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1-1-2016

### Telehealth in nephrology care - promises and challenges

David M. Hailey

*University of Wollongong*, [dhailey@uow.edu.au](mailto:dhailey@uow.edu.au)

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#### Recommended Citation

Hailey, David M., "Telehealth in nephrology care - promises and challenges" (2016). *Faculty of Engineering and Information Sciences - Papers: Part A*. 5971.

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## Telehealth in nephrology care - promises and challenges

### Abstract

Telenephrology has been suggested as an approach to facilitate coordinated care between primary care providers and nephrologists for patients with chronic kidney disease (CKD). Telehealth, the delivery of health-related services and information at a distance by telecommunication technologies, has been relatively little used in nephrology. Technologies used in telehealth continue to expand and range from telephone consultation to various web-based applications. Telehealth offers potential benefits and efficiencies, but evidence of its effectiveness and economic impact is less extensive than might be expected. A recent overview noted limitations in the telehealth literature, including many short-term feasibility studies with few participants, failure to adequately describe the intervention, sparse evidence for the cost-effectiveness of telehealth care, and absence of adequate information regarding patient safety. These are points that need to be considered in applying telehealth to nephrology. There may also be logistical concerns in deploying telenephrology applications.

### Keywords

care, promises, telehealth, challenges, nephrology

### Disciplines

Engineering | Science and Technology Studies

### Publication Details

Hailey, D. M. (2016). Telehealth in nephrology care - promises and challenges. *American Journal of Kidney Diseases*, 68 (1), 5-7.

## Telehealth in nephrology care – promises and challenges

Telenephrology has been suggested as an approach to facilitate coordinated care between primary care providers and nephrologists for patients with chronic kidney disease (CKD).<sup>1</sup>

Telehealth – the delivery of health-related services and information via telecommunication technologies at a distance - has been relatively little - used in nephrology. Technologies used in telehealth continue to expand and range from telephone consultation to various Web-based applications. Telehealth offers potential benefits and efficiencies but evidence of its effectiveness and economic impact is less extensive that might be expected. A recent overview noted limitations in the telehealth literature include many short-term feasibility studies with few participants, failure to adequately describe the intervention, sparse evidence on the cost-effectiveness of telehealth care and absence of patient safety issues.<sup>2</sup> These are points that need to be considered in applying telehealth to nephrology. There may also be logistical concerns in deploying telenephrology applications.<sup>1</sup>

In this issue of the *American Journal of Kidney Diseases*, Ishani et al.<sup>3</sup> describe a study of a telehealth approach for delivering health care to persons with CKD. This was a large randomized trial covering provision of care to patients in both rural and urban settings which compared a telehealth intervention with usual care. They show that telehealth by an interprofessional team is a feasible care delivery strategy in patients with moderate to severe CKD. The intervention used a video monitoring device with peripherals. The primary end point was a composite outcome of death, hospitalization, emergency department visits, or admission to a nursing home. No significant differences between the two groups were seen

for the primary outcome or for secondary endpoints. Among rural patients, the intervention group tended to have better primary outcomes compared to usual care than urban patients but the difference was not statistically significant.

Other studies have reported promising results from the operation of telenephrology programs, while noting the need for follow up evaluation to confirm performance in the longer term. In Bradford, UK 17 general practices and a secondary care nephrology service participated in evaluation of a system that enabled general practitioners to send electronic referrals and share patient electronic health records with a renal specialist.<sup>4</sup> E -consultation provided nephrologists with access to more clinical information and significantly reduced paper referrals. GPs found that the service provided timely and helpful advice, and avoided outpatient referrals. Specialist recommendations were well followed, and GPs felt more confident about managing CKD in the community. An observational study in the Netherlands of Web-based consultations by 28 family practices and 5 nephrology departments showed the potential to avoid unnecessary referrals to nephrologists from family physicians.<sup>5</sup> Telehealth provided cost savings when compared with usual care.

Some of the strongest evidence of benefits from telehealth has come from application to rural or remote communities, where local services are limited and travel to major centres expensive and inconvenient. In an 18 months feasibility study of telemedicine clinics for patients with CKD (not on dialysis) linking two peripheral hospitals with a specialist hospital in Ottawa participants were overwhelmingly positive and wanted telemedicine to continue.<sup>6</sup> There was little increase in staff hours worked following the introduction of telemedicine. An audit of pediatric telenephrology consultations in regional areas of Queensland showed benefits from improved access to nephrology services for patients and their families and educational

opportunity for the regional medical teams.<sup>7</sup> Costs of telehealth consultations were substantially lower than those if the patients had travelled for a face-to face visit in Brisbane. A telehealth program in Jordan linking two clinics in rural areas with specialists at a hospital in Amman provided benefits through changes to final diagnosis and treatment plan through telenephrology consultations, with cost and time savings for patients.<sup>8</sup>

There are encouraging indications of benefits from use of telehealth to support dialysis. Minotodani.et al.<sup>9</sup> reported improved health outcomes and cost savings over three years using home telehealth with nurse oversight for patients with end-stage renal disease undergoing chronic dialysis.<sup>9</sup> Hospitalizations, hospital days, and hospital and ER charges were significantly lower in the telehealth group. A randomized study from Spain on use of telemedicine in the long-term control of stable patients undergoing peritoneal dialysis at home found treatment was modified in 89% of the teleconsultations, which were significantly shorter than in - hospital consultations. The mean hospitalization rate was significantly shorter for the telehealth group.<sup>10</sup>

Telehealth in management of patients with high blood pressure (BP) has had mixed results. A Cochrane review of RCTs of interactive telemedicine found some evidence for a decrease in blood pressure in telemedicine as compared with usual care (four studies, moderate certainty).<sup>11</sup> There was some evidence that monitoring via telemedicine improved blood pressure control in participants with hypertension. The HyperLink Cluster Randomized Trial found home BP telemonitoring and pharmacist case management achieved better BP control than usual care during 12 months of intervention, and that benefits persisted for 6 months post-intervention.<sup>12</sup> In contrast, evaluation of a telehealth program implemented across England for the diagnosis and management of hypertension found that BP control was achieved by only 5-22% of patients signed up to one of the three monitoring protocols.

Patient engagement with the protocols was initially good but reduced over time.<sup>13</sup> An RCT in older veterans with hypertension and CKD used a telemonitoring device pairing a cuff with an Internet-enabled hub, which transmitted readings to a secure website.<sup>14</sup> In the intervention arm 78% continued to use the device regularly, while only 20% of the usual care group brought readings to in-person visits. The difference between the improvement in BP seen in the intervention group compared with controls was clinically significant but not statistically significant.

There is good evidence for the effectiveness of telemedicine in reducing levels of glycated hemoglobin (HbA1c). The Cochrane review<sup>11</sup> found 16 studies that recruited participants with diabetes. There were lower HbA1c levels in those allocated to telemedicine than in controls (high certainty of evidence) at a median of nine months follow-up. There is evidence that telemedicine can improve the control of blood glucose in those with diabetes. The cost to a health service, and acceptability by patients and healthcare professionals, were not clear due to limited data reported for these outcomes.<sup>11</sup>

These and other studies have shown the promise offered by telehealth services in the management of CKD and associated chronic conditions. Further work is needed to confirm the effectiveness of telenephrology interventions in comparison with usual care over the longer term under routine practice conditions. A definition of success for a telemedicine application is that it performs as well as a similar alternative intervention, or better than the alternative if the telemedicine option includes additional services.<sup>16</sup> In the study by Ishani et al. details were not available on services provided by usual care so that the success of their initiative is not entirely clear. If the intervention was more elaborate, economic analysis would be required to inform clinical and policy decisions.

For some applications there have been useful information on the comparative costs of telenephrology and usual care, though typically short-term and directed towards the costs to providers. This is common in the telehealth literature. Of 24 cost-effectiveness studies identified by Maclean et al. that included formal trial data, only four undertook an evaluation encompassing the broader societal perspective.<sup>2</sup> A societal perspective encompasses the interests of providers, patients and caregivers and gives the best overall picture of the resource implications of interventions. In the case of management of CKD and associated conditions cost-effectiveness studies with a societal perspective could give further insight into the likeliness of patient adherence and program sustainability.

More could also be done in assessing the satisfaction of patients and caregivers with telehealth services. Commonly, studies do not adequately define satisfaction or why patients were satisfied, and few studies explore what happened to satisfaction over time.<sup>2</sup> A way forward is illustrated by the study by Al-Azab et al. where a questionnaire and the SF-8 Health Survey were used to assess the level and changes in the satisfaction and quality of life of telenephrology patients.<sup>8</sup>

The technologies used by Ishani et al. and others in recent studies are part of the range of health IT platforms that might be used to advance kidney disease care by offering innovative solutions to inform, engage and communicate with individuals with CKD.<sup>17</sup> All of these will require evaluation of their safety, effectiveness, efficiency, sustainability and influence on clinical practice.

David Hailey, MSc, PhD, Grad RIC

University of Wollongong

Australia

*Financial Disclosure:* Dr Hailey declares that he has no relevant financial interests.

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