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Perspective

A Hexagonal Aim as a Driver of Change for Health Care and Health Insurance Systems

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Policy Points:

- Improving health systems requires simultaneous pursuit of a patient centered approach aligned with the health professional: improving the experience of care, improving the health of populations, reducing per capita costs of care – Triple Aim - and improving the work life of the care providers – Quadruple Aim -.
- Reinforcing the recently defined Fifth Aim as equity through "health democracy" to represent the wants, needs and responsibility of the population in taking care of their health and their healthcare.
- Adding a Sixth Aim to take into account the increased health risks due to climate change.

Context: Improving health systems, such as the U.S. or French, requires simultaneous pursuit of a patient centered approach aligned with the health professional: improving the experience of care, improving the health of populations, reducing per capita costs of care – Triple Aim - and improving the work life of the care providers, including clinicians and staff – Quadruple

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Aim -. While these aims are already ambitious, they may be insufficient when considering the economic, social and environmental challenges to the health of our communities in the near and long term.

Methods: A conceptual framework to provide additional ethical guardrails for health systems.

Results: Recently, authors have articulated a Fifth Aim and we propose to add a Sixth Aim to the Quadruple Aim model. These additional aims are meant to account for our growing knowledge around the determinants of health and the challenging processes and structures of governance across a wide range of sectors in society including healthcare. We are strengthening the Fifth Aim defined as equity through "health democracy" to represent the wants, needs and responsibility of the population in taking care of their health and their healthcare. The Sixth Aim is to account for the increase in risk to population health due to climate change as well as the impact our health systems have on the environment.

Conclusions: As social tension and environmental changes seem to continue to impact the structure of our society this "Hexagonal Aim" taken together might provide additional ethical guiderails as we set our healthcare goals.

Keywords: Hexagonal Aim, health democracy, environment.

Countries around the world are challenged by increasing demands for health services, the rising costs of medical care associated with rapid advances in technology, the aging of populations that are increasingly medically complex, and increasing poor health outcomes exacerbated by climate change. Against these immense challenges, how do we deliver appropriately valued care for any population?

These challenges cannot be met without the integration of individual care within a population health approach and Triple Aim framework: better health for the population, better experiences of care and outcomes for individuals, and lower per capita costs.[1] Many health care systems around the world are using this as the foundation for their health systems' transformation. The Quadruple Aim, which focuses on improving the work life of health care providers, including clinicians and staff, addresses the reality that for patients to receive the best possible care, we need to reduce providers' burnout.[2–4]

A key challenge to improving health through health care delivery systems is that they are estimated to contribute only one-tenth of the improvements[5] we could make in life expectancy and well-being. McGinnis and colleagues noted that on a population level, approximately 30% of health is determined by genetic predisposition, 15% by social circumstances, 5% by environmental exposures, and 40% by behavioral patterns.[6] However, in some countries, many of the biggest future threats to population health, such as diabetes and obesity, are affected both by public health interventions and individuals' behavior choices.[7]

Cross-country comparisons of selected health outcomes, government investments, and public–private medical care enterprises reveal important patterns in how social services, public health, and medical care fit within a holistic health ecology. For example, across the World Health Organization (WHO) European region's expenditures on preventive care vary from an estimated less than 1% to over 8% of total health budgets. That means we invest less than 10% of our health care expenses to the problems that account for more than 60% of the health impact, which are amenable to be mitigated by these preventive strategies.[8] France's share of its budget toward preventive services falls in the middle of this reported range, whereas the United States invests less public health spending as compared with other countries of the Organization for Economic Cooperation and Development.[9] Furthermore, it is unlikely that expenditures on preventive strategies will change soon.

Given that the health needs of populations have increased because of aging, the growing prevalence of preventable chronic diseases,[10] and the intensive use of expensive technologies, the costs of health and medical care spending have increased in most countries. In the United States and France, between 1960 and 2010, health care costs have increased by more than 800%, which is nearly five times more than the growth in the gross domestic product (GDP), and 50 times more than wages have grown in the same period.[11]

As the costs of medical care continue to grow faster than wages, and as many countries see increases in unemployment and economic inequality, we anticipate that health outcomes will be affected.[12] For example, we are seeing, both in France and the United States, avoidance of care, which affects the health of the population and also growing frustration with the lack of affordability in the health care system.[13]

In France, there are more citizens who have given up or deferred treatment with a rapid rise even before the COVID-19 pandemic: 13% in 2010, 30% in 2018, and nearly 63% in 2019.[14] In the United States, approximately 40% of Americans reported skipping a recommended medical test or treatment because of access or economic factors, and 44% said they did not go to a doctor when they were sick or injured in the last year because of cost.[15] In addition, about 30% of respondents said they had to choose between paying for medical bills and necessities like food, heating, or housing over the past year. Many people experience increasing health care disparities by having challenges in multiple social determinants of health. Furthermore, as climate change has begun to increasingly affect the health and well-being of populations, policymakers are finding it difficult to address more environmentally influenced root causes of disease and impacts on health, thereby putting the health care system under further stress as it tries to care for people in ways that are ecologically and socially responsible.

Taken together, these trends call into question the effectiveness and sustainability of health systems in both the near and long term if governments and

policymakers continue to focus on the treatment of individual diseases rather than focusing on improving the determinants of health. Indeed, single-determinant approaches are unlikely to achieve expected improvements in the health and well-being of the individual and society.[16] Approaches that are more integrated may be required to address the root causes of disease.

The Quadruple Aim Alone Is No Longer Sufficient for Health Care Systems to Address Challenges on the Horizon

Although the objectives of the Triple and Quadruple Aims are widely accepted as a compass to optimize health care systems' performance,[17] the experience of fully integrated care, such as that practiced by Intermountain Health in the United States and other international systems, has taught us that there are ways of organizing care to meet the objectives of the Quadruple Aim by breaking down the artificial boundaries between hospitals and primary care, between generalists and specialists, and to organize integrated care that is genuinely coordinated around the patients and their needs.[18]

We believe we must break well beyond the boundary of current care models to address the challenges described earlier in this article. For example, we are starting to see this emerging in the Ile-de-France region of France through their Health in All Policies[19] agenda, where the local government is allocating an unprecedented percentage of their local budget to improving the environment where people live (better housing for the needy, more public nonpolluting transportation, more green space, etc.).[14] At the same time, a major strategic plan is shaping up to redesign the health care delivery system, focusing foremost on local community population-based wellness programs as opposed to the existing hospital-centrist care model.[14] Each time, these local governments ask their citizenry to participate in the design of these developments.

This codesign work also requires government agencies and health care systems (hospitals or regions) to work together with people and communities in a participatory and inclusive way (whole-of-society approach) as well as across different governmental sectors and levels (whole-of-government approach) to inform, develop, and implement successful policies and interventions that are sustainable and conducive to health, well-being, and equity as well as to prosperity, security, and environmental sustainability.[20]

The Triple and Quadruple Aims, although groundbreaking when they were first proposed in 2008 and 2014, respectively, would benefit from additional aims to achieve an improved health system given additional challenges including health inequity and climate change. Thus, we propose a modification of the Fifth and a new

Sixth Aim that we believe will better address the barriers to effective and compassionate health care.

Fifth Aim: Health Equity Broadened to Include Health Democracy to Ensure the Needs of the French Population Are Being Met

Health equity is defined by the WHO as the "absence of unfair, avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other dimensions of inequality."[21] Although some US health systems have historically focused on evidence-based care, they applied it broadly to the population with the disease at hand, rather than understanding who were most disadvantaged and may have needed different solutions for evidence-based care.

More recently, during the COVID-19 pandemic, as death rates were predicted based on zip codes and a disproportionate number of minorities were infected,[22] health care systems became more focused on addressing health inequities and health care disparities. In doing so, health care systems embraced new frameworks to ensure their quality-improvement initiatives were addressing health disparities.

For example, at Intermountain Health, widely known for improving outcomes through standardization of evidence-based care,[18] during COVID-19, disparities in outcomes based on race or limited English proficiency were discovered.[23] In France, the result of the COVID-19 pandemic also resulted in the poor having worse outcomes compared with the general population.[24] To contextualize the French health system and its response to the pandemic, we first need to explain what has happened in the past 20 years. In the early 2000s, France was facing challenges related to the HIV epidemic. As an outgrowth, France added to its French Public Health Code a law related to "Patients' Rights and the Quality of the Health System" that included the notion of "health democracy," defined as a system that recognizes the capacity of each individual to know about, decide, and act for his or her own health and for the "protection of the health," this latter being enshrined in the French Constitution.[14] Some of this was modeled after the Oregon Health Insurance Experiment.[25] Also encompassed in the concept of health democracy is the idea that individuals elect representatives to defend the consideration of their health needs and the determinants of health by the government and the administration, in particular the institutions that deliver care.[26] France is focusing on establishing health and care priorities based on shared societal values and moral preferences—such as equity—through health regions and territories.[26] This allows for a better understanding of the divergences among the choices made by citizens themselves, the state, health insurance, or local authorities. The idea is that regional health conferences will then allow public debates around

differences to arrive at compromises between representatives of these key stakeholders. These compromises will then need to be integrated and monitored within more equitable regional health programs that incorporate all the engaged stakeholders views.[26,27] Health democracy can thus promote the co-construction among representatives of civil society, the state, health insurance, and local authorities of a more equitable health policy by populations and territories with the objective of achieving the Triple Aim objectives. In essence, health care democracy pushes system leaders and elected officials to more quickly transform the health care and health insurance system to achieve the goals of the Triple Aim, thus reducing the risk of social movements and civil unrest on the part of citizens. The COVID-19 pandemic revealed that the practice of health democracy did not live up to its ideal state, including the increasing of deferred treatment experienced by the citizens and public authorities making top-down decisions, contrary to some of its principles.[13,14]

In order to close the gaps in outcomes for its most vulnerable, much like its counterparts in the United States and elsewhere in the world that are using the Fifth Aim of Health Equity as a guiding post, France needs to determine too what it wants to do with its 20-year journey in health democracy. The Fifth Aim is imperative to advance health equity[22] and health democracy in France to ensure that everyone can participate in codeciding on their health and co-constructing of the health system and health insurance system.[13,14,26,27] We believe the Fifth Aim of Health Equity is critical, as it calls out those populations that have been left behind as health care systems and health insurance work together to improve care for all. It is also clear that there is more work to do in the United States around improving health outcomes. There remain challenges for vulnerable populations who are insured by Medicaid,[28] and ongoing poor outcomes across racial and ethnic minority groups persist. Health insurers might consider having more favorable contracts for those health systems that focus on closing the gaps in health equity outcomes and can demonstrate improvements. To do this at the population level, an overall improvement may mask a vulnerable group not having the same level of improvement. Only by calling out that group, tracking their outcomes, understanding their particular reasons they have challenges, codesigning solutions with them, and actually implementing those solutions will health systems be able to see improvements occur. Health insurers would then realize the benefits for their insured vulnerable populations. In France, as health insurance is granted for their citizens, this approach focused on health equity and bolstered by health democracy, could also help close the disparities gap in health outcomes.

Social movements also arise from concerns about environmental changes and their potential impacts on the health of our citizenry and our future generations and health insurance systems. It therefore requires us to also take into account the determinant of environmental health and its present and future challenges. Therefore, the goals for better health and care at the community level should also include preserving and

improving the health of the environment to create the best health possible for the local, regional, and national populations.

A Sixth Aim for the Well-Being of Our Future Generations and Our Planet Is Sustainability of the Environment

The newest threat to health is climate change. The scientific community agrees that the evidence is clear and consistent: climate change is the result of human-caused greenhouse gas emissions.[29] Although climate change is clearly an important global challenge, why does it merit inclusion as a Sixth Aim for improving health care system performance? The answers are threefold: first, we are starting to see the health effects of climate change, particularly on the most vulnerable patients and communities. To provide the best care possible, it is critical to recognize, treat, and prevent poor health outcomes related to climate change. Second, the health care sector contributes significantly to climate change and other environmental problems that further exacerbate poor health outcomes. Health care professionals and key stakeholders must acknowledge their antithetic contributions to the global climate crisis and the ethical imperative they hold to reduce their health care carbon footprint and "first, do no harm."[30] Third, we are only seeing the initial effects of climate change, and the health care sector will need to prepare for forthcoming changes to be able to better care for patients affected by climate change.

Health disparities and the impact of the environment are often intermingled. African Americans, who are more likely to live in neighborhoods with few trees and more heat-trapping pavement,[31] have a 36% higher incidence of asthma and are three times more likely than their non-Hispanic White counterparts to live in poverty.[32] Native Americans and Alaska Natives already experience high levels of generational poverty and little access to drinking water and electricity.[31] The Hispanic/Latin population similarly has poorer health outcomes, has higher asthma and type 2 diabetes rates, and is more likely to live within proximity to oil and gas developments than non-Hispanic White communities.[33] Food scarcity and malnutrition are likely to worsen in developing nations as food and water prices increase globally.[34] Generally speaking, low-income communities of color that have been historically disenfranchised and discriminated against in health care, housing, education, and employment are likely to experience the worst of climate change because of health inequities, unhealthy living conditions, and low political and economic power and voice.[35]

Climate change impacts patients' health via a multitude of mechanisms including high temperatures, drought, flooding, and air pollution. High temperatures are directly related to incidences of heat-related illnesses such as heat exhaustion, heat syncope, and heat stroke.[36] High temperatures are also linked to behavioral disorders[37]

and suicide risk.[38] Rising temperatures also influence the world's experiences of drought. Droughts can cause many serious acute health conditions in populations including exacerbating asthma, respiratory allergies, and respiratory diseases.[39] Additionally, a general decrease in water availability leads to an increase in the spreading of diseases because of poor hygiene.[40]

Over the past 50 years, floods have remained the most common extreme weather event in the world,[41] and climate change has contributed to this. Numerous health diseases and problems during the weeks after include the following: injuries caused by debris, carbon monoxide poisoning, gastrointestinal illness, respiratory infections, and skin and tissue infections.[42] Other health care–related issues include individuals missing medications because of shortages, health services having extremely high demand and potential damage, and livelihood and mental health being threatened with property and possessions loss.[43] Residents with low socioeconomic status are differentially vulnerable to the serious effects of flooding because of housing location, infrastructure, and evacuation protocols.[36]

In part because of rising global temperatures and higher drought incidence, many areas in the world have experienced larger wildfires and longer seasons.[44] Wildfire smoke exposure poses a great risk for those downwind. Particulate matter and gases emitted from wildfires are associated with adverse respiratory health outcomes such as asthma, chronic obstructive pulmonary disease, and infections.[45] For children with asthma, many are triggered, resulting in worsening symptoms, more emergency department visits, and more hospitalizations because of worsening air pollution in part caused by particulate matter increases.[46] The Intergovernmental Panel on Climate Change's most recent report asserted that climate change has harmed the physical and mental health of humans and that "women, children, the elderly, Indigenous People, low-income households, and socially marginalized groups within cities, settlements, regions and countries are the most vulnerable."[29] Low area level socioeconomic status neighborhoods have higher emergency department visits following wildfires.[47]

Finally, the health care sector is a significant contributor to the climate crisis being responsible for approximately 4.5% of worldwide greenhouse gas emissions and a similar amount of toxic air pollutants.[48] In the United States, the numbers are more alarming. The US health care sector contributes 27% to the global health care carbon footprint[49] and 8.5% to the US greenhouse gas emissions,[50] including 479 million tons of carbon dioxide yearly.[51] Hospitals and health care facilities are energy-intensive buildings; operating rooms in particular utilize high amounts of energy, including their choice of anesthetic agents.[52] Greenhouse gases are emitted directly from health care facilities, such as on-site boilers.[50] Studies show approximately four-fifths of total health care greenhouse gas emissions come from the supply chain.[48,50] This includes the production, transport, and disposal of food, pharmaceuticals, and medical supplies and devices. The pharmaceutical industry's carbon emissions profile is 50% higher than the automotive sector.[53] Health systems are

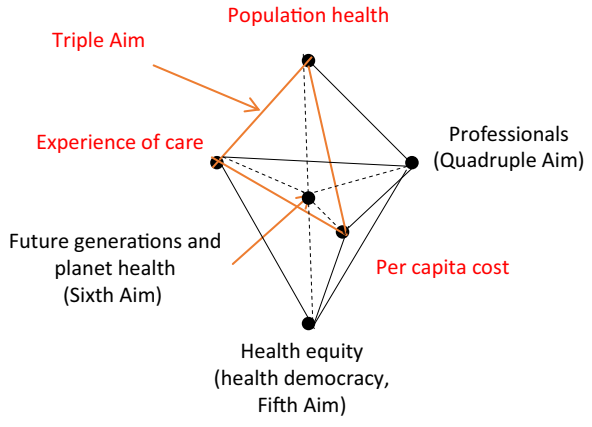
taking novel approaches to cut down their contributions to greenhouse gas emissions. Within Intermountain Health, a multidisciplinary team underwent a quality-improvement study to substitute the use of desflurane (which has a 14-year atmospheric lifetime) to sevoflurane (1.1-year atmospheric lifetime) for anesthetic gases to have patients safely put to sleep for surgeries in the operating rooms. This resulted in over 1,300 fewer bottles of desflurane use, with an estimated lowering of CO_2 by 1.2 million kg. As sevoflurane is also less expensive, there was a cost-saving aspect to the health system. Anesthesia societies have called for widescale adoption of this practice. Health insurance could also speed the adoption of health systems committing to the reduction of carbon emissions by providing discounts in their contracts, which benefits not just their insured patients but also the general population.[54] Achieving the goals of the Paris in France Agreement and the Race to Zero to cut greenhouse gas emissions in half by 2030 and entirely by 2050 could prevent some of the most catastrophic health effects, saving about a million lives by 2050 via air pollution reduction and an additional 250,000 deaths per year from malnutrition, malaria, diarrhea, and heat stress.[55]

Therefore, the Sixth Aim must be expanded to include preserving and improving the health of the environment to create the best health possible. Improving the health of the population must also take into consideration the health of the environment where this population lives and works. The time is now for all health care organizations to curb their impact on the environment and to implement proven strategies and continue to evaluate and test new improvement strategies through research.

A Hexagonal Model: a Vision to Help Foster Sustainable Health and Life

The challenges that are emerging on the horizon as described earlier may force our health care delivery and health insurance systems to not only accelerate their transformation to achieve the Quadruple Aim goals but to also go beyond toward a Fifth with the broadening to include health democracy and a Sixth Aim or a "Hexagonal Aim" (Figure 1). Although the first four aims have been what was needed at the time to better serve our population's health care needs and the professionals who take care of it, we believe the challenges facing our nations will be better addressed by pursuing the "Hexagonal Aim." This would allow for a new policy strategy to build the organizational structure that includes the voice of the citizenry and more determinants of health including the environment. This model might enable health care and insurance leaders and governments to forge innovative partnerships with their citizenry to democratically take care of the health care needs of the population while addressing social determinants of health.[56]

Figure 1. The Hexagonal Aim or Diamond of the Six Aims



Finally, a hexagonal model or "diamond of the six aims" would take into account the fact that population health is affected by a wide range of influences across society (Figure 1). Improving population health is not just the responsibility of health delivery systems, health professionals, health insurance providers, or patients. It requires better coordinated efforts across every sector of society, more effective use of public and private resources, and more integrated and coherent policies along with sustainable cooperative actions for the health and well-being of our citizens, their children, and their grandchildren.[19] The growing public health, inequality, economic, and environmental challenges across our countries' systems require cross-sector and international collaborations if sustainable development is to be achieved and health and well-being ensured for present and future generations.

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