

Updating the economics of the “War on Cancer”: False metaphor and faulty economics

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The “War on Cancer” is undoubtedly a poor metaphor. Cancer is a complex biological process, not a single target for bellicose action; science is not organized on war strategy principles; and the winners and losers in a military war reflect neither the experiences nor the choices of cancer patients and scientists. A more fundamental problem exists: the economics of the so-called “war” are faulty. The first section of this article discusses the false war metaphor and its faulty economics. The second describes a more dynamic economic context that draws on evolutionary and institutional perspectives.

Wars come and go and some unfortunately last a long time in the imagination. The so-called “War on Cancer” is faulty on many fronts: metaphorically, one cannot wage a war on cancer because cancer reflects complex biological processes whose science is still being understood, thus any “war” is certain to be “lost”; the costs of better prevention and early treatment combined are vital to understanding the long-run quality of life losses to patients; and that the “war” itself has many fronts including geography, gender, income, and other social divisions and differences (1). The metaphor of war is best seen as a simplistic approach to politics and financing – for industry, for politicians, NGOs, and scientists (2,3). It assumes that led by political will, laboratory science proceeds from R&D to patients in a determined march, partnering with national institutes of health, an active set of industrial firms, and an array of non-profits, with beneficial effects for the economy and rewards for firms. Similar to the “linear model” of science, which used shorthand rhetoric to concentrate investments during the Second World War and establish the supremacy of science, the “War on Cancer” directed investment and claimed an inevitable role for science and industry (4).

One problem with the “war” metaphor is that social priorities are not directly translated as if by a camp of military strategists with a clear finger on the map, tracing the most directly effective path to an outcome. Yet, while the metaphor has been recognized as flawed, the health economics is not always updated (5). Another problem is that a “standard model” of cancer science(s) is not neatly organized on standardized institutional fronts and acts as only one, albeit

powerful, source of knowledge and industrial transformation (6). Other sources may be engineering firms, patient networks, “traditional” systems of science, non-profit advocacy, or clinical “applied” research. With multiple biological and social causes and correlates, cancer stakeholders extend well outside the lab-based model.

Industrial organization and technological efforts (both technical and organizational) are thus a fundamental feature of cancer care response from diagnostics to treatment, palliation to rehabilitation. If it becomes easy to identify and abrade a tumour through better laser optics and miniaturization, clinical skills will change. Conversely, making it easier for researchers to study tissue samples can stimulate more ambitious prototyping to advance the design of patient-friendly miniature optics or handheld diagnostics.

A dynamic economics for cancer and health

A dynamic economy is not accurately described as actors under a command and control military tent; neither a linear march to success, nor paths entirely driven by the efficient intentions of a heartless industrial complex. Institutions are the social norms, customs, guidelines, standards, rules, regulations, and laws which, through specific organizations such as government agencies, business firms, or universities, define the scope of the economy. Different institutional combinations exist in all societies. Because these combinations are dynamic and change over time, an older static, non-equilibrium, analysis of technological change is entirely misleading.

The “War’s” foundational metaphor arguably reflects a time when cancer was less well understood and the economics

of learning and innovation were nascent. Yet, advances in evolutionary and institutional economics in the last 50 years have revolutionized the study of technological change (7). These changes dislodge an equilibrium perspective and emphasize an uncertain search and learning process of firms with no “best” technology (8). One simple heuristic suffices to show different pathways: three domains of an “institutional triad” of production, demand, and delivery can distinguish national health industries, each of which has a distinct technological history (9). “Health policy” and “industrial policy” are separated in this heuristic (10). Laboratory science also historically emerges as only one type of institutional combination, not a universal paradigm. For example, India’s cancer profile where a significant incidence is preventable, needs a rethinking of its economics and policy design, with science channelled and publicly supported in priority areas, and firms and other organizations with their ears to the ground, encouraged to assess health problems and learn, create, and adapt technologies or service solutions.

Countries with greater industrial self-reliance can more confidently shape their health priorities. While there is no inevitable link between health policies and industrial policies, there may well be a jostling for power by some dominant firms to create and protect the institutional combinations that favour them e.g. intellectual property, market design, technical standards or even their “brand” as friends to NGOs or other communities, or other favourable business strategies. Competition can thus prove to be critical in differentiating effective firms by technology, price, quality, or other patient-friendly features and rejecting expensive solutions by building value-based strategies. At the same time, other social institutions such as welfare regimes and an ethos of assistance should be encouraged alongside individual lifestyle shifts. This attention to real-world variety, complexity and uncertainty against an artificial “rigour” of clinical and economic evaluation is also supported by clinicians who study the variable nature of health interventions (11).

The benefits of viewing cancer through evolutionary and institutional lenses

I have argued that the health industry is best seen as multiple markets and combinatorial problems requiring close attention to non-market institutions. That the social determinants of health might include industrial organization and especially industrial policy is a relatively new acknowledgement, also supported by the need to appreciate the complexity of health interventions (12). Successful supplier countries are those with active firms (public, private, hybrid) and other organizations (non-profits, grassroots, or cooperatives) which will generate new problems and where new markets have to be constituted,

regulated, phased out, or cancer priorities addressed through non-market means. Notably, countries with wider health knowledge systems and home-grown abilities to prototype, develop hybrid organizations, and develop treatments or equipment, are a special case of countries, and democracies an especially important sub-group. This is not a normative view but informed by the different historical pathways of nations and products, and far removed from the idea that an “invisible hand” of efficient markets should dominate society. With this conceptual shift comes uncertainty and the need for new methods, but provides a historically more accurate approach toward realistic long-term health policy and plans driven by robust problem-solving (13).

The pharmaceutical industry’s history is based largely on chemical industry progression, while biotechnology has had its own evolution (14). Mixed together as they are in cancer science and clinical treatment, there is no definable trajectory of a single industrial pathway, but there certainly can be priorities for accelerating access, accuracy, and humane care. Neither are the dynamic features of industrial organization easily collapsed into a traditional profit-driven description of a “medical-industrial complex”, because there are increasingly more actors in the health industry world – public hospitals, non-profits, hybrid platforms and service organizations, charities, or others, who play often invisible search, learning, and solution provider roles, and whose primary motivation may not be profit. Moreover, different sub-sectors have their own learning and regulation requirements, with equipment manufacturers and generic pharmaceuticals difficult to compare; the former suffering industrial rules devised for the latter (15). Similarly, the measures of industry impact and scale have to be context-driven: the degree of vertical integration and industry diversification goals can then be used to assess whether the policy goal is greater numbers of start-ups in handheld devices for breast cancer diagnostics, “big data”, fewer cases altogether, or something else entirely.

The industrial foundations of “choosing wisely”

Articles I and V of the Alma Ata Declaration 1971 require a commitment from governments that policy design will ensure responsibility for improvements in population health. Cancer response is therefore shaped by which demand institutions ensure such improved and judicious consumption of care and treatment. Therefore, industrial policies will need to situate cancer strategies beyond a single disease and its clinical management goals to a context-driven industrial response for health enhancements and universal healthcare commitments. At the same time, cancer-generating and multi-industry challenges such as environmental toxicity can be framed within industrial and systemic drivers of health (16).

A technologically contingent approach emphasized that societies need continuous problem-solving capabilities to resolve production, demand and delivery challenges and to clarify what knowledge systems serve them best. Industrial churn in cancer technologies can originate outside cancer. During COVID-19, countries under strict lockdowns or import curbs have behaved in unexpected ways in highly compressed timelines to produce PPE or COVID-19 diagnostic kits and which now shape how their cancer treatment is addressed (17,18).

How institutions and organizations come together illustrates the dynamic problem of morphine production for cancer palliation (19). India has in principle a complete supply chain but in practice one with several production, demand and delivery gaps, from opium cultivation to final opioids availability. Dramatic improvements are certainly possible: industrial gaps between agricultural production, procurement quotas and licences to align with technology upgrading for opium processing; and alignment of national programmes, state bureaucracies, or leading hospital procurement systems to track and anticipate the demand of palliative care morphine. This requires procurement systems to match decentralized district-level networks of regional hospitals and clinics which can see the urgency of morphine availability hiding in plain sight (20,21). Patients are also often unaware that doctors and medical bureaucrats may unwittingly undermine pain management with misplaced worries about addiction or trafficking. Medical and science education, and the training of bureaucrats need updates in dynamic industry models of global and national opioids supply chains, and exposure to economics, engineering, law and ethics.

A second example, Choosing Wisely India, demonstrates why and how traditional US, UK, or Canadian technology priorities for scanning or chemotherapy may need to be reassessed in Indian or African contexts (22,23). Choosing Wisely India fits within the ambitious National Cancer Grid of India (NCG) with tumour boards and expert panels and Vishwam Connect which combines Indian cancer standards with growing overseas requests (24). If extended to the industrial side, these initiatives can usher in sensible minimum thresholds for standardized imports, identify priority innovations, specify local content requirements that dovetail

with economic plans, establish quality or safety standards, and iteratively develop agile procurement or malpractice systems. In turn, such clarity on size and regulation of markets can aid firms in areas such as materials, scanners, lasers, dosage forms, optics, plastic molding and 3-D printing. This departure from cancer's US or European industrial histories, more accurately reflects domestic cancer data as well as domestic technological capabilities.

Conclusion

Major changes in the economics of technological change have emerged in the last half century which can move us beyond unrealistic war metaphors. COVID-19 has also revealed fundamental industrial gaps in global distributed manufacturing, fair pricing for imports or adjudication rules for technology transfer. Global policies in cancer should therefore support, not drive, national dialogues on priorities and evaluation. Health policy and industrial policies are rarely analysed as essentially intertwined. We hope that the Innovation for Cancer Care in Africa (ICCA) project can provide a preliminary body of research to analyze these linkages and improve cancer care in the coming years. ■

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