

# How to Evaluate Interventions for the Treatment and Care of Patients With Acute Kidney Injury



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Acute kidney injury (AKI) is reported to be the most common cause of organ dysfunction in critically ill adults,<sup>1</sup> affecting on the order of 1 in 5 hospitalized patients, with a high mortality rate (20% to 25%), and to present a substantial economic burden for the health care system. In this issue of *KI Reports*, Mistry *et al.*<sup>2</sup> present a micro-costing analysis that highlights the complexity and the high and variable costs associated with acute and shorter-term outcomes for patients with AKI in critical care. AKI also has long-term patient and societal outcomes that arguably present greater burdens on patients, carers, and the health care system. In survivors of intensive care units, AKI is independently associated with longer-term mortality, poorer quality of life, frailty, and cardiovascular disease.<sup>3,4</sup> It has been estimated that

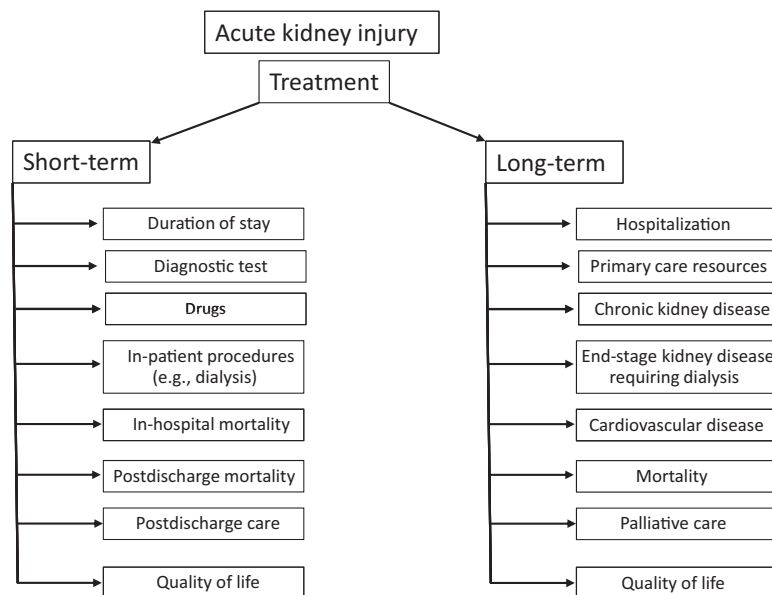
almost one-third of AKI events are avoidable, and perhaps one-half of the cases receive suboptimal care. Furthermore, there has been little or no advancement in interventions to prevent, treat, and manage patients with AKI in intensive care. Finally, available evidence to inform clinical guidelines for the prevention and treatment of AKI is limited and of poor quality.<sup>1</sup>

Mistry *et al.*<sup>2</sup> present the results of a substudy of the AKORDD project,<sup>5</sup> a pilot before-and-after trial of an AKI outreach program in 2 UK hospitals. The substudy reports on a micro-costing assessment for individual patients enrolled in AKORDD. Specifically, Mistry *et al.*<sup>2</sup> assessed the feasibility of estimating individual patient costs based on detailed collection of patient resource use from the time of the AKI episode for a follow-up period of 12 months. The micro-costing required a detailed inventory of all in-patient diagnostic tests, medications, and procedures, as well as resource use after discharge (the latter based on self-report

questionnaire). Given the complexity of treatment and procedures required for patients with AKI, prospective micro-costing is highly onerous compared with the more common approach of assigning average national tariffs according to diagnostic groupings assigned to individual patients. The authors conclude that micro-costing provides a more accurate estimate of in-patient costs; however, it requires substantial research resources and there still remain uncertainties in assigning AKI-related costs, as well as accuracy of primary care resource use following discharge.

Evaluating the cost-effectiveness of an intervention requires estimation of the incremental costs and outcomes for the intervention when compared with an alternate intervention or standard care. The incremental costs and benefits enable calculation of an incremental cost-effectiveness ratio. Clearly, most if not all proposed interventions will have a primary aim to achieve better outcomes for patients with AKI; however, many interventions, particularly in an intensive care unit, will cost more to achieve the improvement in outcomes. The incremental cost-effectiveness ratio provides one basis for comparing interventions in terms of the additional unit cost to achieve a desired outcome, such as life years saved, quality-adjusted life years, or cases of end-stage kidney disease. Whether a particular intervention is cost-effective will be determined by how much the community of health care providers is willing to pay to achieve that outcome. However, the short-term costs and outcomes considered by Mistry *et al.*<sup>2</sup> are only part of an evaluation of the cost-effectiveness of acute care interventions for AKI that will be

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**Figure 1.** Some of the short- and long-term consequences associated with treatment and care of acute kidney injury relevant to economic evaluations.

relevant to health care providers, patients, and society. [Figure 1](#) shows some of the consequences of treatment of AKI relevant to an economic evaluation. As an example, the cost-effectiveness of provision of dialysis in acute care of AKI, which is a major cost differential for individual patients in intensive care as highlighted by [Mistry \*et al.\*](#)<sup>2</sup> will be dependent on many short- and long-term post-discharge outcomes including (but not limited to) recovery of kidney function, mortality, quality of life, cardiovascular disease, progression to end-stage renal disease, and requirement for maintenance dialysis. Not only is there is variability in short- and long-term outcomes, there is a high degree of uncertainty in predicting the outcomes for individual patients. The micro-costing approach of [Mistry \*et al.\*](#)<sup>2</sup> would allow for calculation of an incremental cost-effectiveness ratio in a larger study; however, as the estimation of costs and outcomes is limited to the short term, the incremental cost-effectiveness ratio provides guidance only to short-term perspectives and will greatly

underestimate both costs and outcomes/benefits.

Economic burdens and cost-effectiveness should form only one part in the identification of options for the treatment and care of patients with AKI. It is increasingly acknowledged that health care should be patient centered and in so doing, not only reflect community values and preferences with respect to resource allocation and willingness to pay, but should also reflect preferences and values of the patient. In this context, AKI presents several issues. In an acute care setting in which there is a high degree of uncertainty in patient-important outcomes, and there is a narrow gap between the occurrence of serious harms and benefits following intervention, clinicians necessarily act as patient advocates, decision makers, and gatekeepers.<sup>6</sup> In patient-centered care, decisions made should reflect the values and preferences of patients so to be, as far as possible, the decisions the patients would have made themselves had they been able. In the clinician's role as patient advocate, there is an

inevitable conflict between achieving incremental gains for individual patients and maximizing efficiency for all patients (i.e., minimizing costs through potentially futile or uncertain procedures and tests). In short, the responsibilities of professional integrity, acting as the gatekeeper, achieving equity, and maximizing overall benefit, necessarily conflict with the clinician's role as the patient's advocate. Whether this leads to the "best" outcome for that patient will depend on the extent to which the clinician can act as an effective agent and make decisions that reflect the patient's values and preferences. This conflicting role is most problematic in areas of resource limitations and where there is a high degree of uncertainty in both short-term and long-term outcomes. Both these conditions are applicable to AKI.

[Mistry \*et al.\*](#)<sup>2</sup> have added to the understanding of the complexity and variation in the short-term costs and benefits and demonstrate the difficulties in applying micro-costing techniques to the treatment and care of AKI in acute care. Whether the additional research resources required to undertake micro-costing is warranted remains unclear. Irrespective, there remain 2 missing elements to completing a meaningful evaluation of the "value" of the AKI outreach intervention that are arguably more important than short-term costs and outcomes. First, the costs and benefits associated with long-term outcomes, and second, patient and carer preferences and values for both short- and long-term outcomes. The first is key to a comprehensive economic evaluation of any AKI intervention, whereas the second is critical to developing patient-centered

interventions and models of care and providing evidence for clinical practice guidelines.

## DISCLOSURE

The author declared no competing interests.

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