

# QALYs, DALYs and Now PALYs: Strengthening the Argument for Prevention of CKD

Mark Canney<sup>1</sup> and Adeera Levin<sup>2</sup>

<sup>1</sup>Department of Medicine, University of Ottawa and the Ottawa Hospital Research Institute, Ottawa, Ontario, Canada

<sup>2</sup>Division of Nephrology, University of British Columbia, Vancouver, British Columbia, Canada

JASN 32: ●●●–●●●, 2021.

doi: <https://doi.org/10.1681/ASN.2021020208>

In any healthcare system, financial and human resources are finite and the decision to invest in any therapy or strategy must be considered through that lens. Traditionally, we have used certain thresholds to establish whether a new intervention represents value for money, and the opportunity cost from not funding another intervention. This framework is the cost per quality-adjusted life year (QALY), a measure of the anticipated effect on patient survival (quantity of life) weighted by the quality of life experienced by patients in that health state. Accurately measuring the cost of healthcare becomes extremely important in such discussions, and can act as a powerful means of advocating for our patients. In nephrology, we can point to the enormous expense of providing kidney replacement therapy,<sup>1</sup> but there are other costs to consider, including high rates of healthcare utilization as patients approach the need for dialysis or transplantation, and intercurrent illnesses and complications while receiving those therapies.<sup>2</sup> Quantifying these costs helps to justify funding for novel treatments to mitigate the risk of disease progression, and for improved access to transplantation and home dialysis therapies.<sup>3</sup> The direct medical costs of CKD, although striking, do not necessarily capture the broader, societal effect of kidney disease.

In this issue of *JASN*, Savira *et al.*<sup>4</sup> add a new dimension to the discussion by estimating the economic losses encountered due to reduced work productivity among individuals with CKD, as measured by productivity-adjusted life years (PALYs). PALYs are analogous to QALYs, except the expected years of life are weighted by productivity indices rather than quality-of-life indices. Productivity is represented by the combination

of absenteeism (missing days from work), presenteeism (reduced output while at work), and withdrawal from the labor force. The investigators used multiple population-level data sources to project the incidence of CKD, progression of CKD, years of life lived, and work productivity among Australians of working age (15–69 years) from 2020 to 2029. Their model assumed people would transition in a linear fashion from living without CKD to living with progressively more severe stages of CKD, or death. Each PALY was assigned a value on the basis of the Australian gross domestic product. Over the next decade, both prevalent and incident cases of CKD were projected to result in a loss of 635,236 PALYs. Accordingly, the prevention of 10% of new cases of CKD would result in a gain of 7590 PALYs, with an associated cost savings of US\$1.1 billion.

This study has some important implications. First, these findings move the emphasis away from advanced CKD (where costs are known to be high), and toward the potential economic benefits of preventing earlier stages of kidney disease. A 10% reduction in incidence translated into the prevention of 1503 cases of stage 3 CKD, 117 cases of stage 4/5 CKD, and six new cases of ESKD per year. Consequently, the majority of expected economic gain from enhancing work productivity was from the prevention of CKD, rather than delaying progression of existing CKD. Second, this study draws our attention to something that we perhaps underestimate when considering the “costs” of having a chronic disease: someone’s ability to fully participate in the workforce.<sup>5</sup> Third, the model did not incorporate either the direct medical costs of treating kidney disease or the productivity loss due to an inability to work, unpaid work, or caregiving roles. Thus, the true economic benefit of disease prevention is likely substantially greater. Fourth, the study highlights the critical importance of high-quality, population-level data across the full spectrum of CKD for accurate economic modeling.

Like any model, certain assumptions must be made, and caveats exist in the interpretation of these findings. Kidney disease is often not an isolated finding and, although a subset of people in this age group may have a primary kidney disease, many more have additional chronic health conditions, such as diabetes, cardiovascular disease, and depression. The prevention of CKD may have knock-on benefits for some of these conditions; however, an individual’s work productivity may well be affected by their cumulative burden of comorbidities, such that alleviating their kidney disease alone may not automatically reverse a loss of productivity. The health state of “alive with ESKD” did not differentiate between types of kidney replacement therapy, and there may be differences in productivity among patients receiving in-center hemodialysis versus home therapies or kidney transplantation. At face value, a 10% reduction in the incidence of CKD seems

Published online ahead of print. Publication date available at [www.jasn.org](http://www.jasn.org).

**Correspondence:** Dr. Adeera Levin, Department of Nephrology, St. Paul’s Hospital, 1081 Burrard Street Room 6010A, V6Z1Y6 Vancouver, BC, Canada. Email: [alevin@providencehealth.bc.ca](mailto:alevin@providencehealth.bc.ca)

Copyright © 2021 by the American Society of Nephrology

a reasonable goal, but how we get there is a different story. Not all forms of CKD are preventable (for example, forms due to genetic predisposition), whereas other forms of CKD are accrued later in life, some time after leaving the workforce. Perhaps most importantly, the burden of CKD is not distributed equally around the world.<sup>6</sup> The strategic approaches to reducing that burden will vary by jurisdiction, depending on public health infrastructure, local economic structures, and prioritization of kidney health.<sup>7</sup> If the findings in this study are translatable to other countries and, in particular, to developing countries where kidney disease can disproportionately affect the younger “productive” population, there could be a strong economic incentive to invest in primary prevention strategies for which we have emerging evidence of benefit.<sup>8</sup>

This study adds to an accumulating wealth of data demonstrating the negative economic and health consequences of CKD. Behind these numbers, the largest burden of kidney disease is experienced by individual patients, families, and the communities in which they live. To truly affect the maximum number of people living with, or at high risk for, kidney disease, we need to shift the economic argument away from the high costs of kidney replacement therapy, and instead quantify and actively promote the societal benefit of preventing kidney disease. The study by Savira *et al.*<sup>4</sup> provides us with a powerful tool to do just that—a fresh argument, aligned with sustainable development goals and universal coverage, to prevent kidney disease and lighten the load on patients, families, communities, and healthcare systems.

## DISCLOSURES

A. Levin reports being a scientific advisor to, or member of, AstraZeneca, Bayer, Boehringer-Ingelheim, *Canadian Journal of Kidney Health and Disease*, Canadian Institutes of Health Research, Certi, Chinook Therapeutics, Johnson and Johnson, Kidney Foundation of Canada, National Institutes of Health (NIH), National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), Otsuka, Reata, Retrophin, and The George Institute; receiving research funding from AstraZeneca, Boehringer-Ingelheim, Canadian Institute of Health Research, Janssen, Johnson and Johnson, Kidney Foundation of Canada, Merck, NIDDK, NIH, Ortho Biotech, Otsuka, and Oxford Clinical Trials; and having consultancy agreements with Amgen, AstraZeneca, Bayer,

Boehringer-Ingelheim, Johnson and Johnson/Jansen, Reata, and Retrophin. The remaining author has nothing to disclose.

## FUNDING

None.

## ACKNOWLEDGMENTS

The content of this article reflects the personal experience and views of the author(s) and should not be considered medical advice or recommendations. The content does not reflect the views or opinions of the American Society of Nephrology (ASN) or JASN. Responsibility for the information and views expressed herein lies entirely with the author(s).

## REFERENCES

1. Vanholder R, Davenport A, Hannedouche T, Kooman J, Kribben A, Lameire N, et al.; Dialysis Advisory Group of American Society of Nephrology: Reimbursement of dialysis: A comparison of seven countries. *J Am Soc Nephrol* 23: 1291–1298, 2012
2. Wong SPY, Kreuter W, O'Hare AM: Treatment intensity at the end of life in older adults receiving long-term dialysis. *Arch Intern Med* 172: 661–663; discussion 663–664, 2012
3. Klarenbach SW, Tonelli M, Chui B, Manns BJ: Economic evaluation of dialysis therapies. *Nat Rev Nephrol* 10: 644–652, 2014
4. Savira F, Ademi Z, Wang B, Kompa A, Owen A, Liew D, et al.: The preventable productivity burden of kidney disease in Australia. *J Am Soc Nephrol* 32: XXX–XXX, 2021
5. van Haalen H, Jackson J, Spinowitz B, Milligan G, Moon R: Impact of chronic kidney disease and anemia on health-related quality of life and work productivity: Analysis of multinational real-world data. *BMC Nephrol* 21: 88, 2020
6. GBD Chronic Kidney Disease Collaboration: Global, regional, and national burden of chronic kidney disease, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 395: 709–733, 2020
7. Bello AK, Levin A, Tonelli M, Okpechi IG, Feehally J, Harris D, et al.: Assessment of global kidney health care status. *JAMA* 317: 1864–1881, 2017
8. Kelly JT, Su G, Zhang L, Qin X, Marshall S, González-Ortiz A, et al.: Modifiable lifestyle factors for primary prevention of CKD: A systematic review and meta-analysis. *J Am Soc Nephrol* 32: 239–253, 2021

---

See related article, “The Preventable Productivity Burden of Kidney Disease in Australia,” on pages xxx–xxx.