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**Alexion Challenge: Who are the winners & losers in healthcare funding & payments**

In 2017, $7.48 Billion were distributed from healthcare companies to hospitals and individual physicians. Over 30% of these funds went to physicians specialized in cancer treatment. While cancer is the second leading cause of death in the US, there is an over-allocation of funds directed towards specific types of cancer compared to their burden on society. We find that compared to their “Years of Life Lost Per Incident”, a measurement that takes into account the age of the person affected as well as the mortality rate of types of cancer, the research spending on breast cancer, leukemia, and prostate cancer seem to be higher funded that justified. This leads to a lack of funding for less known and rarer types of cancer such as bladder, oral, uterine, and stomach, which are funded below their estimated costs to society. We, therefore, recommend a redistribution of the money spent on cancer research that addresses the overspending on the most commonly known types of cancer, which also promise high profits as a mass market is available for a newly developed drug. We found a clear positive linear relation between research spending and overall, national spending on the different types of cancer.We recommend that the overall societal cost of the type of cancer should be taken into account when allocating research funding.

Moreover, from our analyses of research payments by NIH, we found out that many diseases are significantly underfunded than other diseases with the same or lower incidences per year. For instance, AlDS/HIV is immensely overfunded than diseases such as peptic ulcers and strokes which are significantly more prevalent in the US and have higher mortality rates. The primary reason for this gap in research funding is likely due to a lack of widespread public awareness of the disease. We recommend that funding should be shifted from the diseases that are more well-known but cause less burden on society to the one's that actually afflicts a greater number of people. The gap in research funding also represents an investment opportunity as it is likely that there are opportunities of developing better treatments (drugs, therapies, and/or devices) for these diseases.

Our analysis also points out that 37.42% of general payments are royalties and licensing fees. Because of the need for less risky drug development process and better research facilities, pharmaceutical companies often buy the rights to drugs and devices developed by others. The need for capital and commercialization drive physicians and hospitals to rely heavily on companies. This relationship possesses hidden risks for patient communities. As companies are licensing at higher rates than ever, the price of drugs increases to offset those costs and affects patients' affordability. In addition, research findings can be geared more toward meeting companies' expectation rather than patients', thus give rises to quality issues. Therefore, more payments should be made toward quality assurance and consultation to make sure that innovations go out to the market fulfill what patients desire. Companies should also place a strong emphasis on reasonable royalties and pricing controls to not overspend and hurt patients.