Technical and collaborative work in the management of acute kidney injury

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Abstract. Patient care may become complicated by acute kidney injury (AKI), a syndrome that affects a patient's renal functioning. Our study aimed to explore the work involved in dealing with clinical situations where AKI may be present in primary or secondary care. From interviews with 54 doctors and pharmacists in England, we describe their work under three themes: the clinical context; the organisational context; and meeting challenges arising from these contexts. Our findings reflect the role of cognitive work, in particular decision making and collaboration, in facilitating clinical tasks. These should be the focus of any interventions to improve AKI management.

Keywords. Primary care; secondary care; care interface; macrocognition

1. Introduction

Acute kidney injury (AKI) is a clinical syndrome in which a patient's renal functioning rapidly deteriorates, with potentially negative consequences for well-being. It is often a consequence of other conditions that impair supply to, or output from, the kidney. It has been estimated to affect some 15% of hospital admissions, and so is an issue of significant concern across healthcare settings (NCGC, 2013; Blakeman et al., 2013).

The management of AKI depends on community and hospital healthcare practitioners identifying its onset and taking appropriate, co-ordinated action to limit its effects (NCEPOD, 2009; Ashley, Ostermann & Shaw, 2015). However, while that may be straightforward in principle, evidence suggests that it is challenging in practice. For example, case-note studies in the United Kingdom, Australia and Canada have found deficiencies in the transfer of medicines information, both at admission and at discharge (e.g. Gleason et al., 2010; Witherington et al., 2008).

The aim of our study is to examine the technical and non-technical work involved in managing clinical situations where AKI may occur. A particular focus of our study is the activity that occurs at the interface between primary and secondary care.

2. Methods

2.1 Design and participants

Our study combined qualitative data from two samples. The first sample comprised secondary healthcare professionals with experience of optimising medicines when care is complicated by AKI. The second comprised primary healthcare professionals and patients with experience of managing chronic kidney disease (CKD). Within each frame participants were identified using a combination of purposive and snowball sampling, to represent staff and service users in various roles and locations across England.

2.2 Procedure
Interviews were semi-structured and conducted on a one-to-one basis. Participants were invited to discuss their general experiences of dealing with AKI, either by taking preventative measures or by dealing with occurrences of AKI. Each interview lasted for 30-60 minutes and was audio recorded for later transcription with the participant's permission.

2.3 Analysis
Our primary analysis used the template method (King, 1998) to generate qualitative themes from the interview data. The initial thematic template reflected the people, artefacts and interactions that have an effect on the management of clinical situations involving AKI. This template was further developed through successive readings of the transcripts, during which the template themes were compared to the content of the transcripts, until a final set of themes was agreed by the researchers.

3. Results

3.1 Technical challenges
Acute kidney injury is an inherently complex condition to manage across the primary-secondary interface. As Figures 1 and 2 show, renal function is in the first instance observed through a set of physiological markers and acted on by changes to medication and fluid supply; potentially, a more invasive intervention may be required for a specific organ. Some of the markers, though, are less directly coupled to the renal system (e.g. blood pressure) than are others (e.g. urinary output). Furthermore, the presence of co-morbidities introduces the possibility that taking a particular action to manage AKI (for example, suspending medication that is contraindicated given the patient's condition) leads to sub-optimal management of other conditions, or vice versa. This makes managing AKI a matter of assessing and trading-off different aspects of well-being.

For instance you might have a patient who has come in with an AKI and they're on furosemide, so normally you might think, […] let's stop that furosemide, let's hold it, let's reduce the dose, but that patient might also have severe heart failure and they might be short of breath, […] they might still need the diuretic, so it's not as simple as saying let's just stop this drug. You might have to say let's cautiously give it and monitor things like fluid output, urine electrolytes, just to make sure it's not doing any [more] harm. [Hospital pharmacist]

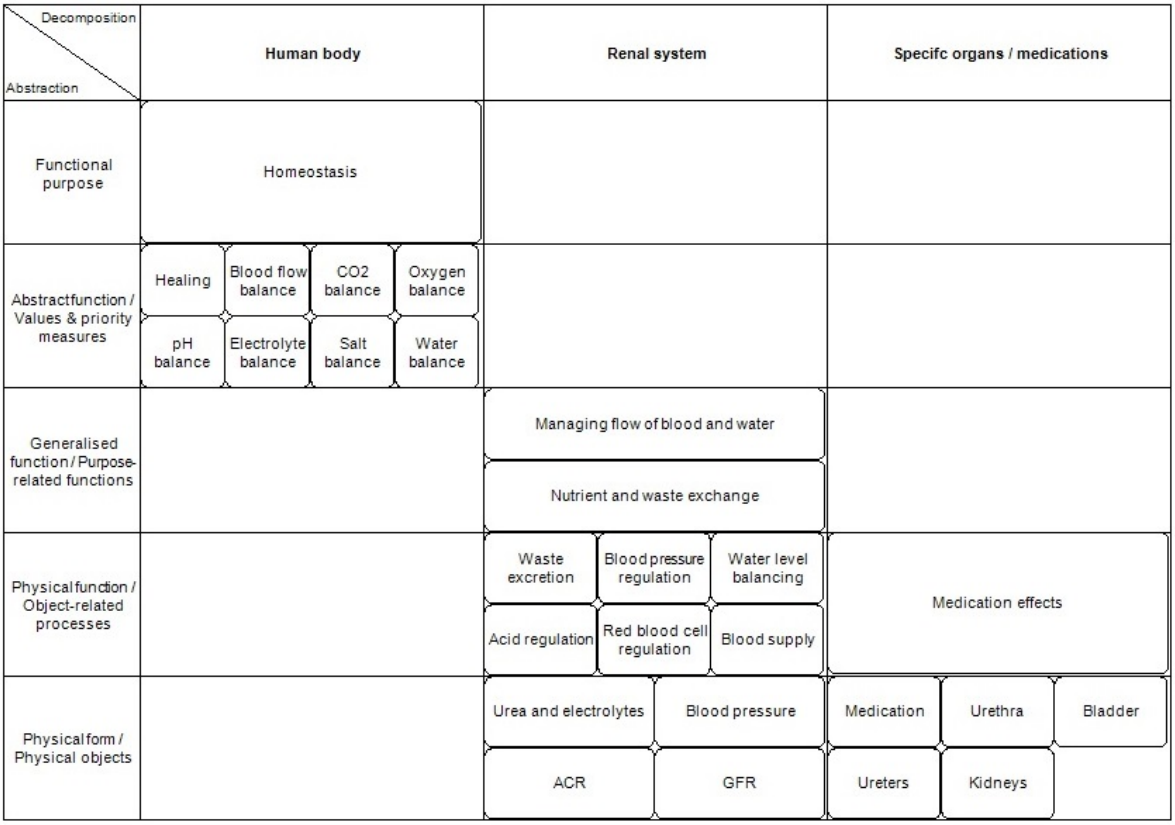

Figure 1. An abstraction-decomposition space representation (Rasmussen, 1985) of the work domain in AKI management

Participants' accounts suggested that their behaviour – both individually and collectively – could be characterized by a "decision cycle" (cf. Connolly & Wagner, 1988), in which the work domain mediates an interplay between situation assessment and action in order to resolve the problem. For example, one participant describes how she managed a patient who had been referred to the renal ward with suspected AKI.

As soon as [hospital admits] someone with an acute kidney injury, the reflex action is to give loads of fluids. We took the [patient's] history again, re-examined, […] played around a bit with the fluids and the diuretics. We tried to improve his fluid status. I think he got a bit of dialysis at one point. […] We had to do a kidney biopsy to get the diagnosis [and] it turned out he had a severe allergic reaction to trimethoprim. [Hospital doctor]

3.2 Organisational challenges

In addition to the technical challenges, much of the activity involved crosses professional and organisational boundaries in both primary and secondary care. For many of the participants, identifying the clinical situation or executing a plan of action required input or cooperation from elsewhere. Sometimes the data needed to identify the situation were readily available and of suitable quality; but on other occasions, participants encountered difficulties in assimilating or making use of data.

Sometimes [I cannot tell from] the discharge whether the hospital [has administered] all the tablets that [the patient is supposed to be] on. It's very clear on the discharge which ones they've stopped, but you've got all these other tablets and you think, have they stopped them or have they just not been restarted. […] So then you're having to chase up the hospitals to find out whether that has actually been done. […] [But] you

speak to the secretary who then says, I'll contact the consultant, […] there's a couple of days' delay there and the patient's running out of medication, so you've [then] got to make the decision [yourself]. [General practitioner]

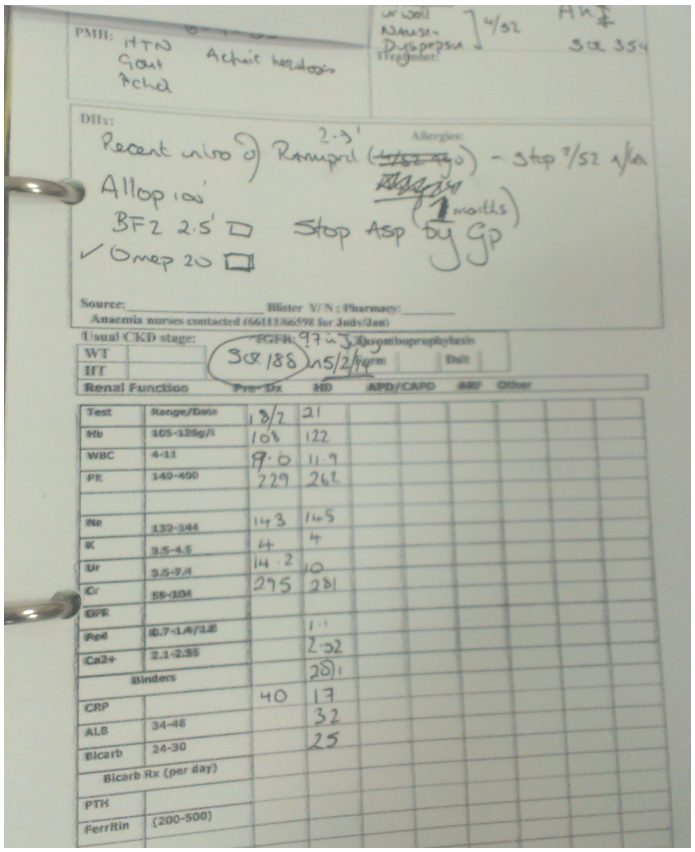

Figure 2. Tracking the physiological markers of a patient whilst in the hospital renal department

In some cases, other organisations or departments (for example, community pharmacies and specialist clinics) are involved in the care of a patient but not routinely involved in communications about patient admission and discharge. This can cause data gathering or the co-ordination of care activities to become even more complicated, and increase the risk of AKI being missed or managed in a suboptimal manner.

A patient was discharged from us and a copy of the discharge summary sent to the community pharmacist and […] the [general practitioner]. But when I spoke to the pharmacy […], four [prescription] items were missing. […] [The pharmacist] thought that the [general practitioner had prescribed everything that] they wanted the patient to be on. [But] the GP thought that the [pharmacist] had requested [everything that] the patient should be on. So the patient ended up without her rheumatoid arthritis medicine [or] her beta-blocker. [Pharmacist working in intermediate care]

The experience of the intermediate care pharmacist is noteworthy, as it illustrates an apparently unsuccessful attempt to improve co-ordination between different organisations – providing both with a copy of the discharge summary, which neither the community pharmacist nor the general practitioner used but both assumed that the other had. While providing the summary to both the general practitioner and the community pharmacist might be a sensible intervention in principle, its effectiveness depended on each end user understanding how all users could and should make use of it.

3.3 Meeting the challenges of managing care situations involving AKI
Given the challenges posed both by the technical complexity of AKI and by the distribution of the work across different settings, the question arises of how AKI management is achieved in practice. To overcome the problem of dispersed, incomplete or unavailable data, some participants discussed the use of alternative data sources to help them establish what is happening.

[Patients] at a care home […] [have a] medicine administration record. […] They're a good source of information because […] the GP list is a list of medicines the GP wants the patient to be on but if they're in a care home and you've got that medicine administration record, then you can see where the nurses have signed to say the patient actually had the medicine. [Hospital pharmacist]

In order to achieve better co-ordination across the different settings, some participants adapt their own methods of working. For example, one general practitioner described carrying out tests on discharged patients in anticipation of being asked to do so by the hospital that discharged the patients.

I just keep marking [the list that] I've got, ticking the boxes […], so [the] medications are already there, and when [there are any changes to the medication], I just [make them here]. And if I think they have changed something, like they have added an ACE inhibitor, or done anything which might have caused any damage to the kidneys, I actually repeat the [urea and electrolyte test]. Sometimes they ask us [to repeat the test] as well. [General practitioner]

4. Discussion and Conclusion

Our study makes use of accounts from different professional groups to understand the work involved in managing clinical situations during AKI. In general terms, they demonstrate how practitioners actively contribute to the effective functioning of a complex, high-risk system (cf. Smith et al., 2003). More specifically, the findings highlight the role of cognitive work, such as problem detection and solving (e.g. Klein et al., 2005; Rasmussen, 1981). In this regard, practitioners characterized their work as a decision cycle, in which they use the information from the work domain as cues to diagnose or predict renal functioning, and if necessary take control actions to transform it into an acceptable state. With regard to the collaborative work between distributed actors and organisations, our findings highlight the importance of mechanisms for explicit (that is, using specific plans, procedures or communications) and implicit (that is, the general sharing of knowledge about the task or each actor's involvement) coordination (e.g. Espinosa et al., 2004). In practical terms, our findings demonstrate the need to incorporate support for decision making, communication and coordination as part of work design and training interventions at the primary-secondary care interface.

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References

Ashley, C., Ostermann, M., & Shaw, S. (2015). Guidelines for medicines optimisation in patients with acute kidney injury in secondary care. Bristol: UK Renal Registry. Retrieved 22nd June, 2015, from https://www.thinkkidneys.nhs.uk/wp-content/uploads/2015/06/Medicines-optimisation-toolkit-for-AKI.pdf

Blakeman, T., Harding, S., & O'Donoghue, D. (2013). Acute kidney injury in the community: why primary care has an important role. British Journal of General Practice, 63, 173-174.

Connolly, T., & Wagner, W.G. (1988). Decision cycles. In R.L. Cardy, S.M. Puffer & M.M. Newman (Eds.), Advances in Information Processing in Organizations (pp. 183-205). Greenwich CT: JAI Press.

Espinosa, J.A., Lerch, F.J., & Kraut, R.E. (2004). Explicit versus implicit coordination mechanisms and task dependencies: one size does not fit all. In E. Salas & S.M. Fiore (Eds.), Team Cognition: Understanding the factors that drive process and performance (pp. 107-129). Washington DC: American Psychological Association.

Gleason, K.M., McDaniel, M.R., Feinglass, J., Baker, D.W., Lindquist, L., Liss, D., & Noskin, G.A. (2010). Results of the medications at transitions and clinical handoffs (MATCH) study: an analysis of medication reconciliation errors and risk factors at hospital admission. Journal of General Internal Medicine, 25, 441-447.

King, N (1998). Template analysis. In G. Symon & C. Cassell (Eds.), Qualitative Methods and Analysis in Organizational Research: A practical guide (pp. 118-134). London: SAGE.

Klein, G., Pliske, R., Crandall, B., & Woods, D.D. (2005). Problem detection. Cognition, Technology and Work, 7, 14-28.

NCEPOD (2009). Adding Insult to Injury: a review of the care of patients who died in hospital with a primary diagnosis of acute kidney injury. London: National Confidential Enquiry into Patient Outcome and Death.

NCGC (2013). Acute Kidney Injury: prevention, detection and management up to the point of renal replacement therapy. London: National Clinical Guideline Centre.

Rasmussen, J. (1981). Models of mental strategies in process plant diagnosis. In J. Rasmussen & W.B. Rouse (Eds.), Human Detection and Diagnosis of System Failures (pp. 241-258). New York: Plenum.

Rasmussen, J. (1985). The role of hierarchical knowledge representation in decision making and system management. IEEE Transactions on Systems, Man and Cybernetics, 15, 234-243.

Smith, M.W., Giardina, T.D., Murphy, D.R., Laxmisan, A., & Singh, H. (2013). Resilient actions in the diagnostic process and system performance. BMJ Quality & Safety, 22, 1006-1013.

Witherington, E.M.A., Pirzada, O.M., & Avery, A.J. (2008). Communication gaps and readmissions to hospital for patients aged 75 years and older: observational study. Quality and Safety in Health Care, 17, 71-75.