



# UK RENAL RESEARCH STRATEGY

## Written by:

Fiona E Karet Frankl<sup>a</sup>

Fiona Loud<sup>c,e</sup>

Richard J Coward<sup>b</sup>

Kirit Modi<sup>f</sup>

Hugh Gallagher<sup>c</sup>

Paula Ormandy<sup>g</sup>

Rachel Hilton<sup>d</sup>

Adrian S Woolf<sup>h</sup>

with contributions from more than 150 renal professionals and patients.

## Project manager:

Elaine M Davies – Director of Research Operations, Kidney Research UK

### UK Renal Research Strategy

**Authors:** Karet Frankl FE, Coward RJ, Gallagher H, Hilton R, Loud F, Modi K, Ormandy P, Woolf AS.

**Published by:** UK Kidney Research Consortium (UKKRC)

**Designed by:** Adept, [www.adeptdesign.co.uk](http://www.adeptdesign.co.uk)

**Printed by:** Fisherprint, [www.fisherprint.co.uk](http://www.fisherprint.co.uk)

**Launch generously supported by:** Linklaters LLP, [www.linklaters.com](http://www.linklaters.com)

Copyright © The Authors, 2016. This work is available under the terms of Creative Commons BY-NC-ND licensing.

---

<sup>a</sup> Academic Vice-President, UK Renal Association (steering group chair)

<sup>b</sup> British Association for Paediatric Nephrology

<sup>c</sup> Co-author of the 'Kidney Health: Delivering Excellence' report

<sup>d</sup> British Transplantation Society

<sup>e</sup> Kidney transplant recipient and Policy Director, British Kidney Patient Association

<sup>f</sup> Kidney transplant recipient; recent Chair, National Kidney Federation; co-chair of the NBTA

<sup>g</sup> Vice-President for Research, British Renal Society

<sup>h</sup> Chair, Kidney Research UK Research Strategy Committee

# Index

<b>Foreword</b>	2
<b>Executive summary</b>	3
<b>Our aims</b>	4
<b>Chapter 1</b>	
1.1 <b>Introduction</b>	6
1.1.1 Introducing the kidneys in health and disease	6
1.1.2 Kidney disease, kidney patients and their care	6
1.1.3 Kidney research	7
1.2 <b>Organisational components of UK renal research</b>	8
1.3 <b>The impacts of UK renal research</b>	9
<b>Chapter 2</b>	
2.1 <b>Research priorities</b>	11
2.1.1 The patient view	11
2.1.2 Professional bodies	12
2.1.3 Renal research charities' priorities	13
2.2 <b>Evidence gaps</b>	14
<b>Chapter 3</b>	
<b>Strategic Aims and Recommendations</b>	17
<b>Conclusions</b>	30
<b>Abbreviations</b>	31
<b>Appendix 1</b>	32
<b>Appendix 2</b>	36

# Overview

This strategy document begins in Chapter 1 by outlining in lay terms:

- i) how the kidneys perform in health and disease;
- ii) who is affected by kidney disease; and
- iii) what constitutes the current spectrum of renal research

We follow in Section 1.2 by summarising the organisational components involved with and supporting this research, by outlining the main funding bodies and by charting in Section 1.3 the current strengths of UK renal research.

Chapter 2 uses information gathered from a preliminary round of consultation, firstly to detail the renal community's expressed priorities for UK renal research and secondly, based on these priorities, to ascertain the main evidence gaps.

In Chapter 3 we make a series of Recommendations for maximising our successes and addressing these priorities while overcoming the challenges associated with research in the 21st century.

# Foreword

**Human health cannot improve without research, which forms the basis both for the understanding of diseases and for the delivery of better healthcare. Kidney disease affects several million people in the UK, and can have a devastating impact on the lives of patients, their families and carers.**



I am therefore delighted to welcome the UK's first comprehensive Renal Research Strategy. It is an ambitious yet realistic document and one that, in time, deserves to effect a step change in renal care - an area that historically has been somewhat neglected.

As Minister for Life Sciences, my principal motivation is to ensure that the NHS is equipped to be the global leader in the latest medical innovations and healthcare technologies. In this role I have had the privilege to see how our scientists, researchers and clinicians are pioneering ground-breaking approaches and achieving staggering breakthroughs. I am confident the Accelerated Access Review (AAR) will provide a sense of how we can make sure all of this is carried out with the single aim of finding new and improved ways of treating and caring for patients and enhancing their health and quality of life.

But I have also heard from all sectors of the research community about the challenges facing their critical part of the equation. At the heart of the AAR are some key questions: "how can the UK continue to be an attractive environment both for research and for seeing results translated into practice?" and "what are the levers that will help transform patient experience and the way our NHS works?"

That is why I am so encouraged to see the renal community come together, reflect on these challenges and set out clear research themes, research priorities and enablers. Its focus on the full spectrum, from research in the laboratory all the way to kidney patients and their carers, is intended to support the design, delivery and dissemination of sustainable high quality programmes of work.

This document provides an invaluable starting point, from which we can ensure that the UK's renal health sector is recognised as a global beacon of excellence.

I look forward to continuing working with the renal community to facilitate the Strategy's delivery and its alignment both with the AAR and the Government's broader policy agenda.

A handwritten signature in black ink that reads "George Freeman".

**George Freeman MP,  
Parliamentary Under Secretary  
of State for Life Sciences**

# Executive summary

- This document is intended both to unite the whole renal professional and patient community and to provide information and evidence for funders, policymakers and those helping to create and support the next generation of researchers.
- Kidney disease in its many forms affects several million people in the UK, and in its more severe manifestations has devastating impacts on the lives of patients, their families and carers.
- Research is an essential driver of improvements in all human health, forming the basis for the understanding of disease, for development and roll-out of new therapies, for the delivery of better healthcare and for preventative strategies.
- This first UK Renal Research Strategy highlights areas where we believe investment and collaborative efforts will have maximum impact to benefit the health and welfare of kidney patients and those at risk of kidney disease.
- These Aims and Recommendations are not intended to be a ranked list.
- A Steering Group comprising a representative from each of the major renal stakeholder organisations developed this document,<sup>1</sup> and two rounds of widely-based consultation were undertaken. Thus a wide cross-section of interested parties including patients, clinicians,<sup>2</sup> multi-disciplinary teams, researchers and funders contributed to the strategic vision described here.
- Concerted action from many parties over the next five to ten years will be needed to realise these Aims. We have highlighted what we as a kidney community believe to be the key research themes, priorities and enablers to support the design, delivery and dissemination of sustainable high quality programmes of work.
- We recognise that funding for research can never stretch to cover all aspirations. Within the document, each Recommendation is accompanied by a description of the related issues, followed by one or more possible ways forward. Some are short-term, while others look very much to the longer-term; some can be achieved by the renal community working together (e.g. Recommendations 1,2,4,7,8), while others (e.g. 3,5,6,9-13) will require external input and contributions.
- Progress will need to be monitored and reviewed by an Implementation Board, preferably under the UK Kidney Research Consortium umbrella and including representation of the full renal researcher spectrum, with formal review after two years.
- Our Recommendations are set in the context of what has been achieved over many decades, and we believe they will present good opportunities for advancement in the future. The Steering Group would like to take this opportunity to celebrate and commend the kidney community's long-standing commitment to improving the lives of people with kidney disease.

---

<sup>1</sup> **Steering Group:** See members listing on inside front cover

<sup>2</sup> Includes surgeons, paediatricians and medical specialists

# Our aims

## Strategic Aim 1

Increase engagement of professionals, patients and the public with kidney research.

### Recommendation 1:

Develop a culture where every person with a renal disorder<sup>3</sup> accessing any type of renal service (or their families and carers, where appropriate) is offered the opportunity to participate in research.



### Recommendation 3:

Create a national Kidney Biobank for collection and storage of biological samples from every kidney patient, to provide a strategic resource for fundamental and translational research.



### Recommendation 2:

Increase and promote equitable access to research for minority groups with kidney disorders, including children and those from Black, Asian and Minority Ethnic backgrounds.



### Recommendation 4:

To complete the research loop, better communicate the outcome of all kidney research to patients and the public in accessible language that they can understand.



## Strategic Aim 2

Capitalise on the full spectrum of research approaches to ensure a well-balanced portfolio that includes underlying mechanisms, prevention, treatment and impact.

### Recommendation 5:

Preserve support and funding of laboratory science, because new fundamental discoveries are the key to future improvements in health.



### Recommendation 7:

Embed commitment to robust and appropriate patient-focused and patient-led qualitative research, to allow improvements in quality of care, health, quality of life and patient empowerment.



### Recommendation 6:

Increase the number and quality of clinical trials, to address evidence gaps and measure and determine best practice/treatment.



### Recommendation 8:

Build the evidence base (improvement science) that will reduce unwarranted variation in practice and increase equitable access for patients to the best available treatment.



<sup>3</sup> The terms 'kidney' and 'renal' are used interchangeably throughout, as are 'nephrology' and 'renal medicine'

## Strategic Aim 3

Support the research training and career development of all contributors to renal research, to build sustainable research capability and capacity.

### Recommendation 9:

Increase resources and mentorship to develop and maintain research skills among all health professionals, to ensure high quality multi-disciplinary renal research.



### Recommendation 10:

Improve support, training and career paths for non-clinical renal scientists in the academic sector.

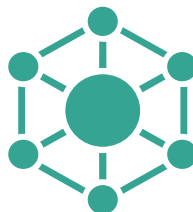


## Strategic Aim 4

Create a more open research culture to maximise cross-disciplinary and collaborative research.

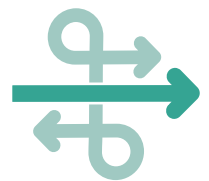
### Recommendation 11:

Strengthen formal partnerships across disciplines, patient groups, professional bodies and charities aligned with kidney disease, particularly in diabetes and cardiovascular disease.



### Recommendation 13:

Work collectively towards a simpler, faster and more responsive pathway to ethical and regulatory approval, particularly for low-risk projects.



### Recommendation 12:

Build closer research links with industry to identify new therapeutic targets, develop collaborative clinical trials and increase research funding opportunities.

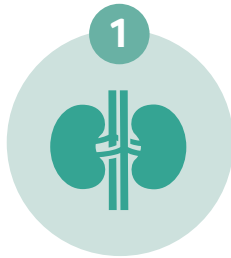


# Chapter 1

## 1.1 Introduction

### 1.1.1 Introducing the kidneys in health and disease

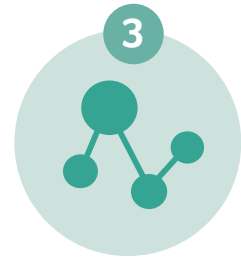
The urinary system is crucial for life. It consists of the kidneys and lower renal tract (the ureters, bladder and urethra). This complex set of structures works in harmony to fulfil three main functions:



**the production and passing of urine as a vehicle for the excretion of metabolic waste products, at the same time retaining cells and useful proteins within the circulation;**



**maintaining normal bodily balances of water and many different molecules and minerals (such as sodium, potassium and calcium);**



**and the production of hormones that play roles in blood pressure control and the formation of red blood cells.**

To carry out these various functions, the kidneys contain many different types of cell. The kidneys begin to form during the first three months of pregnancy, and even after birth they continue to grow and mature. Without kidneys a person would die within a few days to weeks as a result of the build up of

waste products and fluid. From approximately age 30, there is a natural subtle but progressive decline in kidney function that does not usually impair health, but which may make the kidneys less able to cope with disease.

---

### 1.1.2 Kidney disease, kidney patients and their care

Disorders of the kidneys and urinary tract may occur across a spectrum ranging from serious structural abnormalities or complete failure to produce urine to disturbances in the balance of one or more substances in the body for which the kidneys are responsible, but which leave excretory function intact. Minimally damaged kidneys often have no significant impact on wellbeing; poorly functioning kidneys may still be able to sustain life, but at the expense of chronic ill health including high blood pressure, anaemia, bone disease (causing fractures and, in children, poor growth) and a marked propensity to heart attacks and strokes.

Many different disease processes can affect the kidneys. Young children with renal failure are often born with abnormal kidneys and some of them carry mutations in genes that control normal kidney growth, maturation and function. By contrast, most kidney failure in older children and adults is caused by damage to previously normal kidneys, and may be due to immunological factors (glomerulonephritis); infections (often originating in an abnormal lower renal tract); diabetes; or the overgrowth of tubules (in polycystic kidneys).<sup>4,5</sup> At all

ages the kidneys may be 'innocent bystanders' damaged by side-effects of drugs administered for a wide range of other disorders, or by circulatory failure triggered by disease (such as heart or liver failure) or massive blood loss elsewhere in the body (e.g. during surgery). In addition,

**up to 12% of those attending renal units have a rare cause of their kidney problem**



(defined as affecting fewer than one in 2,000 people). The spectrum of such disorders is huge, ranging from those that are life-limiting in early life to those where excretory renal function is unlikely to be affected but homeostatic processes (the body's ability to maintain internal stability) have gone awry.

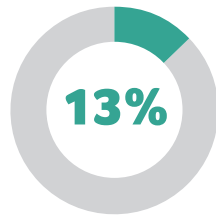
Chronic kidney disease (CKD) is the term conventionally applied to abnormalities of kidney structure or function that are present for more than three months and have implications for health.

<sup>4</sup> Finne P et al *JAMA* 2005;294:1782

<sup>5</sup> de Boer IH et al *J Am Soc Nephrol* 2014; 25:2342-50



**CKD is common - up to of the UK adult population may be affected<sup>6</sup>**



- and is frequently unrecognised. It commonly co-exists with diabetes and cardiovascular disease. A small but important minority of people with CKD will progress to 'end stage kidney disease', where regular dialysis treatment or kidney transplantation are needed to sustain life.



**In the UK, about 800 children and 57,000 adults are in this situation;**



**haemodialysis costs the NHS at least £30,000 per patient per year.<sup>7</sup>**



Cardiovascular risk is increased in CKD, even in the earlier stages, and much more so in the dialysis population. Robust epidemiological (population-level) data demonstrate that reduced excretory function and the presence of protein in the urine are powerful independent risk factors for cardiovascular disease across a range of populations.<sup>8</sup> People with CKD may also be vulnerable to harm as a result of poor prescribing. There are also important associations between CKD, depression<sup>9</sup> and frailty.<sup>10</sup>

Acute kidney injury (AKI), formerly called 'acute renal failure', is characterised by the abrupt impairment of kidney function. Existing CKD is a critical risk factor for AKI. AKI is associated with 20% of emergency hospital admissions and a mortality rate in hospital in-patients of nearly 24%.<sup>11</sup> It is also common postoperatively.

**The annual cost of AKI-related in-patient care in England is estimated at over**

**£1 billion**

**just over 1% of the NHS budget.<sup>12</sup>**



**of cases are thought to be predictable and avoidable.<sup>13</sup>**

Kidney disease does not affect all populations equally. Black and South Asian patients are over-represented, particularly in the most severe stages of disease. CKD is associated with lower socio-economic status, and people from more socially deprived areas have poorer access to the transplant waiting list.<sup>14</sup>

### 1.1.3 Kidney research

The complex biology of normal kidneys and the very wide spectrum of renal disease makes Nephrology both a potentially challenging but also a highly rewarding specialty. The same complexity is reflected in the variety of research being undertaken to better understand how the kidney works in health and disease, and how best to meet the needs of kidney patients of all kinds. This spans trying to understand how kidneys grow, how they respond to injury, and how best to treat people with established kidney disease.

Understanding renal pathophysiology and the implications for patients has therefore been the subject of a wide spectrum of scientific approaches. These have interested researchers with primary backgrounds in molecular, cellular, whole organism and population-based techniques, and have included both quantitative and qualitative methodologies.

The renal research community encompasses a wide range of both academic (i.e. university-salaried) and clinical (employed by the NHS) investigators. The main pockets of excellence in 'pre-clinical' research have traditionally been based in the major UK Russell Group Universities.

**They are renowned for world-leading basic science, and the UK has a strong international track record in genetics, molecular and biochemical mechanisms and animal studies in a range of renal disorders.**



However, the geographical distribution of renal research has widened over the past decade. The synergy of pre-clinical and clinical approaches has resulted in various high-impact clinical trials, and the engagement of different members of the multi-professional team has ensured that Nephrology has long been perceived as an exciting academic specialty and as such has attracted generations of trainees.

**People with kidney disease and their families are essential partners in research, and the power of the patient voice must not be under-estimated.**



This was exemplified in the creation of the *Kidney Health: Delivering Excellence* report published in October 2013,<sup>15</sup> which was co-written by patients and professionals. It articulated 16 future ambitions for kidney care, several of which call for better evidence to support the delivery of high-quality care. The need for a UK renal research strategy was highlighted in *Ambition 15*; this document is the renal community's response to that call, within which the patient's voice, research preferences and priorities have been sought and embedded.

<sup>6</sup> <https://catalogue.ic.nhs.uk/publications/public-health/surveys/heal-surv-heal-life-eng-2009/heal-surv-heal-life-eng-2009-rep-v2.pdf>

<sup>7</sup> <https://www.england.nhs.uk/wp-content/uploads/2014/04/a07-renal-transpl-ad-0414.pdf>

<sup>8</sup> Nitsch D et al *BMJ* 2013; 346:f324; Fox CS et al *Lancet* 2012;380:1662-73; Matsushita K et al *Lancet* 2010;375:2073-81

<sup>9</sup> Palmer S et al *Kidney Int* 2013;84:179-191

<sup>10</sup> Walker SR et al *BMC Nephrol* 2013;14:228

<sup>11</sup> Selby NM et al *CJASN* 2012;7:533

<sup>12</sup> Kerr M et al *Nephrol Dial Transplant* 2014;29:1362

<sup>13</sup> <http://www.ncepod.org.uk/2009aki.html>

<sup>14</sup> Udayaraj UP et al *J Epidemiol Community Health* 2010;64:535-41

<sup>15</sup> <http://www.britishkidney-pa.co.uk/images/stories/downloads/Kidney-Health-Report.pdf>

## 1.2. Organisational components of UK renal research

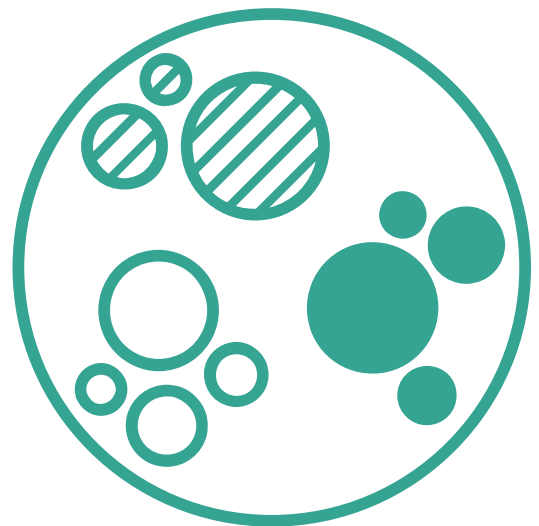
Renal research in the UK is underpinned by a variety of professional and patient organisations and funding streams that often overlap. These are listed below and a description of each can be found in **Appendix 1**.

### A. Professional and patient organisations

- The Renal Association<sup>16</sup>
- The British Association for Paediatric Nephrology (BAPN)<sup>17</sup>
- The British Renal Society (BRS)<sup>18</sup>
- The British Transplantation Society (BTS)<sup>19</sup>
- Patient organisations
  - a) The British Kidney Patient Association (BKPA)<sup>20</sup>
  - b) The National Kidney Federation (NKF)<sup>21</sup>
  - c) Many individual diagnosis-specific charities as well as patient/family support groups including The PKD (Polycystic Kidney Disease) Charity,<sup>22</sup> Action for Alports<sup>23</sup> and Atypical Haemolytic Uraemic Syndrome (aHUSUK)<sup>24</sup>
  - d) The National BAME (Black, Asian and Minority Ethnic) Transplant Alliance (NBTA)<sup>25</sup>
- The UK Kidney Research Consortium (UKKRC)<sup>26</sup>
- The National Institute for Health Research (NIHR) Clinical Research Network (CRN) Renal Disorders Specialty Group<sup>27</sup>
- The UK Renal Registry (UKRR)<sup>28</sup>
- Rare disease working groups and registry (RaDaR)<sup>29</sup>
- NHS Blood and Transplant (NHSBT)<sup>30</sup>
- Devolved nations
  - a) The Wales Kidney Research Unit<sup>31</sup>
  - b) The Northern Ireland renal Clinical Research Network<sup>32</sup>
  - c) NHS Research Scotland<sup>33</sup>

### B. Main funders

- Kidney Research UK (KRUK)<sup>34</sup>
- Kids Kidney Research (KKR)<sup>35</sup>
- British Kidney Patient Association (BKPA)<sup>20</sup>
- British Renal Society (BRS)<sup>18</sup>
- Other charitable research funding bodies e.g. Wellcome Trust,<sup>36</sup> British Heart Foundation<sup>37</sup> and the Royal College of Surgeons<sup>38</sup>
- Medical Research Council<sup>39</sup>
- National Institute for Health Research (NIHR)<sup>40</sup>
- The Health Foundation<sup>41</sup>
- Chief Scientist's Office Scotland and NHS Research Scotland<sup>42</sup>
- Industry
- The European Union<sup>43</sup>



<sup>16</sup> <http://www.renal.org>

<sup>17</sup> <http://www.renal.org/bapn>

<sup>18</sup> <http://www.britishrenal.org>

<sup>19</sup> <http://www.bts.org.uk>

<sup>20</sup> <http://www.britishkidney-pa.co.uk>

<sup>21</sup> <http://www.kidney.org.uk>

<sup>22</sup> <http://pkdcharity.org.uk/home>

<sup>23</sup> <https://www.kidneyresearchuk.org/action-for-alports>

<sup>24</sup> <http://ahusuk.org>

<sup>25</sup> <http://www.nbta-uk.org.uk>

<sup>26</sup> <http://www.renal.org/about-us/what-we-do/joint-activities/uk-kidney-research-consortium>

<sup>27</sup> <http://www.crn.nihr.ac.uk/renal>

<sup>28</sup> <https://www.renalreg.org>

<sup>29</sup> <http://www.rarerenal.org> and <http://rarerenal.org/radar-registry>

<sup>30</sup> <http://www.nhsbt.nhs.uk>

<sup>31</sup> <http://kidneyresearchunit.wales/en/>

<sup>32</sup> [http://www.research.hscni.net/sites/default/files/Renal\\_Leaflet\\_10\\_12.pdf](http://www.research.hscni.net/sites/default/files/Renal_Leaflet_10_12.pdf)

<sup>33</sup> <http://www.nhsresearchscotland.org.uk/research-areas/renal>

<sup>34</sup> <http://www.kidneyresearchuk.org>

<sup>35</sup> <http://www.kidskidneyresearch.org>

<sup>36</sup> <http://www.wellcome.ac.uk>

<sup>37</sup> <https://www.bhf.org.uk>

<sup>38</sup> <https://www.rcseng.ac.uk/surgeons/training/fellowships>

<sup>39</sup> <http://www.mrc.ac.uk>

<sup>40</sup> <http://www.nihr.ac.uk>

<sup>41</sup> <http://www.health.org.uk>

<sup>42</sup> <http://www.cso.scot.nhs.uk> and <http://www.nhsresearchscotland.org.uk>

<sup>43</sup> <https://erc.europa.eu>

# 1.3 The impacts of UK renal research

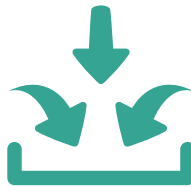
The UK Renal community has a long tradition of research in combination with clinical care.

**A key feature of this research has been the wide range of topics studied, which covers the spectrum from pre-clinical ‘laboratory’ research to patient-focused ‘clinical’ research.**



For the latter, research has generated a significant evidence base for patient care, including treatment delivery, workforce planning, nutrition and exercise counselling, models of shared and self-care, psychosocial and psychiatric care, behaviour change, patient education, treatment choices, and patient-shared decision making. Such studies have directly informed National Institute of Health and Clinical Excellence guidelines, and continue to do so.<sup>44</sup> There are also strong examples in clinical trials, epidemiology and, at the ‘laboratory’ end, understanding normal and disease implications of genetics, developmental and cell biology, immunology, and physiology.

**Often, both laboratory-based and clinical research can be enhanced by inputs from more than one individual, team, organisation or approach.**

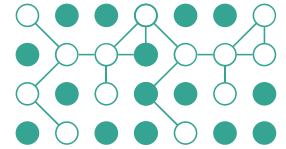


The NIHR CRN provides the infrastructure to support clinical trial activity and successful coalitions of professional and patient groupings highlight the capacity for UK kidney community collaboration. For example, the harmonious

interaction of UKKRC, Kidney Research UK and the NIHR Renal Disorders group has led to an excellent model within which research developments (the Clinical Study Groups (CSGs)) and delivery (NIHR) are flourishing.<sup>45</sup>

We are also beginning to see better integration of clinician with non-clinician academics, and of renal researchers with industrial partners. In addition,

**the Renal Registry offers a potential wealth of routine healthcare data for researchers.**



Together with the recognised strengths of UK basic science research and a strong academic pedigree within renal medicine, all these elements create a fertile environment for world-class research.

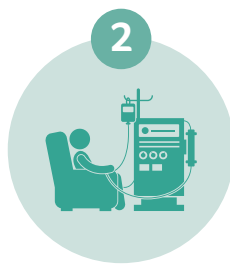
**We began the process of formulating this strategy document by asking a wide range of stakeholders to provide examples of recent research that they consider have had (or will have) the most impact.**



While a complete list is beyond the scope of this document, the responses received included a number of notable research studies in which the UK has led the way, which are presented in **Appendix 2** and which sit within the following areas:



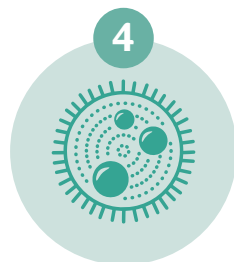
**Drugs and interventions to treat CKD and its complications**



**Care of people with CKD prior to and on dialysis**



**Kidney transplantation**



**The biology of renal diseases**



**Genetic causes of renal disease**

<sup>44</sup> Examples include CG182 (Early identification and management of chronic kidney disease in adults in primary and secondary care), CG157 (Phosphate binders in adults), NG8 (Anaemia management in people with CKD).

<sup>45</sup> UK Kidney Research Consortium. *Clin Med* 2015;15:415-9

# Chapter 2

---

In this chapter, we first summarise the research priorities that were identified by consulting a wide range of stakeholders comprising renal professional bodies, renal research charities and representative patient charities and organisations. Secondly, we have collated the major evidence gaps identified by stakeholders themselves. In Chapter 3 we distill these into a set of major goals and propose strategic ways to achieve them.

## 2.1 Research priorities

### 2.1.1 The patient view

As described in Chapter 1 and Appendix 1, in the UK the patient voice can be heard through various organisations. As well as the BKPA,<sup>20</sup> NKF<sup>21</sup> and Kidney Research UK,<sup>33</sup> condition-specific patient groups have sprung up over the past few years, particularly for those with rare diseases. However, there is little published evidence for the research priorities of UK renal patients.

In 2013 Kidney Research UK undertook a survey<sup>46</sup> that asked people in the UK with a variety of kidney diseases what they considered to be the most important directions for renal research.



**Over 1,000** people responded.

From the questions posed, and despite the difficulties of living with a long-term condition that can negatively affect both quality and length of life,

**the majority of these patients said they preferred to see research focus on an improved outlook for future kidney patients.**



They wanted studies to concentrate on cures and prevention as well as the causes and early detection of kidney diseases. They also highlighted the importance of finding new sources of organs for transplantation as well as improving the quality of life of people with kidney disease.

Also in 2013, patients consulted on the *Kidney Health: Delivering Excellence* report<sup>47</sup> said that

**research into self-management and finding better ways to alleviate the difficult symptoms of kidney failure**



were very important to them. Patient research preferences and priorities clearly need to be captured in future research, and a representative patient voice sought to inform the foci of renal research and the direction of research funding.

In recent years patients have begun to be better informed about research. There is more of a focus on 'lay summaries' in research proposals; research groups are encouraged to include patients at all stages of the research development process. Information and opportunities to participate in research are presented and circulated by the BKPA (via its patient advisory group, website<sup>20</sup> and social media), by the NKF (in its magazine *Kidney Life*)<sup>21</sup> and via the KRUK website.<sup>48</sup> A session at the 2013 NKF Conference on research generated a plea for more patient involvement, not only as trial participants but also on research steering groups; this group also highlighted the need for more effective communication of research findings and outcomes.

<sup>46</sup> <https://www.kidneyresearchuk.org/patient-survey-2013-results>

<sup>47</sup> <http://www.britishkidney-pa.co.uk/images/stories/downloads/Kidney-Health-Report.pdf>

<sup>48</sup> <https://www.kidneyresearchuk.org/research/patient-and-carer-involvement>

## 2.1.2 Professional bodies

In compiling this report we received input from various professional bodies including the British Dietetic Association,<sup>49</sup> BTS,<sup>19</sup> NHSBT,<sup>30</sup> NHS England,<sup>50</sup> RA,<sup>16</sup> the UK Renal Pharmacy Group,<sup>51</sup> BRS,<sup>18</sup> BAPN,<sup>17</sup> UKKRC<sup>26</sup> and the UK Renal Registry.<sup>28</sup>

As an overarching principle,

**kidney healthcare professionals believe that a UK renal research strategy should ultimately focus on outcomes that matter to patients,**



regardless of the cause or stage of kidney disease. It should enable world-class renal research to be performed from bench to bedside and from gene to populations. Furthermore there should be provision for high-quality qualitative and quantitative research. It should be across all age groups from the very young to the very old.

Consequently, clinical research should, wherever possible, include evidence from patients relating to quality of life and patient experience, not only to reflect what is important to patients but also to help assess risks and benefits from the patient perspective when making treatment decisions. There is also a specific need to evaluate the impact of all multi-disciplinary renal-related healthcare professionals, such as pharmacists and dieticians, and the impact of self-care or self-management, on the patient experience and patient quality of life.

**There is a firm opinion that a strong foundation of relevant 'basic' or 'pre-clinical' research is essential to inform future clinical research.**



For example, understanding the molecular biology underlying renal diseases enables the development of new therapies, as well as new tests to predict clinical outcomes. Related to this there is concern that we are in danger of losing the next generation of non-clinical renal researchers, which is currently a major issue throughout medically related science. It is therefore a high priority to develop and maintain the best possible environment to train future renal researchers, both clinical and non-clinical.

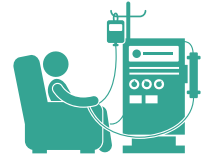
**There is also recognition of the importance of research into rare diseases,**



each of which may affect only a handful of patients, but which together affect a significant proportion of kidney patients. Better research into these diseases should lead to more equitable care, better treatments and better outcomes.

The professional groups highlighted a number of specific research priorities encompassing the entire spectrum of kidney disease, although in terms of lives saved,

**acute kidney injury and dialysis are perceived to be the biggest impact areas and therefore important areas to invest in.**



However there is also a need to improve transplantation and CKD outcomes and to provide more support to explore the qualitative aspects of shared care models, which are an area of strength in the UK.

Clinical research priorities identified by these groups can be otherwise grouped into major themes:

- Preventative care
- Prevention of AKI
- Prevention of CKD
- Prevention of the associated complications of CKD and dialysis such as cardiovascular and metabolic bone disease,

which all lead to premature ill-health and death.

**A second theme is the pressing need to find better therapies for existing problems,**



for example advancement of perfusion technology to increase the availability of viable organs for transplant, and avoidance of nephrotoxic immunosuppression to help reduce kidney rejection and so extend transplanted organ survival. Within this theme there is a need to better understand the existing spectrum of response to established therapies, such as blocking the renin-angiotensin hormone system in proteinuric diseases. In other areas new therapies are required because there is either no proven treatment or no optimal treatment for the disease process; examples here include treatments for glomerulonephritis, acute kidney injury and antibody mediated transplant rejection.

**A further theme is the need to develop therapies with fewer and more acceptable side effects, particularly in the arena of immunosuppression,**



to avoid undesirable consequences such as diabetes, infection and cancer. There is also support for investigation into medication usage, efficacy and optimisation.

<sup>49</sup> <http://www.bda.uk.com>

<sup>50</sup> <http://www.england.nhs.uk>

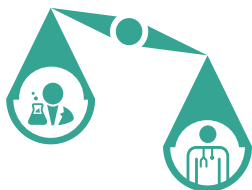
<sup>51</sup> <http://www.renalpharmacy.org.uk>

## 2.1.3 Renal research charities' priorities

Three UK renal research charities made inputs into this section of the report: Kidney Research UK,<sup>33</sup> KKR<sup>34</sup> and the PKD Charity.<sup>22</sup>

Stakeholders within the charities themselves saw the importance of supporting a balanced research portfolio, encompassing not only established investigators with high-impact projects but also emerging investigators and/or those with more innovative but potentially riskier projects including technologies such as new imaging techniques, stem cell and other biological therapies.

**Research undertaken by scientists, clinicians and professionals allied to medicine should be equally encouraged.**



The wide spectrum of research priorities was recognised, ranging from basic research into the causes of renal disease (because a better understanding of disease mechanisms should help to develop therapies in the medium to long term), through to randomised clinical trials in order to balance the potential benefits against harm from medicines and other interventions.

**The importance of a strengthened integration between clinical investigators, basic scientists and industrial partners was highlighted.**



Particular areas of research interest encompass early pre-clinical work, such as defining the best animal models relevant to people with renal disease, exploring alternatives to animal models, where appropriate,<sup>52</sup> and translating new biological insights into new treatments.

Stakeholders also acknowledged that there is a second 'translational gap',

**namely quality improvement or the embedding of proven treatments into clinical practice, particularly at this time of unprecedented financial austerity within the NHS.**



Stakeholders wish to prioritise research into preventative measures such as earlier diagnosis, improved indicators for more prompt referral into specialist care, slowing the progression of chronic kidney disease, and prevention and treatment of its associated complications such as cardiovascular disease, bone disease and anaemia. There is also a significant appetite for more collaborative multi-centre randomised clinical trials, for example those designed to test interventions to optimise early and long-term kidney transplant outcomes.

**Lastly there is enthusiasm for the application of modern genomics**



(e.g. whole genome sequencing and gene association studies) to understand renal disease both in populations and at the individual level ('personalised genetics'). In particular this might include the application of genetics to define the primary disease for patients with 'End Stage Renal Disease of unknown cause', or studies to determine subgroups likely to benefit (or not) from particular therapies.

<sup>52</sup> Wells DJ *Ann NY Acad Sci* 2011;1245: 14–16.

## 2.2 Evidence gaps

In every area of renal medicine there are knowledge gaps. In some cases these concern the mechanisms of how kidney diseases begin, how they progress and their complications. In turn, such insights should lead to new treatments. The relevance of specific animal models and their study being translatable to human disease, and finding suitable alternatives, are also important questions. In other areas there is insufficient evidence to be able to define the best care pathways, assess acceptability to patients, or ensure best outcomes. The track record of negative clinical trials reaching publication is poor and could be addressed by engaging in more feasibility studies, via organisations such as AllTrials<sup>53</sup> but most importantly by increasing the number and quality of clinical trials carried out in the UK.

The following list has been directly collated from our initial consultation, and has therefore been contributed to by all sectors within the renal community. Many of the evidence gaps highlighted here will require randomised trials to address them.



### Acute kidney injury:

- Suitable markers for earlier detection
- Better identification of those at risk
- Novel therapies for prevention and to enhance recovery
- Long-term outcomes and responses to therapy
- Optimal nutritional support



### Chronic kidney disease:

- The impact of earlier diagnosis and intervention on outcomes
- Better indicators for prompt referral to specialist care
- Reducing cardiovascular risk
- Better markers of progression, and prevention and treatment of systemic complications
- Phosphate binders: long-term illness and mortality
- Mechanisms of fibrosis

<sup>53</sup> <http://www.alltrials.net>





## Dialysis:

- Biological and psychosocial effects
- Benefits of exercise
- Nutritional research
- Understanding and reducing cardiovascular ill-health and mortality
- Reducing complications of peritoneal dialysis
- Vascular access and dialysis techniques
- Technological innovations



## Genetics and genomics:

- Applying modern genomics (e.g. whole genome sequencing, association studies etc) to understand renal disease at the population level and at the individual ('personalised genetics') levels
- Mining the genome to understand the molecular basis of many renal disorders, determining factors governing differential progression, responses to treatment etc.
- Epigenetic modifiers in kidney disease



## Transplantation:

- Classifying risk levels in transplant recipients
- Defining the best immunosuppressive regimen
- Best perfusion technology
- Effective therapies for chronic rejection
- Best management of the highly sensitised kidney transplant recipient
- Management of antibody-mediated rejection
- Optimising transplant outcomes
- Inducing tolerance to prevent rejection



## Patient experience, quality of care and quality of life:

- Patient experience and its relationship to outcomes
- Addressing the second 'translational gap' (quality improvement) of embedding proven interventions into clinical practice, in the context of a resource-limited NHS
- Significantly different attitudes to organ donation within BAME communities
- Additional questions regarding differences in clinical outcomes in this patient grouping and in different socio-economic groups in general
- Patient reported outcomes – what patients want to know, what patients understand about what we tell them and how we should best communicate with them
- Lack of evidence for treatments for many rare disorders
- Making the leap into personalised medicine

# Chapter 3

---

**In this chapter we present the Recommendations underpinning our four strategic Aims that are designed to provide a framework for the sustainment of excellence in UK renal research. These were distilled from the challenges affecting research identified by researchers, clinicians, funders and patients in the renal community (Chapter 2). Each Recommendation is accompanied by a description of the related issues, followed by one or more suggested ways to achieve progress. They are not in a rank order.**

# Strategic Aim 1

To increase engagement of professionals, patients and the public with kidney research.

- We believe that all people with kidney disease should be able to participate in research, regardless of where they receive their care. Critically, access to clinical trials should be a routine part of discussions about treatment options. These ideas should apply equally to children and adults with kidney disease, and will require increased engagement of all staff encountering kidney patients and their families.

## Recommendation 1:

Develop a culture where every person with a renal disorder accessing any type of renal service (or their families and carers, where appropriate) is offered the opportunity to participate in research.



### Commentary 1

Our experience, which is supported by our consultations, is that patients and their carers are keen to take part in research studies of all kinds. Such participation may involve the single contribution of a research sample, engagement with more complex protocols such as clinical trials, or participation in clinical research development.

We should strive to develop a culture similar to that in oncology, where enrolment of patients into research studies becomes the norm. There is a pressing need to further raise awareness and understanding of research among renal patients and their families in order to achieve a change in culture and secure a higher level of patient interest and engagement, both as advisors and as participants.

The reverse of this coin is that ideally, every kidney condition has one or more eligible research studies (be they observational, interventional or laboratory-based) together with a local investigator. This would ensure that every patient has the opportunity to contribute to research locally, thereby both improving their own understanding of their disease while at the same advancing knowledge in that area. At present this is both disjointed and variable, somewhat akin to a 'postcode lottery' in that patients remote from 'centres of excellence' are generally disadvantaged.

Taken together, these changes will mean that the footprint for renal research will grow, with a research culture embedded within all Renal Units. This will allow patients and their carers to participate in research more widely, give researchers better access to patients in local NHS Trusts, and enable more clinicians to engage in research activities.

### Ways forward 1

- More widespread adoption of a policy of Consent for Consent or Consent for Contact, where patients (or, where appropriate, their carers) give consent for researchers to access their medical records to check eligibility for future research studies. This would work most effectively in conjunction with a register of people who are willing for researchers to contact them to ask if they would like to take part in relevant current or future research projects. With additional resourcing, this register could form part of the UK Renal Registry.
- A flexible and responsive regional Clinical Research Network resource of nurses/trials practitioners to engage and up-skill local multi-professional teams.
- Investment from academic renal units in one or more tenured research nurses/research managers would ensure greater agility to commit to both small-scale local studies as well as larger multi-centre studies (see Strategic Aim 3 on page 25).
- Increased support for all patients and carers willing to become local ambassadors for research, ideally in every renal unit across the UK.

## Recommendation 2:

**Increase and promote equitable access to research for minority groups with kidney disorders, including children and those from Black, Asian and Minority Ethnic backgrounds (BAME).**



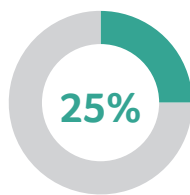
### Commentary 2

Various issues that impede research relate more specifically to children than adults. Examples include adherence to treatment (especially for adolescents); effects of growth and puberty; difficulties applying data primarily obtained in adults; the high percentage of children whose underlying renal disorder is malformation of the urinary tract; and providing appropriate information so as to obtain appropriate consent.

A major gap both in paediatric nephrology (where many of the underlying conditions are rare) and in rare diseases in general is in translating research into patient benefit. This is partly due to the very small numbers at any one centre (and/or overall), and is related to a lack of consensus amongst paediatric nephrologists in this subspecialist field, and to difficulty in obtaining nationwide engagement.

Some research has already identified particular needs of BAME kidney patients in the UK and this has been summarised by the NBTA<sup>25</sup>. However, there are major issues that need both further research and action. For example, we do not know enough about why kidney diseases continue to be more common among BAME communities, including among those who are born in the UK, nor what can be done to reduce this. Attitudes to transplantation vary, despite actions taken to promote organ donation and transplantation within BAME communities as well as better understanding of what has worked in bringing about limited change to date.

**The proportion of kidney patients from BAME background on dialysis or waiting for a transplant is disproportionate at around**



and will increase if we do not take action. Provision for patients from BAME backgrounds across the country varies greatly and this variation is unexplained. We need to focus future research activities on these issues and encourage funders and others to give this priority.

### Ways forward 2

- **Development of the culture, as recommended for adults, whereby every child's family is offered inclusion into a research study if possible.**
- **Better development of high-quality paediatric clinical trials with national and international collaboration.**
- **Ensuring that research opportunities and training are available for the paediatric multi-disciplinary team, to include study of all parts of a child's psychological and physiological development.**
- **Further investment in and development of the Rare Renal Disease registries. This is an obvious way to build critical research evidence, ensure best practice nationally and develop new therapeutic strategies.**
- **NBTA, charities and other patient organisations should raise awareness of the importance of research involvement within the kidney community and especially BAME community groups, and evaluate the barriers to such participation.**
- **To increase BAME community participation, the UKKRC should work with NBTA and others to support and encourage research on BAME issues, raise researcher awareness, promote and monitor equitable recruitment opportunities (e.g. accommodating people with different languages, reading and writing skills, and needs) and develop guidance on best practice in recruiting BAME kidney patients.**
- **Positive action by research funders to promote research into BAME issues.**

## Recommendation 3:

**Create a national Kidney Biobank for collection and storage of biological samples from every kidney patient, to provide a strategic resource for fundamental and translational research.**



### Commentary 3

There is a pressing need for more extensive investment in and access to Biobanks (collections of biological samples e.g. DNA, tissue biopsies), of which there are currently in renal medicine a mere handful and most are diagnosis-specific. The research studies that were made feasible by the establishment of both the MRC-Kidney Research UK funded glomerulonephritis and also the Wellcome Trust/MRC funded vesicoureteric reflux UK DNA Banks began to illustrate the potential of biobanking in Nephrology.

**These early successes, which involved the collection of a few thousand samples, now need to be further developed and scaled-up.**



In the genomic and post-genomic eras, we must be able to generate and mine genomic, proteomic and metabolomic datasets relevant to renal disease in order to generate new therapeutic targets. We recognise that national genomic initiatives such as Genome England Limited (GEL) may well provide a solution for DNA and 'omics' samples, which are readily obtained and for which there is already storage and curating infrastructure. Other initiatives, such as the Wales Kidney Tissue Bank, the Rare Renal Disease Registry (RADAR) and the new Genomics England Clinical Interpretation Partnership (GeCIP) naturally feed into these aspirations.

In future, we need to consider how to coordinate existing repositories as well as banking blood, urine and pathological samples from all participants in research (e.g. to be used to measure potential marker proteins and gene activity) and viable cells (e.g. to be used to generate stem cells capable of developing into kidney cells) – to be used as test beds for new therapies).

### Ways forward 3

- **Adoption of Open or Blanket Consent where patients give consent for their clinical material to be used in future research. Informed consent generally permits specific uses of clinical material, yet there are situations where material could be used more than once, even for as yet unknown research. Open or Blanket Consent is given only once, but covers any future use of the material. This is particularly important where new ideas or assays may emerge many years after individuals have given the consent and donated their clinical material; they may even have died in the meantime.**
- **The development of the new national Biobanking facility in Milton Keynes (or similar) may present an immediately workable way forward for new collections.**
- **Coordination of existing collections via a central register.**
- **Adequate investment in observational or cohort studies with long-term follow up will be required to provide high quality clinical data alongside the collection of samples for biobanking.**

## Recommendation 4:

To complete the research loop, better communicate the outcome of all kidney research to patients and the public in accessible language that they can understand.



### Commentary 4

Effectively communicating the outcome of research projects to patients and the public is crucial not only to improve understanding of kidney function and disease, but also to enable patient involvement and participation in future studies. We believe that overall this needs significant improvement;

**many patients complain that they receive no or little feedback from the research activities in which they have participated voluntarily.**



We recognise that communicating the outcome of research requires special skills and funding, since adaptation of language is often needed, and a variety of media will need to be employed.

### Ways forward 4

- **'Kidney Charities Together'** (a group comprising the main kidney charities) is a suitable umbrella to develop guidance on how the outcome of research should be communicated to patients and consider what support it can provide in doing so.
- Funding to communicate the outcome of clinical research should be built into the research budget. Some organisations (e.g. the Wellcome Trust) already make such sums available.
- Clear and open publication of centre-specific research activity would help patient awareness and enable them to make comparisons.
- Review by the UKKRC of progress on the involvement of patients in research projects it supports and the way the outcome of these projects is communicated to patients.

## Strategic Aim 2

**Capitalise on the full spectrum of research approaches to ensure a well-balanced portfolio that includes underlying causes, prevention, treatment and impact.**

- As discussed in Chapter 1, the UK renal community can take pride in research successes concerning studies involving a very wide spectrum of topics from single molecules to whole populations, from quantitative to qualitative, and from observational to interventional. Preserving this variety is key to improving renal health and patient welfare.

### Recommendation 5:

**Preserve support and funding of laboratory science, because new fundamental discoveries are the key to future improvements in health.**



### Commentary 5

The journey to disease modifying therapies or preventative interventions can be long - the current ability of (for example) cancer researchers to initiate clinical trials is based on basic scientific discoveries made over a two-decade or more timespan. We therefore need to ensure that

**we continue to be world leading in basic science in order to develop the new therapeutic targets of the future**



which can be integrated into patient-centred research studies.

Of the various types of study relevant to renal patients, this Recommendation concerns those that seek firstly to understand the normal biology of the kidney (including how it is formed, grows and ages, and how it functions to maintain health) and secondly, those directed to understanding the nature of kidney diseases and how best to treat them. Without understanding these processes, it is unlikely that ideal therapies can be envisaged and applied.

Cutting through these themes are a range of experimental techniques and approaches, all of which may provide critical 'pieces of the jigsaw'. Some of these are very 'laboratory-based', while others involve direct studies of patients. A wide variety of basic science (e.g. developmental, cell and molecular biology, and physiology) and applied sciences (e.g. adult and paediatric nephrology, clinical genetics and health economics) may be involved.

Furthermore, while there is much discussion about the use of animals (overwhelmingly mice and rats, but also fish and frogs) in research, renal research is likely to continue to need realistic animal models to work out the mechanisms of human disease and to act as test beds for new therapies. An excellent example of this is the 'remnant kidney' rat model of progressive renal disease in which the study of altered pressures within glomeruli led to the discovery that angiotensin II blockade could ameliorate kidney failure; such drugs are now a mainstay of treatment for people with damaged kidneys. In future, the more extensive use of biomarkers and non-invasive imaging techniques to monitor renal disease in pre-clinical models will allow a more sophisticated use of animals, and minimize numbers in experiments.

### Ways forward 5

- **Setting up designated UK centres that can champion specific fields (e.g. genomics, animal research, pathophysiological mechanisms, clinical trials) and can act as hubs for these. An example is the recently-announced Genomic Clinical Informatics Panel (GeCIP) for nephrology, which is being led from University College London but has national membership.**
- **Recognition in funding allocations that the eventual benefits to patients of pre-clinical studies may not be immediately apparent.**

## Recommendation 6:

Increase the number and quality of clinical trials, to address evidence gaps and measure and determine best practice/treatment.



### Commentary 6

Randomised clinical trials remain the best method to test most interventions in medicine, and renal medicine is no exception. Indeed, such trials are essential for studying such complex and diverse populations.

**Despite some successes, it is well documented that nephrology lags behind most other specialties in the number and quality of clinical trials conducted,<sup>54</sup>**



and this situation must be addressed.

Lack of reliable trial evidence is one reason for the variation in care between kidney units that is discussed elsewhere (see Recommendation 8). For improvement science to play a role, we must prioritise randomised trials as a key method to establish best practice and then reduce inequalities by all units adopting the best practice guided by such trials. The SHARP trial has demonstrated that large randomised trials can change practice substantially and improve patient outcomes.<sup>55</sup>

While recognising that some interventions may not be amenable to randomisation and not all questions can be addressed immediately by trials, we must aspire to improve the evidence base in this fundamental way.

Some patients/carers are keen to contribute to research design and development and contribute to research bids and project boards, and this needs to be utilised more widely.<sup>56</sup> More often than not such volunteers are neither approached nor included, or are nominally included as a 'box-ticking' exercise. This is a highly undesirable situation, which if unchecked, risks Nephrology becoming a 'research poor' field in comparison with other specialties.

**Where appropriate, patients or carers should be genuinely involved from the earliest stages of study development so that their voice can be heard more effectively.**



Those who wish to sit on steering groups will clearly need training in how to be an effective member of a group in which they are going to be in a minority.

### Ways forward 6

- Promote the strengths of UK nephrology (importantly the Renal Registry and other NHS registries, which allow efficient trial designs) and the NHS as an ideal venue for multicentre trials to industry to leverage funding to support activity in trials and related research.
- Support and develop the existing infrastructure for clinical trials within the UK. The UKCRC has highlighted clinical research and fostered collaboration between units, but requires further support (e.g. a funded secretariat) to help it deliver further benefits.
- Highlight clinical research and trials more to trainees (both clinical and in allied health professions) to encourage them to consider and seek training in such research.
- Develop dedicated training in clinical trials methodology, and embed this within existing training courses (e.g. the Advanced Nephrology course).
- Appropriately train, support and reimburse patients and their carers who agree to take up positions on research study steering groups; this will require specific funding to be built into the overall budgets of such studies.
- Develop a code of practice on how patients should be involved on research steering groups, both locally and nationally, led by patient-facing organisations (e.g. under the umbrella of 'Kidney Charities Together').
- Funders to more comprehensively monitor and report the involvement of patients.

<sup>54</sup> Strippoli, et al. *J Am Soc Nephrol*. 2004;15:411-9, Inrig et al. *Am J Kid Dis*. 2014;63:771-80

<sup>55</sup> SHARP Collaborative Group. *Lancet*. 2011;377:2181-92

<sup>56</sup> Navaneetha et al. *Am J Kid Dis*. 2015;65:641-643



## Recommendation 7:

**Embed commitment to robust and appropriate patient-focused qualitative research, to allow improvements in quality of care, health, quality of life and patient empowerment.**



### Commentary 7

The strength and value of qualitative research complementing data from quantitative clinical studies has long been recognised, particularly within NIHR funding streams, but this is often an underrepresented and poorly developed element of research bids. Identifying what works without exploring why and for whom provides a limited evidence base.

Historically it cannot be denied that priority of access to larger renal charity money has been given to bench research and clinical trials at the expense of qualitative patient-focused studies. Reasons for the perceived lack of importance associated with qualitative renal research until relatively recently are unclear.

**For research bids to be successful in the current competitive funding market, qualitative methods and expertise needs to be valued and integrated into bid development at an early stage.**



As with clinical trial development, co-producing bids with patients can assist this process. Organisations such as the Health Foundation state that expertise in patient/service user/ carer engagement must be included in bid applications.

### Ways forward 7

- **Renal Clinical Study Groups should invest in and cultivate qualitative expertise within and across groups, to enhance the potential of research bid submission to a successful outcome.**
- **To improve equity of research funding, research panels that assess grant applications must include members with the skills to understand and critically appraise the merits of robust qualitative methods.**
- **Further invest in applied clinical researchers trained from an early career stage in health services research methods.**
- **Further develop patient-led research hubs, such as that in Cambridge.<sup>57</sup>**

<sup>57</sup> <http://www.cuh.org.uk/clinical-trials/cambridge-clinical-trials-unit-cctu/patient-led-research-hub>

## Recommendation 8:

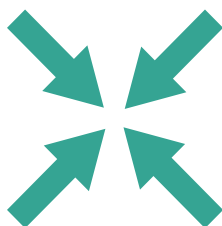
**Build the evidence base (improvement science) that will reduce unwarranted variation in practice and increase equitable access for patients to best available treatment.**



### Commentary 8

For many years the renal community has collated and monitored outcomes through the UK Renal Registry, but significant variations still exist among centres in the way care is delivered. There is unequal access to best treatment approaches for patients, which too often depends upon where people live.

**We will improve care for patients if we can reduce the research-practice gap and increase translation of research findings into clinical practice.**



However, improvement activities are often not backed by high quality evidence, and local context is a critical factor that may inhibit or facilitate the uptake and implementation of improvement work.

To raise standards in clinical practice, reduce unwarranted variations and increase equitable access for patients to best available treatment, more research that builds the evidence base supporting implementation of clinical improvements is needed.

To this end, NHS England and the Welsh Government's Health Quality Improvement Partnership is currently funding a National CKD Audit whose objectives are to improve the identification of CKD patients in primary care, improve the management and outcomes of CKD patients and tailor the care of people with CKD to local care pathways.<sup>58</sup>

As a community we should better promote the science of improvement work, in order to determine 'what works' and also better understand where and why interventions are effective. In this way we will be able to develop interventions that have transferable effectiveness and are based as much on evidence as the practices they seek to implement.

### Ways forward 8

- **Accept that the question of how to deliver reliable implementation of 'best practice' is a legitimate research question. This will require ownership and commitment by clinicians, units and renal care organisations to modifying practice based on best available evidence.**
- **Continue to identify and expose variations in practice using the UK Renal Registry.**
- **Understand that evaluating complex, 'system' interventions requires different methods depending on the different treatments and conditions involved.**
- **Increase the emphasis on partnerships between academics with experience in improvement methodologies and front-line clinical staff, to enable the design, delivery and rigorous evaluation of complex interventions.**
- **Expand opportunities for and funding of Quality Improvement in kidney care.**
- **Develop collaborative networks of experts to promote and facilitate appropriate studies (such as cluster-randomised trials) and trials, and promote the spread and uptake of the evidence they generate.<sup>59</sup>**

<sup>58</sup> <http://www.hqip.org.uk/national-programmes/a-z-of-nca/kidney-chronic-kidney-disease-in-primary-care>

<sup>59</sup> Green CA *BMC Med Res Methodology* 2006;6:54; Ormandy et al *J Ren Nursing* 2015; 7:5

## Strategic Aim 3

**Support the research training and career development of all contributors to renal research, to build sustainable research capability and capacity.**

- Our future health depends on our ability to train and support the research leaders of the future, across all disciplines.

### Recommendation 9:

**Increase resources and mentorship to develop and maintain research skills among nurses, allied health professionals and clinicians to ensure high quality multi-disciplinary renal research.**



### Commentary 9

It can convincingly be argued that Nephrology was the first specialty to truly embrace multi-professional working, which is crucial to delivering excellent renal clinical care. Similarly, research teams increasingly need multi-professional membership and allied health professional (AHP) team members (including nurses, social workers, pharmacists, physiotherapists, dietitians, counsellors, psychologists and technicians) can lead or play a vital research role. Good examples include the investigation of metabolic bone disease in CKD, optimal exercise regimes, nutrition questions and psychosocial counselling.

**For AHPs, the problems associated with training and subsequent involvement in research are particularly challenging, and not limited to Nephrology.**



Post-qualification, research is not a mandated part of the progression pathway in any of these careers. Some undertake MSc or MPhil research and a very small number progress to a PhD. The relevant professional bodies do recognise the value of research in their competency frameworks, but many employers do not consider it to be a priority area when set against clinical responsibilities. In addition, few renal units have a resident team of research nurses, and many survive on short-term funding for individual projects. This disrupts continuity in longer-term project management and risks loss of 'institutional memory' when funding streams come to end and (for example) research nurses move on into other disciplines. Furthermore, research staff recruitment 'lead time' may delay the start of studies.

Clinicians wishing to do research generally begin by taking time out of their postgraduate clinical training, during which an external source of salary funding has to be found, usually by the

award of a competitive research training fellowship from one of several funding bodies (e.g. KRUK, MRC, the Royal College of Surgeons or Wellcome Trust). This period may lead to the award of a higher degree (i.e. an MPhil, MD or PhD). However,

**Increasing inflexibility in the training programmes of clinicians often prevents comprehensive research training.**



Thereafter, the majority returns to full-time clinical training and NHS consultant employment. For this cohort, pressure of clinical duties increasingly prevents release for research. Study leave is difficult to obtain. Dedicated research sessions are the exception, and are rarely supported by management who often see the clinical role as starting and finishing with service delivery. Left unchecked, this will eventually lead to depletion of senior nephrology clinical academic role models, with a cycle of further depletion in academic recruitment.

A motivated workforce is needed to instigate and manage research.

**The concept that research is the cornerstone of everything that we do and it should be everyone's business is not generally supported across all professional and managerial sectors.**



It takes considerable time to write a successful grant application, and to lead or support a research project and analyse the findings. It is almost impossible to do this well

unless the investigator has dedicated research time. It is becoming increasingly uncommon for such protected time to appear outside of an 'academic' university contract. Time allocation for NHS post-holders, either to lead research – if they have developed a particular area of expertise – or to act as local Primary Investigators in multi-centre studies, has been increasingly removed from NHS posts as it is not perceived to be profitable.

## Ways forward 9

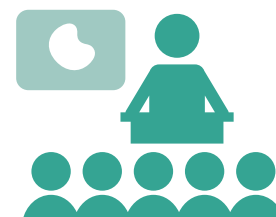
- **Research funders and NHS Trusts must be encouraged to develop training opportunities to invest in and enhance the research skills of the full multi-disciplinary renal team.**
- **An enhanced AHP fellowship initiative; those funded over recent years have progressed to, and continue to make a significant impact on, the renal research agenda.**
- **Inclusion by relevant accreditation bodies of explicit requirements for research skills competencies in all renal-related health care professions.**

- **For training-grade academic clinicians, there is a need to work collectively on new fellowship models where capacity can be increased through partnerships with industry, the Royal Colleges, and others including the MRC and Wellcome Trust.**
- **For those with academic training who have returned to full-time clinical posts, and those in clinical posts who have the ability and desire to lead and participate in research, research skills acquired over periods of years should not be wasted. All patients will not have the opportunity to participate in research without greater recognition of the importance of this group. The Royal Colleges and British Medical Association should make the case, to the NHS Confederation, NHS Employers and others, that more, not less, protected time for research is urgently needed.**
- **The proposed re-introduction of AHP Fellowships would have a highly significant impact. At least one should be funded each year for the next decade.**
- **Funding support for those returning to research after a career break would help prevent attrition of talent.**

---

## Recommendation 10:

**Improve support, training and career paths for non-clinical renal scientists in the academic sector.**



## Commentary 10

Non-clinician 'basic' scientists are the bedrock from which much of the molecular, cellular, animal-based and epidemiological research derives. This group includes those working in laboratories, statisticians and epidemiologists. There is little in the way of career security for these researchers apart from the small percentage who achieve independence as group leaders/tenure-track post-holders. Those doing renal research are not unique in not having a properly developed and supported career structure – for the majority, the model is one of moving along a series of short-term contracts, the terms of which impose a lack of security that is a disincentive to continuing. This is a major problem across the spectrum of biomedical science.

necessitating the constant diversion of talent from research to writing applications for small segments of each programme. In addition, the lack of institutional support for professional technicians and lab managers means that academics can spend much time on lab maintenance tasks rather than larger issues and advances.

## Ways forward 10

- **We urge specialist funders to continue identifying and supporting excellent emerging researchers and research groups: there might otherwise be a danger of continually supporting a handful of centres.**
- **Conversely, academic centres need proactively to support their basic scientists who wish to conduct renal research.**
- **Flexible support for those taking career breaks is essential.**

**In addition, individual laboratories are often hampered by the lack of long-term, significant infrastructure funding,**



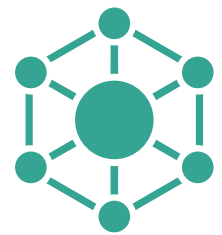
## Strategic Aim 4

Create a more open research culture to maximise cross-disciplinary and collaborative research.

- To perform world-leading research it is critical that national collaborative projects and initiatives are established and supported across disciplines, and this applies to a wide spectrum from genomic studies to clinical studies and trials.

### Recommendation 11:

Strengthen formal partnerships across disciplines, professional bodies and charities aligned with kidney disease, particularly in diabetes and cardiovascular disease.



### Commentary 11

While renal researchers are eligible for funding from Research Councils, Wellcome Trust and the NIHR, it goes without saying that this is an intense competition with other disciplines. Historically therefore, funding for renal research has relied to a great extent on specialty-specific charities such as Kidney Research UK, Kids Kidney Research, BKPA and BRS. These cannot usually provide sufficient funding to support a major multidisciplinary research idea to fruition over the medium to long term, particularly where co-morbidities are involved. Small-scale grants and the lack of seamless and sustainable support have in turn discouraged collaboration, leading to competition for access to clinical research material.

**Engaged and effective teamwork is a core requirement to initiate, support and carry out high-quality research.**



The UK kidney community offers a formidable opportunity for collaborative working amongst clinicians within a relatively small specialty and with relatively similar practice. This is well demonstrated in the rare diseases arena, where national multi-disciplinary working groups have been developed. However, collaborative effort is not yet always sufficient to avoid diffusion of ideas and resources, or competition for access to clinical material.

Effective research communication is also essential. It should allow all clinicians, researchers and patients to be aware of new funding initiatives they can bid for and also new studies in which they can participate and contribute. Currently, sometimes inadequate dissemination of relevant information means that individual researchers may be unaware of research opportunities and available support.

As a result, kidney research within the UK has on occasion been ad-hoc and opportunistic rather than structured and collaborative. Cooperation between centres rather than competition between them would significantly advance some fields of research. Better communication and collaboration among researchers would enable a more open culture and also discourage reporting bias.

Importantly, kidney disease commonly co-exists with other conditions, particularly diabetes mellitus and cardiovascular disease.

**Up to 30% of people with diabetes have moderate to severe CKD.**



Powerful epidemiological data clearly demonstrate that CKD and an increase in albuminuria are both powerful independent risk factors for cardiovascular disease. The management of many other conditions is also complicated by the presence of kidney disease.

Joined-up care that avoids 'silo management' is a well-articulated (if often incompletely realised) concept in clinical practice. Thus we need to devote a greater effort to research that is integrated across these relevant specialties, not least to define and test appropriate quality markers relevant to patients with complex multi-morbidity.

The climate is changing with the advent of new funding streams from the European Union, MRC and NIHR; the renal community needs rapidly to adapt to these opportunities.



Research integration should also include urology and other sub-specialties within surgery. Among many examples of the need to be more inclusive are complications and consequences of stone disease, unmet needs for transplantation research and post-operative AKI.

## Ways forward 11

- Establishment of a single high-quality, user-friendly UK national research communication portal through which all renal research activities can easily be accessed and used to identify new funding calls and studies. For clinical studies this could be curated by the UKKRC or the UKRR, and for preclinical ones, the RA or KRUK.
- Greater recognition of the importance of collaboration with local NHS Trusts away from the traditional centres

of excellence. Traditional academic centres may currently be leading research, but the contributions of participating sites must be better reflected in the budgeting of multi-centre studies.

- Investment in smaller research units outside of London and the Home Counties to increase potential patient involvement.
- A clearly stated commitment by the professional associations supporting kidney disease, diabetes and cardiovascular disease to hold regular dedicated special interest sessions at their UK professional conferences would be helpful.
- The UKKRC should expand and formalize its dialogue with research networks in diabetes and cardiovascular medicine.
- A series of more specific research recommendations across the medical and surgical vascular disease spectrum should be agreed by the necessary patient and professional groups to define an appropriate scope for genuine interdisciplinary applications to NIHR and other funders.

## Recommendation 12:

**Build closer research links with industry** to identify new therapeutic targets, develop collaborative clinical trials and research funding opportunities.



## Commentary 12

Historical mistrust between academia and industry has been dispelled in recent years, and

there is a need to expand the renal portfolio of commercial research within the UK.



An increased growth could markedly improve the research infrastructure in individual units, allowing staff expansion, and in turn, greater success with academic grants. This is also a major government target. It will also ultimately reduce the time that it takes for ideas to be translated into patient benefit.

There are now recognised funding streams that are available for early and late academic-industrial collaborations through funding agencies such as MRC and Wellcome Trust. A good example is recent significant funding from Pfizer to carry on the work included in a recent 'Progressive IgA nephropathy'

grant from the NIHR Rare Diseases Translational Research Collaboration funding stream.<sup>60</sup>

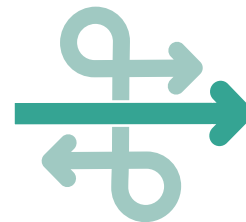
## Ways forward 12

- Creation of firmer links between industry and the renal research community through collaborative meetings. The UKKRC and CSG leads are ideally placed to develop these relationships.
- Ensure that the benefit of these links is clearly communicated to the academic and industrial world.
- Intellectual property rights in this setting should be clearly defined, with involvement of those with specific expertise in this area; this will allow appropriate sharing of ownership between academic and industry partners.

<sup>60</sup> <http://rd.trc.nihr.ac.uk/themes-2>

## Recommendation 13:

Work collectively towards a simpler, faster and more responsive pathway to ethical and regulatory approval, particularly for low-risk projects.



### Commentary 13

The diversity of approaches required for innovation is a constant challenge in large institutions such as government, universities, NHS Trusts and other agencies

**hence the difficulty in navigating regulatory processes was an important barrier identified by respondents to our survey.**



While there have been many recent improvements, particularly since the introduction of the Integrated Research Application System, pathways for study approval would benefit from a swifter routing to shorten the time required to apply for and achieve Regulatory and Ethics approval.

The current regulatory environment would benefit from adaptations that take into account the size and complexity of a study. Some NHS Trusts have been able to limit unnecessary bureaucracy and thus increase patient recruitment, particularly to low-risk studies. Work to support the spread of this good practice is essential.

Importantly, the current regulatory environment could be better adapted to consider Quality Improvement and Improvement Science projects, which occupy a space between service evaluation and human subjects research. Both of these areas of research are particularly in need of a flexible framework.

In other areas legislation may benefit from review, one example being The Human Tissue Act 2004, which requires a license to remove material from a deceased person for research purposes. Whilst this provides important protection, as a consequence

**there has been a significant fall in the number of appropriately consented organs available for research.**



NHS Blood and Transplant report that partner organisations seek research material from abroad or move their studies to other countries where access to research material is less restricted.

### Ways forward 13

- There should be a more collective, proactive approach to identify and drive legislative improvements in areas where new legislation could accelerate and enhance research.
- Multicentre studies have benefitted from recent changes in procedures for local approval; these pathways would benefit from continued efforts to improve efficiency.

# Conclusions

We hope that you have enjoyed reading this report. The stimulus to create it came from the Kidney Health: Delivering Excellence report that was published in 2013. One of the Ambitions articulated there was to develop a strategy for kidney research, and this is the result.

The Steering Group first met in early 2014 and in the ensuing two years we have held several rounds of consultation with many stakeholders including patients, renal organisations detailed in Chapter 1.2 and Appendix 1, and various external bodies. Scoping exercises to learn stakeholders' perspectives were followed by an opportunity to comment on the draft report, which yielded more than 70 responses and a revision. In these early and late phases we took into account all opinions and distilled them so that they could be represented in the main text and reflected in the Executive Summary.

As we write this we are aware that

**each month, nearly 600 more people in the UK will reach 'end stage kidney disease', with lives that can only be saved by dialysis and transplantation.**



Hence research to understand why kidney disease occurs, and how best to prevent and treat it, is more important than ever before.

We believe that the current report is unique in encompassing the whole of 'renal research in the UK' and it is indeed a wide spectrum: from 'blue skies' basic biology studies, to pre-clinical and clinical trials, to research about quality of life and patients' attitudes to their disease. Obviously, all these aspects are important and need to thrive.

**This report should act as a springboard so that its Aims and Recommendations are now discussed in depth and then vigorously taken forward by renal and funding organisations, with help from patients and their families.**



Progress will need to be monitored and reviewed by an Implementation Board, preferably under the UKKRC umbrella and including representation of the full renal researcher spectrum, with formal review after two years.

Finally, this report highlights actions required from champions of renal research in government and in industry to secure the future for high quality kidney research in the UK.

## The Steering Group





# Abbreviations

AHP	Allied Health Professional
AKI	Acute Kidney Injury
BAME	Black, Asian and Minority Ethnic
BAPN	British Association for Paediatric Nephrology
BKPA	British Kidney Patient Association
BRS	British Renal Society
BTS	British Transplantation Society
CKD	Chronic Kidney Disease
CRN	Clinical Research Network
CSG	Clinical Study Group
CSOS	Chief Scientist's Office Scotland
KRUK	Kidney Research UK
KKR	Kids Kidney Research
MRC	Medical Research Council
NBTA	National BAME Transplant Alliance
NHS	National Health Service
NHSBT	NHS Blood and Transplant
NIHR	The National Institute for Health Research
NKF	National Kidney Federation
RA	The Renal Association
UKKRC	UK Kidney Research Consortium
UKRR	The UK Renal Registry

---

## What action next?

Suggestions for implementation would be welcome to:

[ukkrc@kidneyresearchuk.org](mailto:ukkrc@kidneyresearchuk.org)

Initial Discussion Session: UK Kidney Week 2016 (Birmingham)



# Appendix 1:

## Organisational components of UK renal research

### A. Professional and patient organisations

- 1. The Renal Association** was founded in 1950. It has historically been regarded as the main professional organisation for the specialty. Initially a pre-clinical research-based grouping, it is active in promoting and disseminating research that may ultimately improve outcomes for people with kidney disease. It has grown to play an important role in clinical standards setting and in the education of clinicians and scientists interested in kidney disease. More recently it has become more active in issues around training of doctors and the planning and development of clinical services. The Association has become increasingly aware of the importance of healthcare delivery by a multi-disciplinary team and is affiliated with the British Renal Society, the umbrella organisation for healthcare and patient organisations with an interest in kidney disease.
- 2. The British Association for Paediatric Nephrology** was founded in 1972; it is committed to both high quality basic science and translational research related to children's kidney diseases. It supports multicentre clinical trials across all areas of quantitative and qualitative paediatric research. One of the main initial reasons for its inception was to make clear that babies and children are not just tiny adults. Instead they require clinical care and advocacy from specially trained paediatric nephrologists and associated professionals to address their unique physiological and psychological needs. In 2010 The BAPN became a direct partner of The Renal Association.
- 3. The British Renal Society** began as The British Renal Symposium in 1989 to promote formal dialogue between the many specialist groups supporting professionals involved in the care of people with kidney disease. It soon became apparent that such a strong multi-professional input could be of major benefit to the future development of renal care, by exerting influence at various levels including advancement of the evidence base, the commissioning process, and the formulation of policy. Since becoming the British Renal Society in 2001, the Society has grown substantially. Its core aims are: promotion of effective patient-centred multi-professional care to improve quality of life for patients, their families and carers; advancement of education in the area of renal disease and replacement therapy in the UK; funding and support of multi-professional research into kidney disease and its management.
- 4. The British Transplantation Society** is the professional voice of transplantation in the UK, representing all the varied disciplines in transplantation including clinicians, nurses, pharmacists, scientists involved in both basic research and in tissue typing laboratories, ethicists and other professionals allied to medicine. Founded in 1972, BTS membership is open to all professionals working in the field of transplantation. It hosts an annual congress for its members, and also runs a variety of meetings throughout the year, including an annual ethics conference, living donation forum and training workshops.
- 5. Patient organisations** There is a strong Patient, Carer and Public Engagement strategy within the renal community. Because kidney disease is frequently chronic, we engage with a large and mostly stable patient group who trust their clinicians and are interested in participating in research. Kidney patient charities are pivotal to the support of kidney research in the UK.
  - a) The British Kidney Patient Association** was founded in 1975 by the mother of a young kidney patient. This well established charity is working to improve the quality of life for adults and children with kidney disease by providing information, advice and support for those with kidney disease. Its programme of practical patient support includes a telephone counselling service and its role as the principal funder of the NKF/BKPA national Advocacy Service; grants to help patients and families to cover the costs of domestic bills; hospital travel; education and holidays; and financial support to kidney units throughout the UK to help improve kidney services and patient care. Patient-centred research and service evaluation sits at the heart of its efforts to improve health and social care policy and practice.

**b) The National Kidney Federation** is the national kidney charity run by kidney patients for kidney patients and was formed in 1978 to bring together local **Kidney Patient Associations** under a national umbrella. It is the largest kidney patient charity in the UK, representing nearly 25,000 kidney patients and has 55 Kidney Patient Associations as its members. The NKF provides direct support and advice to patients, carers and others through a dedicated helpline and employs a team of nationally located advocacy officers to support more complex cases. It campaigns for improvements to renal provision and treatment for patients and works closely with the Departments of Health, NHS Blood and Transplant (NHSBT) and NHS England as well as the All Party Parliamentary Kidney Group consisting of over 106 MPs and Peers. The NKF has a well-established system of communication with kidney patients and others through its magazine *Kidney Life* and through electronic and social media.

**c)** There are many individual **diagnosis-specific charities** as well as **patient/family support groups** that aim to provide information, advice and support to patients and families and raise awareness, particularly in the rare diseases arena (see (9) below). These are often a powerful voice for clinical progress and research. Examples of such charities include The PKD (Polycystic Kidney Disease) Charity, Action for Alports and Atypical HUS.

**d) The National BAME (Black, Asian and Minority Ethnic) Transplant Alliance** is a group, consisting of BAME groups, charities, NHSBT, the Department of Health and academics, which provides leadership and co-ordination of work with BAME communities in tackling barriers to organ and stem cell transplantation.

## 6. The UK Kidney Research Consortium

was established in 2007 and is chaired in rotation by the Renal Association, Kidney Research UK and the British Renal Society. The overall aim is to facilitate the best collaborative clinical research for health in kidney disease. The consortium brings together interested researchers from the broad multi-disciplinary team into Clinical Study Groups (CSGs) with 12 different themes, as listed in Table A. Each group has a remit for generating a portfolio of clinical studies that can and should be undertaken in the UK where there is a clear need for more evidence. Membership of the CSGs includes representation from the multi-professional team and, wherever possible, trainees and patients/carers.

**Table A: UKKRC Clinical Study Groups**

Acute kidney injury
Anaemia
Mineral and bone disorder
Cardio-renal
Chronic kidney disease progression and biomarkers
Cystic diseases
Exercise
Glomerulonephritis and vasculitis
Haemodialysis
Paediatric nephrology
Peritoneal dialysis
Transplantation
And a cross-cutting clinic trials network

Affiliated activities within the UKKRC include a reporting line from the Rare Diseases Committee of the Renal Association (see below); a clinical trials methodology training initiative for trainees; and more recently, it identified the need for an initiative to develop the science of Quality Improvement, to reduce variation in practice and facilitate spread and uptake of best practice.

## 7. The NIHR Clinical Research Network Renal Disorders Specialty Group

This group oversees research relating to renal medicine and supports a wide range of research studies for example in anaemia, chronic kidney disease and genetic disorders. A major remit is to review potential studies in renal disorders, particularly from industry, for inclusion on the UKCRN portfolio. All portfolio studies are eligible for infrastructure support from the UKCRN as well as additional support from the 15 Local Clinical Research Networks that cover the length and breadth of England to ensure they are delivered successfully in the NHS for the benefit of patients.

**8. The UK Renal Registry** is a UK-wide organisation governed by the Renal Association, which led and continues to support its development. The UKRR is recognised as having one of the very few high-quality, comprehensive and secure clinical databases open to requests from researchers. It is principally funded by a capitation fee based on renal replacement therapy patient numbers and collects, analyses and reports on data from 71 adult and 13 paediatric renal centres. Participation is mandated in England through the NHS National Service Specification. A major strength derives from the access to well-defined patient cohorts, allowing for the linking of basic and clinical research. Although there are large patient populations elsewhere (especially the US), access to those cohorts is often restricted due to competition between institutions and the lack of a national health service. The UK Renal Registry is indicative of the best of centralisation and coordination. The Registry has therefore become a major source of clinical data for the renal community, and with imminent technical upgrades, will become an even more useful tool for collecting outcomes data in observational and interventional research studies. It is currently expanding to include dialysis-requiring acute kidney injury patients and also houses the renal Rare Diseases Registry.

**9. Rare diseases** A parallel initiative to the UKKRC was the establishment of a collection of Rare Disease Groups (RDGs). This initiative is a cornerstone of the Renal Association's strategy for rare diseases. There are currently 17 RDGs; each has an inclusive membership including patient, family or carer representatives. The groups are affiliated with the UK Registry for Rare Kidney Diseases (RaDaR), publishing online patient/clinician information and developing best practice care pathways. The next step is the establishment of group-specific national patient cohorts; this is being coordinated within the Renal Registry. RaDaR will provide a unique resource for future research in rare renal diseases. The chair of the Renal Association Rare Disease committee reports to the UKKRC.

**10. NHS Blood and Transplant** This Special Health Authority was formed in October 2005 from the merger of the National Blood Service and UK Transplant. NHSBT is responsible for managing the National Transplant Database, which includes details of all donors and patients who are waiting for, or who have received, a transplant. NHSBT maintains the NHS Organ Donor Register, provides support for donor families and is responsible for the fair and unbiased matching and allocation of donated organs. In addition to setting national policies and guidelines for clinical care, NHSBT also undertakes audit and research, performs data analysis on organ transplant recipients, and provides support for external clinical studies and trials.

## 11. Devolved nations

**a) The Wales Kidney Research Unit** was established in 2015 following a successful bid to the Welsh Government. It builds on established links between Welsh Renal Service providers, commissioners, patient groups and researchers, and provides core infrastructure support for renal studies in Wales, including central laboratory and tissue bank support (Cardiff) "big data" analysis in the internationally recognised Secure Anonymised Information Linkage databank (Swansea)<sup>61</sup> and Health and Social Care analyst support (Bangor).

**b) Northern Ireland** has a Renal Clinical Research Network, with wide engagement from nephrologists, covering all five acute hospital trusts. The Northern Ireland Health and Social Care Research and Development Division funds a part-time renal research nurse in each hospital trust (but unlike NIHR, no additional monies are provided to sites for patient recruitment into clinical trials).

**c) The Chief Scientist's Office Scotland and NHS Research Scotland** provide core funding for clinical research nurses on projects supported by eligible funders.

<sup>61</sup> <http://www.saildatabank.com>



## B. Main funders

- 1. Kidney Research UK** was established in 1961, and is currently the leading national charity dedicated to funding renal research. It has played a major role in advancing the profile and importance of UK kidney research. Kidney Research UK funds research programmes and projects, together with individual clinician and non-clinician career awards ranging from intercalated BScs to Senior Fellowships. In 2014/15 it committed £5.1 million across 59 awards. The charity works closely with, and co-funds with, professional organisations and industry, and recognises the benefits of collaborative partnerships. It has facilitated and overseen several academic-led research and quality improvement projects that have been supported by pharmaceutical partners.
- 2. Kids Kidney Research** was originally set up as the Kidney Research Aid Fund in 1973, changing its name in 2006. Originally funding research only at Great Ormond Street at a time when most childhood kidney diseases were poorly understood, KKR has grown to be a national funder to the tune of £0.5 million per year.
- 3. The British Kidney Patient Association** has over the last five years developed its research strategy and has its own grants programme disbursing over £250,000/year. This funds the Dr Tony Wing Fellowship, which is presently evaluating the impact of kidney failure on the lives of young people (managed by Kidney Research UK), and co-funds the annual joint multi-disciplinary Kidney Patient Research Partnership with the British Renal Society (see below) and RaDaR with Kidney Research UK. The BKPA also funds its own patient-centred research, and equipment and researchers needed to develop research studies of direct benefit to kidney patients.
- 4. The British Renal Society** has funded a programme of multi-disciplinary applied research since 2001, and since 2010 has developed sustainable joint research funding of around £150,000/year with the BKPA. The programme informs and impacts on the quality of patient care, service delivery and disease management, directly improving the lives of renal patients through evidence-based practice. Grant funding provides opportunities for multi-professional early career researchers to establish a grant history, applied research experience and training from which to progress and capture sustained and significant research funding – a platform from which many clinical-based renal research leaders originated. A similar partnership between the BRS and Kidney Research UK has facilitated non-medical research fellowship funding.
- 5. The National Institute for Health Research** supports translational and clinical renal researchers through a variety of funding streams including the Translational Research Collaboration Renal theme, Research for Patient Benefit, and Devices for Dignity schemes. These enable investigations ranging from rare disease deep phenotyping to qualitative research to technological development for patient benefit.
- 6. The Health Foundation** has played an important role in raising the profile of improvement science in the kidney community and has funded several improvement projects spanning the kidney care pathway, from primary care through to End Stage Renal Disease.
- 7. In Scotland**, the Chief Scientist's Office grants funds to both clinical and non-clinical research projects and has fellowships for clinicians in training and in the Scottish Senior Clinician Scientist scheme. Funding support is also available from NHS Research Scotland (NRS) to permit NHS consultants to undertake research under the NRS fellowship scheme. Nephrology has generally been successful in attracting funding in these competitive schemes.
- 8. Other funding bodies include the Medical Research Council, Wellcome Trust, British Heart Foundation and the Royal College of Surgeons** Many renal researchers have been awarded grants from major government and charity funding bodies, whose programmes include personal Fellowship funding as well as programme-based and project grants. The overall amounts available are much higher, but renal applicants are in open competition with other eligible applicants from all specialties, and renal research receives only a very small percentage.<sup>62</sup>
- 9. In Industry**, various companies in the pharmaceutical sector have been major supporters of trials in Nephrology. Current and recent examples include Vifor Pharma (PIVOTAL study) and Alexion (Eculizumab study).
- 10. The European Union** is another main funder. In January 2014 the EU launched its largest ever Research and Innovation funding programme, 'Horizon 2020', its eighth Framework Programme. The available budget is over €63 billion (€80 billion) and covers a seven-year period (2014-2020). The funds are allocated through a competitive process, in which the UK traditionally has fared very well, receiving a fifth of all previous grants.

<sup>62</sup> <http://www.hrcsonline.net/pages/uk-health-research-analysis-2014>

# Appendix 2:

## The impacts of UK Renal Research

We began the process of formulating this strategy document by asking a wide range of stakeholders to provide examples of recent research that they consider has had (or will have) the most impact. While a complete list is beyond the scope of this document, the responses received included a number of notable research studies in which the UK has led the way, which are listed here.

### Drugs and interventions to treat CKD and its complications

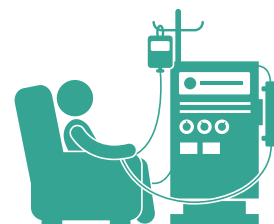


The UK renal community has worked hard to develop approaches to answer well-defined questions of clinical importance in large clinical trials. Recently completed and ongoing studies include:

- The Study of Heart and Renal Protection (SHARP) trial, which has influenced international guidelines for the use of lipid lowering therapy in people with chronic kidney disease<sup>63</sup>
- Determining the benefits of drugs which affect the renin angiotensin system in people with advanced kidney disease (STOP-ACEi)<sup>64</sup>
- Investigating the optimum amount of intravenous iron that kidney patients on dialysis should receive (PIVOTAL)<sup>65</sup>
- Working out the dose of steroids in children with nephrotic syndrome that cause the fewest side effects (PREDNOS, PREDNOS2)<sup>66</sup>
- Determining the best drug treatments for people who have inflammation of kidney blood vessels (vasculitis), a programme that links the UK with other European countries<sup>67</sup>
- Evaluation of the risks and benefits of renal artery stenting to improve kidney function (ASTRAL trial)<sup>68</sup>
- The adoption of eculizumab, a highly effective drug to treat atypical haemolytic uraemic syndrome<sup>69</sup>

### Care of people with CKD prior to and on dialysis

- Unravelling the epidemiology of CKD in the UK<sup>70</sup>
- Exploring how to empower primary care to deliver better quality care to people with CKD (the QI-CKD trial)<sup>71</sup>
- Research related to the importance of exercise for patients with CKD or on dialysis<sup>72</sup>
- Research related to the advantages of home haemodialysis<sup>73</sup>
- Projects such as ENABLE-CKD demonstrating the importance of patients participating in their own renal care<sup>74</sup>
- Research to minimise the harmful effects of dialysis on other organs<sup>75</sup>
- Exploring conservative care for CKD in the community<sup>76</sup>
- Improving vitamin D balance in children with CKD<sup>77</sup>
- Body composition monitoring in children and adults<sup>78</sup>
- Novel behaviour change interventions<sup>79</sup>



<sup>63</sup> Haynes R et al *J Am Soc Nephrol* 2014;25:1825-33

<sup>64</sup> Aimun K. et al *Nephrol. Dial. Transplant* 2010;25: 3977-3982

<sup>65</sup> <http://www.kidneyresearchuk.org/pivotal>

<sup>66</sup> <http://www.birmingham.ac.uk/research/activity/mds/trials/bctu/trials/renal/prednos/index.aspx>

<sup>67</sup> Jones RB et al *Ann Rheum Dis* 2015;74:1178-82

<sup>68</sup> ASTRAL investigators *N Engl J Med* 2009; 361:1953-1962

<sup>69</sup> Sheerin N et al *QJM* Epub ahead of print PMID: 25899302

<sup>70</sup> Stevens PE et al *Kidney Int* 2007;72: 92-99

<sup>71</sup> Lusignan SD et al *Kidney Int.* 2013;84:609-20

<sup>72</sup> Gould DW, *Nephrology* 2014;19:519-27;

Greenwood SA, et al. *J Ren Care* 2014;40:219-26

<sup>73</sup> Jayanti A et al *Nephrol Dial Transplant* 2013;28:2612-2620

<sup>74</sup> Thomas N. *Brit J Renal Med* 2011;16:19-22

<sup>75</sup> Burton JO et al *Clin J Am Soc Nephrol* 2009;4:1925-1931

<sup>76</sup> Okamoto I et al *Clin J Am Soc Nephrol.* 2015;10:120-6;

Da Silva Gane M et al *Clin J Am Soc Nephrol* 2012;7:2002-9

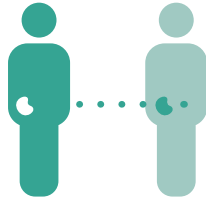
<sup>77</sup> Shroff R et al *Clin J Am Soc Nephrol* 2012;7:216-223

<sup>78</sup> Lindley E et al *Nephrol Dial Transplant* 2012;27(Suppl 2):ii48-ii49

<sup>79</sup> Wileman V et al *Ann Behavioral Med* 2014;4: 275-81

## Kidney transplantation

- Pinpointing inequalities in access to kidney transplantation<sup>80</sup>
- Assessing patient attitudes towards transplant listing: the ATTOM study<sup>81</sup>
- Obesity and kidney transplantation and the role of nutritional intervention in kidney transplant outcomes<sup>82</sup>
- A UK Renal Registry analysis exploring the relationship between socio-economic status, ethnicity and access to living donor kidney transplantation<sup>83</sup>
- Predicting recurrence of kidney disease after transplantation<sup>84</sup>
- Working out the best drugs to prevent rejection of renal transplants: the 3C study<sup>85</sup>



## Genetic causes of renal disease

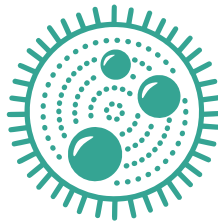
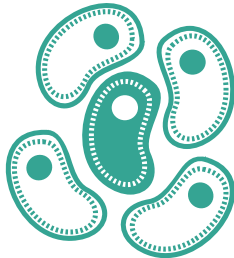
- Explaining why people are sometimes born with abnormal kidneys and urinary tracts<sup>91</sup>
- The discovery of genetic causes of a wide variety of renal diseases (including tubulopathies, podocyte disorders), leading to a better definition of clinical disease, the facilitation of family counselling and insights into basic biological processes<sup>92</sup>
- Pioneering comprehensive gene testing in people with nephrotic syndrome<sup>93</sup>
- Using genetic testing to work out whether relatives of patients with polycystic kidneys should donate organs<sup>94</sup>



## The biology of renal diseases

These examples include cellular and developmental biology, and genetic studies. A subset have used animal studies to better understand how the kidney works in health and disease.

- Showing how insulin affects cells in the kidney's glomeruli, which filter blood to make urine<sup>86</sup>
- Showing how racial background, and whether one is male or female, affects the molecular make-up and structure of the glomerulus<sup>87</sup>
- Demonstrating that antibodies produced by patients may harm their own kidneys and cause renal failure<sup>88</sup>
- Showing that 'growth factors' can be used as novel treatments to slow down the growth of kidney cysts and diabetic kidney disease<sup>89</sup>
- Demonstration of the cause of most cases of membranous nephropathy<sup>90</sup>



<sup>80</sup> Ravanan R et al *BMJ* 2010;341:c3451

<sup>81</sup> Calestani et al *Nephrol Dial Transplant*. 2014;29:2144-50

<sup>82</sup> Chan W et al *J Ren Nutr* 2014;24:1-12

<sup>83</sup> Udayaraj U et al *Transplantation* 2012;93:610-616

<sup>84</sup> Ding WY et al *J Am Soc Nephrol* 2014;25:1342-48

<sup>85</sup> The 3C Study Collaborative Group *Lancet* 2014;384:1684-90

<sup>86</sup> Welsh GI et al *Cell Metab* 2010;12:329-340

<sup>87</sup> Randles M et al *J Am Soc Nephrol* epub ahead of print PMID: 25896609

<sup>88</sup> Bech AP et al *Clin J Am Soc Nephrol* 2015;7:1386-1392; Goodship TH et al *Mol Immunol* 2015;52:200-206

<sup>89</sup> Dessapt-Baradez C et al *J Am Soc Nephrol* 2014;25:33-42; Huang JL et al *J Am Soc Nephrol* 2016;27:69-77

<sup>90</sup> Fresquet M et al *J Am Soc Nephrol*. 2015;26:302-13

<sup>91</sup> Stuart HM et al *J Am Soc Nephrol* 2015;26:797-804; Clissold RL et al *Nat Rev Nephrol* 2015;11:102-112

<sup>92</sup> <http://www.rarerenal.org>

<sup>93</sup> McCarthy HJ et al *Clin J Am Soc Nephrol* 2013;8:637-648

<sup>94</sup> Simms RJ et al *Transplantation* 2015;99:1023-9

Published April 2016  
ISBN 978-1-5262-0191-1

