In Focus

Patient safety in chronic kidney disease: time for nephrologists to take action

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Over the last two decades, the term ‘patient safety’ has been increasingly prominent in the mainstream medical research literature. This prominence reflects a growing realization that unintended and often avoidable harm can result from healthcare interventions, along with the undoubted benefits. Extensive evidence has now been produced documenting the extent of avoidable harm in hospital care [1], and attention is turning to the best strategies to improve patient safety. While education and training clearly play a role, it is now clear that the highest impact can be gained by changing the systems in which care is delivered, acknowledging and mitigating ‘human factors’.

Definitions of patient safety vary [2], but all involve the concept of avoidable harm as a direct result of healthcare, rather than harm resulting directly from the condition for which care is being given. Some authorities include ‘near miss’ events in which no actual harm was caused to the patient, while others concentrate on actual harm, ranging from minor and fully reversible adverse events through to death. Harm may result from errors of omission or commission. Errors of commission are usually more obvious—examples include adverse reactions to drugs or drug interactions, retained surgical instruments and interventions which result in accelerated loss of kidney function [3]. Errors of omission may also be obvious—clotting in the dialysis circuit due to failure to start a heparin infusion, for instance—but may sometimes result in harm that occurs sometime after the omission, and is less clearly causally linked, for instance re-hospitalization with heart failure some months after an admission in which the opportunity to prescribe beta-blockers was missed. Catheter-related bloodstream infection associated with failure to adhere to optimal preventive measures would be an example from kidney disease care, as would late referral of a patient with progressive chronic kidney disease (CKD) to nephrology services.

The existing literature on patient safety among patients with kidney disease is surprisingly sparse. A large retrospective analysis of a Veterans’ Health Administration database showed that patients with CKD had an increased risk of defined patient safety indicators, including hip fracture, post-operative metabolic or physiological derangement and complications of anaesthesia. Infections associated with medical care carried a high risk of death among patients with CKD; and there was a linear association between lower eGFR and higher risk of patient safety incidents [4]. Subsequent analyses from the same group have described the incidence of hyperkalaemia and of hypoglycaemia. Hyperkalaemia was, unsurprisingly, more common among those with CKD and those on blockers of the renin–angiotensin–aldosterone system. Even moderate hyperkalaemia was associated with an increased risk of death within 1 day of the serum potassium measurement [5]. Hypoglycaemia was more common among patients with CKD, with or without diabetes, and was also associated with a higher risk of 1-day mortality [6]. Treatment of hyperkalaemia with dextrose and insulin can also cause severe hypoglycaemia [7]. Several studies have documented that patients with CKD have an increased risk of adverse drug reactions caused by nephrotoxic drugs and drugs that are renally cleared [8–11].

Computerized decision support can improve prescribing for patients with CKD [12, 13], although senior doctors are more likely to over-ride electronic prescribing alerts [13].

In this issue Bray et al., by means of a retrospective case review study, estimate the incidence and nature of adverse events contributing to the death of patients on renal replacement therapy (RRT) [14]. Using Scottish Renal Registry data augmented by abstraction of detailed information from clinical case notes, electronic patient records, morbidity and mortality meetings and critical incident reviews, they identify factors
which may have contributed to a patient’s death. A total of 1551 deaths were reviewed. The factors contributing to each death were determined by four nephrologists and a nephrology trainee; concerns that a patient’s death may have been avoidable were classified using a five point scale. Over a 42-month period, 26% of the 5923 patients on RRT died. Among these deaths, over 50% died as a primary result of cardiovascular disease or infection. A total of 2.1% (28) of the deaths were as a direct result of an RRT complication. Events that may have or did contribute to the death of a patient were identified in 47 (3.6%) deaths within the cohort as a whole, and in 38 (4%) inpatient deaths. On further evaluation by peer review and root cause analysis of 22 of these deaths, five main causes were identified: management of hyperkalaemia; prescribing (particularly of opiates and of antiplatelet agents); out-of-hours care; inadequate prevention and management of infection; and failure to maintain safe haemodialysis and human factors such as poor communication contributed to patient death from these causes.

Despite the recent emphasis on patient safety, the extent of patient harm in kidney care remains unclear; the study by Bray et al., is the first to systematically describe the epidemiology of adverse events resulting in patient death in patients on RRT [14]. As with all retrospective studies based on case note review, the study has limitations. It may have underestimated the true extent of avoidable deaths—in particular, deaths from avoidable catheter-related sepsis and from hyperkalaemia were almost certainly under-ascertained. The same authors have previously identified within the same cohort a significantly higher risk of death from septicaemia in patients dialysing on tunneled central venous catheters [15]. Further, there was a significant variation between the assessors’ judgments on the causal effect an adverse event may have had on the patient’s outcome. The subjective nature of such judgments has been reviewed before, particularly with reference to Global Trigger Tools and serves to highlight the difficulties in accurately describing the epidemiology of patient safety [16, 17] and the difficulties in agreeing to an operational definition of adverse events [18].

Despite these shortcomings, the study clearly shows that it is no longer reasonable for nephrologists to attribute all deaths on RRT to ‘acceptable complications’. Nor is it at all likely that the risks described are limited to the Scottish National Health Service. The study only looked at avoidable deaths: for every such death, there were probably many admissions prolonged by avoidable harms, and other deaths among patients with advanced kidney disease not yet receiving RRT. Nephrologists therefore have to take on the task of learning how to reduce the risks associated with providing care for patients with kidney disease. How should this be done?

The most important lesson is to learn to look at the system, rather than the individual. Very few healthcare workers cause harm by deliberate violations; as described in the Institute of Medicine’s classic 1999 report, ‘To err is human: building a safer health system’, human errors are inevitable, have causes and can be prevented by systems that are deliberately designed to prevent, recognize and mitigate errors [19]. In clinical medicine, diagnosis precedes treatment, and prevention is considered better than cure. The same is true for quality improvement initiatives to improve safety. A number of tools are available to reach a ‘diagnosis’ of the causes of latent errors within a system—these include value stream mapping, hierarchical task analysis, failure modes and effects analysis and root cause analysis. While such techniques are commonplace in other high-risk industries, such as aviation and oil production, they are not yet widely used in clinical medicine.

Once a ‘diagnosis’ has been reached, quality improvement techniques are required to make changes to the system of care. Space does not permit detailed discussion of these techniques, but it is important to recognize that changing the system of care, even in the simplest care pathway, often requires very different skills to those learnt in medical school [20, 21]. Very few readers of NDT would be able to say that they have rigorously reviewed their system of care for any given condition and declared it completely safe. In a systematic review of published quality improvement initiatives in nephrology, none of the 93 studies reviewed focused specifically on safety of care—although there were numerous studies focusing on improving vascular access [22]. This is despite the growing—while still poor—quality evidence that quality improvement initiatives can save money [23].

What can nephrologists do to reduce the risks of avoidable death caused by the healthcare that they deliver?

First, we must acknowledge that there is a problem. Retrospective audits on the scale undertaken by Bray et al. are time consuming, but prospective and rigorous identification of avoidable deaths should now be part of every kidney department’s mortality review meetings. The 1551 deaths reviewed were spread over 42 months in eight centres—less than five deaths per year per centre. It would be easy, but wrong, to ignore these deaths, or to brush them aside as the inevitable consequence of high-technology healthcare.

Second, nephrologists, and the teams they work with, must accept the ‘burden of improvement’. Although some of the causal factors that are identified are seemingly not under the direct control of nephrologists—out-of-hours care, for instance—it falls to us to work out how, within the resources available, to reduce the risks caused by the fact that many patients on RRT will be managed by junior doctors with no experience in nephrology.

The precise solutions will clearly depend on the hospital—hence the need for quality improvement techniques to ‘customise’ the solution to the local setting—but easily accessible protocols and guidance on when to call for help will play an important part. Actively encouraging junior doctors to call for senior help will require a change in culture—which requires strong leadership and clear messages from those in charge of the system. Culture change is also important to mitigate one of the other problems identified by Bray et al. [14],—the reluctance of nurses to challenge doctors when they are concerned that a patient is at risk. Patients who are empowered to be part of their care are also likely to help. Spiegel et al. [24] have demonstrated in US dialysis units that lower case-mix-adjusted mortality is associated with patient activation and better
communication and respect between staff members: these factors explained 31% of the variation in standardized mortality ratios between dialysis units. Interventions designed to improve teamwork and culture can be shown to improve ‘safety culture’ in intensive care units [25]; similar studies are needed in kidney units.

Standardization of care, with clearly written, accessible, protocols and clinical practice guidelines is also important, particularly for junior doctors working out of hours. Even if a clinical practice guideline is not based on perfect evidence, it is unlikely that the alternative—expecting junior doctors to make it up as they go along—is any better. For instance, every hospital providing care for patients on RRT should have readily accessible guidance on treatment of hyperkalaemia; prescribing, particularly opiates; and on diagnosis and management of infections (e.g. peritoneal dialysis-related peritonitis; bacteremia associated with intravascular dialysis catheters). Ensuring adherence to guidelines is difficult [26]—and likely to get more difficult as the number of guidelines continues to increase [27].

A number of recent initiatives have been launched to promote better patient safety. One such initiative is the website ‘Keeping kidney patients safe’ set up by the Renal Physicians Association and the Forum of End-Stage Renal Disease Networks: it allows quick access to relevant clinical performance measures, KDOQI guidelines and initiatives such as ‘fistula first’ [28]. There is a need for a similar initiative in Europe, and this could be a highly appropriate topic for European Renal Best Practice.

It is conventional to conclude reviews such as this with a call for more research. There is clearly a pressing need for more research, both on the epidemiology of avoidable patient harm and on strategies to reduce the risks. However, there is enough evidence now to persuade nephrologists, wherever they practice, to take clearly articulated steps to improve the safety of the patients who trust them to provide care.

CONFLICT OF INTEREST STATEMENT

None declared.


REFERENCES