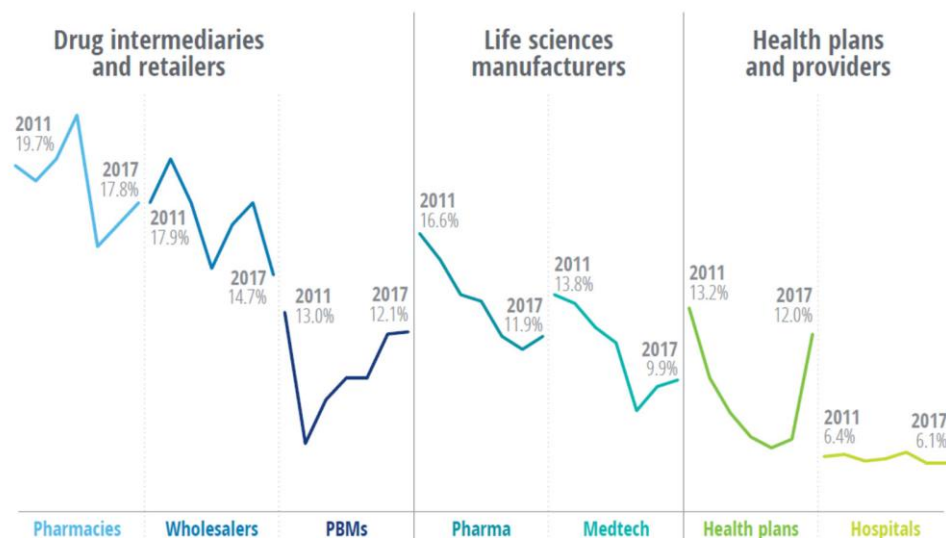
With 5'000 to 8'000 rare diseases identified[35] [36] [37] and high patient expectations within the related families, and with the growing segmentation of therapeutic areas such as oncology in the wake of precision medicine made possible by genetic research, governments will increasingly be faced with social demand for allowing access to costly, highly innovative interventions targeted at small or ultra-small patient populations. The sustainable business model for the dispensation of care to these groups remains still to be invented.

In summary, at a time where science-driven solutions flourish to address a growing number of rare conditions, and where at the same time global performance indicators tend to stall in most developed countries, governments and payers remain impeded, in their effort to streamline health provision, by the existence of silos and by the global hysteresis of health systems.

6. Which economics for providers and suppliers?

On the supply side, all players have seen their profitability decline over years, with an important gap between healthcare provision and healthcare product manufacturers – with some strong disparities within each category[38].

Figure 3: Return on capital in life sciences and health

[35] Griffon N, Schuers M, Dhombres F, Merabti T, Kerdelhué G, Rollin L, Darmoni SJ. Searching for rare diseases in PubMed: a blind comparison of Orphanet expert query and query based on terminological knowledge. BMC Med Inform Decis Mak. 2016 Aug 2;**16**:101. doi: 10.1186/s12911-016-0333-0. PMID: 27484923; PMCID: PMC4970261.

[36] Nguengang Wakap S. et al. Estimating cumulative point prevalence of rare diseases: analysis of the Orphanet database. European Journal of Human Genetics (2020) 28:165–173 https://doi.org/10.1038/s41431-019-0508-0

[37] Ferreira CR. The burden of rare diseases. Am J Med Genet A. 2019 Jun;179(6):885-892. doi: 10.1002/ajmg.a.61124. Epub 2019 Mar 18. PMID: 30883013.

[38] Reh G. 2020 global life sciences outlook. Creating new value, building blocks for the future ©Deloitte

In the provider universe, profitability is typically in the low one-figure percentage in most countries: according to Deloitte[39] 12 % of German hospitals are in financial distress, the average profit margin in 2017 for top hospitals in the Netherlands was 1.8 %, and a typical major US hospital with a current 3 % margin will show a negative margin of (3.5 %) in 2023. Similar estimations are provided by McKinsey[40] for stand-alone hospitals, with a ROIC in the 3-5 % range in the US, although some innovative care dispensation schemes are described as providing significantly higher returns, e.g. 10-15 % for ambulatory care. In other geographical settings, high profit niches can also prosper, such as dialysis clinics in France which yield an average 15 % return on revenues[41]. In general, a trend towards specialized care addressing targeted therapeutic areas (e.g. dermatology, gynecology, ophthalmology, oncology, etc.) can be observed, as a way for agile players to gain attractivity and improve productivity and profitability.

The fundamentals for widespread low profitability of health provision are to be found on both ends of P&L accounts. In terms of production factors, this activity remains mostly a workforce-intensive service industry, although more heavy medical equipment, such as robots or radiotherapy devices, is involved in care delivery. Flexibility in case of evolving demand is limited by the dedication of the staff and of the facilities, so that fixed costs are weighing heavily on the expense side. Delocalization can most often not be considered – until the progress of communications in the wake of 5G deployment allows the transfer of image interpretation and telesurgery to cheaper environments. On the revenue side, tariffs are set by payers who have a stronger bargaining power and manage to keep providers close to break-even.

Major trends in the provider industry are expected from increased technology adoption, including AI, with an impact on care organization, resource utilization, quality of care, patient and medical staff satisfaction. It remains to be seen if quality and productivity improvement will benefit providers or whether increased productivity will be confiscated by payers as efficiencies are rolled out.

By contrast, the health product industry (biopharma and medical technology) enjoys traditionally lofty profits. The traditional 'moral' motive for this lies in the intensity of R&D and in the high level of risk attached to drug discovery and development.

However, here again, the market tends to become segmented between different categories. Broad-portfolio generic companies, facing heavy competition and devoid of measurable differentiation, operate in a commodity universe: a recent BCG study[42] estimates that about half of their products have a negative ROI. Only agile generic companies focusing on being First-to-File or First-to-Market may temporarily enjoy significant returns.

In innovative biopharma and health technology, traditionally yielding high returns[43], R&D remains the driver of growth and the strategic backbone of business. However, the way in which it is conducted has changed dramatically over years.

[39] Allen S. 2020 global health care outlook. Laying a foundation for the future ©Deloitte
[40] Singhal S. et al. McKinsey on Healthcare: Best of 2019. ©McKinsey 2020. P. 78
[41] Cour des Comptes, rapport public 2020
[42] Bouwers C.A. et al. The Paths to Value for US Generics ©BCG 2020
[43] Ledley FD, McCoy SS, Vaughan G, Cleary EG. Profitability of Large Pharmaceutical Companies Compared With Other Large Public Companies. JAMA. 2020 Mar 3;**323**(9):834-843. doi: 10.1001/jama.2020.0442. PMID: 32125401; PMCID: PMC7054843.

In the biopharmaceutical industry, after massively outsourcing development in the 1990s[44] to large, specialized contractors (Clinical Research Organizations or CROs), manufacturers have gone one step further and rely now in majority on external sources to discover new biologicals or new chemical entities. These external sources are more or less mature companies, funded by Venture Capital, which have been formed to develop potential applications of disruptive discoveries stemming from the academic research – or sometimes from large companies which did not dare carry the risk[45].

This change in the conduct of new product targeting and development has led to the fact that in 2018 63% of all new drugs originated from small companies. This led to a sizable increase in new drug registration, which almost trebled compared to a decade ago, with an all-time record number of new drug registrations in 2018 (59) of which 33 (58 %) aimed at rare diseases. During that year 50 % of NDAs originated from small structures and less than 50 % stemmed from in-house R&D efforts[46]. A study by Deloitte[47] shows that the Internal Return Rate (IRR) of biopharma R&D in a sample of 12 top pharma companies has declined from 10.1 % to only 1.9 % from 2010 to 2018. In terms of risk, this means that a large share of the risk has been transferred on Venture Capitalists, but the counterpart is to be found in the extremely expensive price that acquirors have to pay to source-in new products once their risk profile has been reduced.

Finally, the business model for the medical technology industry is even more fragmented, as this definition includes products reaching from very unexpensive disposables such as surgical gloves, up to extremely costly imaging, surgical or radiotherapeutic equipment and all the sterile environment which may accompany these tools. Globally, Bain[48] qualifies the medical technology as extremely profitable, with margins in the range of 22%. Compared to the pharmaceutical industry, medical technology carries less risk of development failure, shorter development times, and enjoys an immediate proximity with users. Actually, most innovations stem from a need identified by a surgeon and turned into a product by an engineer, following highly entrepreneurial opportunistic models.

7. The need for a strategy

The sections above have listed the raison d'être and the financial drivers behind each of the players in the healthcare system. The question now arising is: where is the system heading, operations-wise and financially? And which invisible hand drives it? Let's summarize respective interests.

Governments and payers at large are confronted with the fantasy of Nature, which has provided, as per the ICD-11, for about 55,000 different pathological situations to curse mankind, without reckoning with the advent of unexpected pandemics from time-to-time. The burden of each of these diseases varies over time, geography and location. There is no universally accepted metric to gauge the said burden and provide comparisons or cost evaluations. Epidemiologists have developed good models and can reasonably calculate how the burden of disease will or may evolve over time (excluding pandemics) based on currently available interventions. But they have no legitimacy to suggest priorities if resources are not infinite – which they are not.

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[44] Steering Pharma R&D through Integrated Outsourcing. ©Accenture2013
[45] E.g. Actelion, initially a spin-off of Roche research projects.
[46] HBM New Drug Approval Report 2019
[47] Deloitte Center for Health Solutions. Ten Years On: Measuring the return from pharmaceutical innovation 2019. ©2020 Deloitte LLP
[48] US Medtech Profit Pool to Reach $72 billion by 2024 | Bain & Comhttps://www.bain.com/insights/us-medtech- profit-pool-to-reach-72-billion-by-2024-snap-chart/#:~:text=Medtech%20companies%20are%20among%20the,a%2038%25%20increase%20from%202019.p any (Accessed December 1, 2020)

To tackle these woes, governments and payers can allocate funds levied on the rest of the economy via diverse means, which come in competition with other public or private needs. Part of this money can relatively easily be reallocated (drugs and or medical disposable procurement), notwithstanding the long-term effect of such savings on employment and on future R&D investment, and the rest of expenses is pretty much fixed in amount (heavy equipment amortization and wages) and disciplinary repartition (duration of medical training and equipment specialization). On the (fast-growing) edges of the system, public deciders are left with the option to reimburse, or not, innovative therapies which emerge at an ever-faster pace from clinical research (with its 350,000+ trials under course), on which in the majority of cases they had no initiative as payers, but which meet some kind of social demand irrespective of the level of the burden.

Health providers, on their end, compete locally for market share, for skilled physician and skilled nurse recruitment, and in some places for trained caregiver recruitment. Their revenues are driven by volume (i.e. epidemiology) and payment schemes. As already underlined, their costs are pretty much fixed and their leverage on tariffs is fairly low, as their industry is not consolidated and faces powerful, often public monopolistic, payers. Investment in additional capacity may be subject to prior clearance from the health authorities. In other words, strategic drive is limited, highly dependent on governments and payers' decisions – which we have seen are not necessarily driven by an explicit strategy, and the only leeway to improve profitability resides in better care organization, potentially in delocalizing of some work-intensive tasks in the wake of AI and communication progress, and in opportunistically developing disciplinary focused offers in therapeutic areas where pricing pressure is lower or out-of-pocket expenses more common.

Finally, for manufacturers in the fields of innovative biopharma and medical technology, the current strategic guidance is based on the crossing of several sources of data:

- epidemiological data, to prospectively assess the respective burden of diseases in terms of number of patients, severity of disease, unmet needs, ease of demonstration of potential effect

- consumers' and/or payers' willingness-to-pay

- availability, and affordability (via a licensing or an M&A agreement) of potential drug targets in the burgeoning universe of biopharma R&D start-ups.

As this process is mostly based on a mix of academic serendipity and commercial greed, the resulting port-folio, on the promises of which the value of companies is assessed, has little reason to match the expectations of governments in terms of public health – should governments have such expectations.

Globally, at the end of this process, the system ends up with more proposed new interventions (drugs or devices or equipment), targeting ever smaller populations, for an ever higher individual price per patient – with manufacturers claiming that the cost and time to develop an orphan drug are not different by an order of magnitude of what is needed for a blockbuster targeting hundreds of millions of patients. If this reasoning is applied to 55'000 pathologies, or even just to 6000 rare diseases at several hundreds of millions of dollars revenues each, it is clear that the whole economy is not sustainable.

This is a reason why more and more voices call for a more rationale, data-based, socially acceptable strategy to be concerted[49] [50] [51] amongst healthcare stakeholders, including patients.

8. Conclusion

One central player in this whole construction has been little mentioned in this paper: the patient – current or future[52]. Spontaneously he of she feels that remedies should be proposed for every ill he or she suffers, or may suffer, from. Yet as an insured individual, or as a tax-payer, no patient is ready to contribute without limits to the ever-growing costs of the system. The arbitration between supply of goods and services, and solvent demand, usually performed even unconsciously by consumers, is here delegated to outside players, the prescriber, and the payer. At a micro-level, even though mechanisms exist to try and prioritize the reimbursement of care, many contradictory decisions persist when it comes to funding interventions. At the macro-level, no institution is vested with the role to define, and the power to enforce, a strategic distribution of limited resources to the innumerable health interventions that patients request individually.

The time has come to reinforce research and education in epidemiology and health economics. The fast improvement of data collection and management, using high performance communication and augmented intelligence gear, should allow for a more informed, consensus-seeking, definition of public preferences in terms of health-policy, which would serve as a basis for the allocation of public resources to all healthcare players.

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[49] The Lancet. Global health: time for radical change? Lancet. 2020 Oct 17;396(10258):1129. doi: 10.1016/S0140- 6736(20)32131-0. PMID: 33069323; PMCID: PMC7561297.

[50] GBD 2019 Viewpoint Collaborators. Five insights from the Global Burden of Disease Study 2019. Lancet. 2020 Oct 17;396(10258):1135-1159. doi: 10.1016/S0140-6736(20)31404-5. PMID: 33069324; PMCID: PMC7116361.

[51] Global top health industry issues: | Defining the healthcare of the future. ©PwC2018

[52] To paraphrase Jules Romain's Dr. Knock: "Every healthy person is a patient in ignorance"