



Centre for Sustainable Healthcare

Mapping the Living Kidney Donor (LKD) Assessment Pathway Phase 2: Disseminating learning and supporting services

July 2026

INSPIRE EMPOWER TRANSFORM

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Project

Mapping the Living Kidney Donor (LKD) Assessment Pathway Phase 2: Disseminating learning and supporting services

Collaboration

The project was supported by [The Health Foundation](#), bringing together partners from the [UK Kidney Association](#), [NHS Blood and Transplant](#), [Give a Kidney](#), clinicians, individuals with donation experience, and CSH. The project was delivered in two phases.

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Thank you to those who contributed to Phase 2 of the project. In particular, we would like to thank Dr John Stoves, Dr Matthew Wellberry Smith, Lisa Burnapp, Jen Lumsdaine, and Jan Shorrock for their valuable insights, support, and commitment throughout the development of this project and report.

We would also like to thank colleagues across the Yorkshire and Humber region who generously shared their time and experience throughout the pilot. Their openness, collaboration and willingness to reflect on and challenge existing practice were essential in informing our analysis and grounding the work in real-world pathways. The continued engagement of this group, and their commitment to progressing the identified changes beyond the life of the project, represent an important and positive legacy of this work.



Executive Summary

Living kidney donation (LKD) provides the best outcomes for many people with kidney failure, yet the donor assessment pathway can be lengthy, complex and variable. In Phase 1 of this project, the Centre for Sustainable Healthcare (CSH) worked with three transplant centres to map the LKD core assessment pathway, identifying where carbon emissions, inequitable burden and poor experience arise. Phase 2 focused on translating this insight into practical action in three ways:

Development of practical tools: A practical toolkit and Excel-based carbon calculator was developed to support transplant services to understand and improve their LKD assessment pathways. Designed to be accessible and pragmatic, these tools enable teams to map pathways, identify carbon and equity hotspots, and explore opportunities for improvement without requiring specialist expertise, aligning with existing quality improvement approaches.

Dissemination and national reach: The toolkit and carbon calculator were disseminated nationally and made freely available to all UK transplant services. Dissemination was primarily delivered through established transplant and renal networks, including presentations at national and regional events and webinars, alongside promotion through CSH communication channels. This approach supported broad awareness of carbon and equity hotspots in the LKD pathway and enabled services to begin using the tools locally, even where direct implementation support was limited.

Regional pilot and collaborative learning: A regional pilot in Yorkshire and Humber brought together transplant and referring centres to compare pathways, identify unwarranted variation, and prioritise improvement ideas. Collaboration highlighted three clinically credible changes: reducing low value cystoscopy for trace haematuria, reducing low value routine exercise tolerance testing, and reviewing the use of DMSA scans. These changes were prioritised because they have the potential to reduce unnecessary appointments, investigations and donor burden, offering opportunities to improve clinical efficiency and reduce financial costs alongside carbon emissions. Previous work in renal services has demonstrated that sustainability improvements can deliver both environmental and financial benefits (1). The pilot demonstrated the value of regional collaboration in enabling peer learning, building confidence to act, and moving from insight to practical prioritisation of change.

The regional pilot provided the most detailed opportunity to apply Phase 1 learning in practice, generating the deepest insight into how services can identify and prioritise change. As a result, this report places particular emphasis on the pilot findings.

Overall impact and learning: Phase 2 has laid the foundation for action through practical tools, shared learning and collaboration. It delivered accessible resources, national reach and a model for regional working, while highlighting key constraints, particularly limited staff capacity and the challenge of system-level change. Most actionable improvements sat at local and regional level, providing a strong foundation for wider adoption and future national work.

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1. Introduction

Living kidney donation offers significant benefits for recipients and the health system, but the donor assessment process can be demanding for donors and resource-intensive for services. Donors often attend multiple appointments across different specialties, sometimes travelling long distances, while services manage complex coordination across teams. These features make the pathway particularly relevant when considering environmental sustainability, equity and experience.

The Centre for Sustainable Healthcare (CSH) initiated this project with the UK Living Kidney Donation Network to understand how the Living Kidney Donor (LKD) assessment pathway contributes to carbon emissions, inequity and donor experience, and to identify opportunities for improvement that also support high-quality care. The work was delivered in two phases. Phase 1 focused on understanding the core pathway in detail, while Phase 2 focused on supporting the application of this learning in practice. This report primarily presents findings from Phase 2, while linking back to key insights from Phase 1 where these informed or were tested through implementation.

2. What we learned in Phase 1

Phase 1 mapped the core LKD assessment pathway across three contrasting transplant centres and combined pathway data with lived experience interviews. This work found that:

- The average carbon footprint of an LKD assessment pathway was approximately 114 kg CO₂e
- Donor travel accounted for the majority of emissions, reflecting multiple appointments, repeated visits and long distances to transplant centres
- There was substantial variation between centres in the number, type and sequencing of appointments and tests
- This variation translated into different levels of burden for donors, raising equity concerns

Exploring why this variation exists, staff reported contributing factors could include local interpretation of national guidance, historical practices, access to diagnostics, and differing assumptions about clinical risk and donor reassurance. Many staff were not aware of how different their pathways were from others. Importantly, not all variation is inappropriate; some reflects legitimate differences in donor need, geography or service configuration, and should be considered alongside efforts to reduce unwarranted variation.

Lived experience interviews highlighted the cumulative impact of repeated travel, time off work, uncertainty and inconsistent communication. Donors emphasised the importance of clarity, flexibility and trust-building, particularly when balancing remote and face-to-face appointments. Phase 1 concluded that while opportunities for improvement were clear, particularly through consolidation of tests into fewer appointments, services needed practical tools, shared language and supportive spaces to understand variation and act on it. These findings directly informed the design of Phase 2, and there was agreement that the best vehicle for taking this forward would be a regional renal network.

3. Phase 2 approach

Phase 2 aimed to translate the insights generated in Phase 1 into practical action by developing accessible tools, supporting their use in practice, and exploring how regional collaboration could enable change.

3.1 Open-access tools

CSH developed a practical toolkit and an Excel based carbon calculator to help transplant teams:

- Map their local LKD assessment pathway
- Estimate the associated carbon footprint
- Support structured discussion across multidisciplinary teams
- Identify high impact areas for improvement

The tools were designed to be pragmatic and accessible, requiring minimal specialist knowledge and aligning with quality improvement approaches already familiar to clinical teams. Clear guidance was included both within the resources and via webinars (now available on YouTube) to support appropriate interpretation and use.

Clear communication about the purpose of tools was essential to ensure appropriate use and to avoid over-reliance on quantitative outputs. For example, the carbon calculator is useful for identifying broad hotspots and supporting discussion. It cannot capture all aspects of complex clinical pathways, particularly more specialised tests or system-level factors. The value of the calculator lies in supporting informed discussion and prioritisation rather than providing definitive measurement of all resources and specific tests.

To support uptake beyond the 3 pathways studied, the toolkit and carbon calculator were made openly available via the CSH website and promoted through multiple national and regional channels (e.g. NHS Blood and Transplant and Kidney Network mailing lists).

Targeted dissemination through existing transplant meetings and professional events/forums was prioritised following early learning that engagement was strongest when sustainability work was embedded within established clinical events rather than stand-alone sessions. In contrast, stand-alone webinars and optional drop in sessions attracted lower attendance, reflecting wider capacity pressures across services. This reinforced learning from Phase 1 about the importance of aligning improvement work with routine clinical structures rather than relying on additional voluntary engagement. This approach likely enabled the tools and learning to reach a wider audience of

transplant professionals across the UK.

This approach was deliberately chosen following findings from Phase 1, which suggested variation in the LKD pathway is strongly shaped by local context, including service configuration, access to diagnostics and clinical decision-making norms. As a result, a centrally prescribed pathway was not considered appropriate, and the project focused on developing practical tools to enable services to understand and improve their own pathways. This reflects an intention to support locally owned change, while also learning which elements of the approach may be transferable and how best to create the conditions that enable change to happen across different contexts.

3.2 Regional pilot overview

Regional piloting provided an opportunity to explore application of Phase 1 learning in greater depth, with a focus on how services work collectively at 'meso-system level' (i.e. the regional level of the healthcare system, between individual organisations and national structures). While dissemination activity reached a wide national audience, the pilot allowed more intensive testing of the tools and deeper examination of shared variation and improvement opportunities within a single region.

A regional pilot was delivered across the Yorkshire and Humber (Y&H) region, which has a strong track record of engagement with sustainable renal healthcare. One of the centres had already participated in Phase 1. This region was selected because it includes two transplant centres and five referring centres, providing a useful test bed for regional comparison and collaboration.

Transplant centres

- St James's University Hospital, Leeds Teaching Hospitals NHS Trust
- Northern General Hospital, Sheffield Teaching Hospitals NHS Foundation Trust

Referring Centres

- Bradford Teaching Hospitals NHS Trust
- Humber Teaching NHS Foundation Trust
- Hull University Teaching Hospitals NHS Trust
- York and Scarborough Teaching Hospitals NHS Foundation Trust
- Doncaster & Bassetlaw Teaching Hospitals NHS Foundation Trust

Four CSH facilitated workshops brought together donor coordinators, clinicians and operational staff to:

- Test the toolkit and carbon calculator using the organisations' real pathway data
- Compare pathways across sites in the region and make variation visible
- Identify shared priorities for improvement that could realistically be addressed locally or regionally

Across the four workshops, the focus evolved from describing differences between services to developing a shared understanding of which aspects of variation were unwarranted, which were linked to donor needs or geography, and which could realistically be addressed within existing regional relationships. This progression was important in shifting discussion from problem identification to practical prioritisation.

While the project sought to surface system-level barriers and opportunities for national alignment as part of the regional pilot, most progress focused on changes that could be implemented locally or regionally within existing structures. This reflects both the nature of the issues identified and the capacity constraints faced by participating services.

While Phase 2 included multiple strands of work, the regional pilot provided the most detailed opportunity to explore how Phase 1 learning could be applied in practice and is therefore described in more depth below.

3.3 Embedding lived experience

Findings from Phase 1 donor interviews were explicitly revisited during discussions with the regional pilot group, particularly where proposed changes risked unintentionally increasing donor burden. This helped maintain balance between reducing environmental impact and preserving flexibility, trust and person-centered care, and reinforced that not all variation is inappropriate or undesirable, but should be considered in the context of donor needs, experience and choice.

3.4 National dissemination and engagement

Alongside tool development and regional testing, Phase 2 placed strong emphasis on national dissemination of Phase 1 findings and early learning from Phase 2. The aim was to reach commissioners, transplant services and clinical staff across the UK, raise awareness of carbon and equity hotspots in the LKD assessment pathway, and encourage local reflection and use of the tools.

Key dissemination activities included publication of the Phase 1 findings report on the CSH website (March 2025), supported by a short infographic, and promotion through CSH communications channels. Findings and tools were shared through a programme of national and regional events, including the UK Living Kidney Donation Network meeting, the European Society for Organ Transplantation conference (abstract poster), NHS England Greener Week, renal operational delivery network study days, and the British Transplantation Society Congress.

Two national webinars were hosted in June 2025 to introduce the Phase 1 findings, toolkit and carbon calculator. Webinar recordings were made openly available via the CSH YouTube channel and continued to be promoted through CSH communications channels into 2026.

Engagement was consistently strongest when dissemination was embedded within established transplant and renal forums, enabling the work to reach large, multidisciplinary audiences across multiple centres. This contrasted with lower attendance at centrally delivered, stand-alone sessions such as CSH webinars, an important learning reflected on later in this report.

4. Regional Pilot: Outcomes and learning

4.1 Making variation visible

As in Phase 1, participants of the pilot were surprised by the extent of unwarranted variation revealed through side-by-side comparison, particularly in the use of specialist investigations (which are undertaken in selected donors in addition to the core pathway investigations). Several teams reported that they had assumed differences in practice between centres in the region were minimal, given shared participation in the same national donation scheme. The regional review made clear that unwarranted variation can persist even within relatively aligned systems, reinforcing Phase 1 findings that variation is frequently invisible without deliberate comparison.

Regional discussion helped distinguish between unwarranted variation and variation linked to clinical judgement or donor context, reinforcing that not all variation should be removed. Many drivers of unwarranted variation were not viewed to be based on strong evidence, but instead reflected local interpretation of guidance, local risk tolerance, historical practice and access to diagnostics and specialist input. The project demonstrated that regional collaboration could reveal opportunities for standardisation which bring sustainability and equity benefits. While some of these changes can be made locally and regionally, national awareness, guidance, policy could increase the scale and speed of change.

Seeing this variation prompted constructive discussion about value, necessity and burden. In several cases, teams recognised that practices had developed locally over time rather than in response to explicit evidence or guidance, opening up space for reconsideration. Variation identified through the pilot reflected themes raised during national events and discussions, suggesting that unwarranted variation is not limited to individual centres but is a wider system issue.

4.2 Priority changes explored

Through the pilot, three priority changes were identified for the region:

- Reducing low-value cystoscopy for trace haematuria: Although national guidance exists, local interpretation varied. Small differences in wording (for example, use of the term “*recommend*” instead of “*consider*”) were felt to drive unwarranted testing. Regional discussion helped build confidence that change would be clinically appropriate.
- Reducing routine exercise tolerance testing: these tests rarely altered clinical decisions but caused delays, additional appointments and extra donor travel. Discussion highlighted the importance of involving multidisciplinary colleagues, in this case anaesthetists, when considering changes.
- Reviewing routine DMSA scanning: In one centre this prompted plans for an audit to assess if routine DMSA scanning meaningfully influences decision-making in the living donor pathway, or

if it adds donor burden without changing outcomes, recognising that practice differed between sites.

Importantly, the regional network approach helped to establish a clear understanding that new practice patterns developed were fully endorsed by the transplanting centres (which are the final arbiters in the living donor pathway).

4.3 Learning from regional collaboration and system level change

The above changes aligned with the opportunity to reduce low-value activity highlighted in Phase 1 learning, and were viewed as clinically credible, achievable within regional control, and aligned with improving donor experience as well as sustainability.

Carbon hotspots and measurement

While Phase 1 identified patient travel as a major contributor to carbon impact of the core assessment pathway, this did not emerge as a primary focus of discussion during the regional pilot. This was partly because one centre had already participated in Phase 1 and the learning around streamlining of the core pathway had already been shared with other centres through the UK Living Donor Forum. Participants reflected that travel was often perceived as less directly within local or regional control, shaped by geography and the involvement of multiple services across pathways. Instead, teams focused on regional variation in the use of specialist tests. Although changes to reduce low value tests were not initially framed in terms of travel reduction, they are likely to reduce the number of appointments and therefore reduce travel burden for donors.

This highlighted an important area of learning: while the carbon calculator was useful for identifying broad hotspots such as travel, appointments and tests in the core pathway, it does not capture specialist testing that may take place for a subset of donors. The regional comparison process enabled teams to identify these opportunities in greater detail, which may not have been prioritised through individual service review alone.

Within the timeframe of this project, it was not possible to robustly quantify the overall carbon impact of pathway changes (described in section 4.2), highlighting the need for longer-term evaluation.

Aligning sustainable improvement to organisational priorities

In addition to environmental benefits, reducing low-value tests and appointments may also improve service efficiency by releasing clinical capacity and reducing resource use, strengthening the case for adoption within provider organisations and commissioning systems.

Embedding sustainability and equity in improvement

The regional pilot highlighted important learning about how services work together at regional 'mesosystem' level. Participants reflected that opportunities for cross-site discussion are relatively rare, and when they do occur, existing forums are often not well suited to detailed pathway review or collaborative decision-making, tending to focus on information sharing rather than problem-solving.

Discussions can lack the structure needed to move from identifying issues to agreeing actions. The pilot complemented existing network structures but provided a level of focus and pace that is not always possible within larger, routine meetings.

The pilot created a focused and facilitated space for structured discussion, enabling teams to compare pathways, identify variation or problems, and agree shared priorities. Approaching discussion on service improvement from a sustainability and equity perspective provided a constructive and neutral entry point for engagement. Participants found this framing helped to generate discussion and felt these ideas were unlikely to have emerged without this forum, despite the multiple benefits change could bring.

This approach was also seen as effective in moving conversations forward and avoiding the repetition or lack of progress sometimes experienced in wider meetings. It was agreed that the smaller, focused groups created new opportunities for peer learning and shared problem-solving, and the group agreed to continue beyond the pilot as a task and finish group for the changes identified.

Tension between ambition and capacity

The locally driven approach taken within this project can have limitations. While it enables context-sensitive change, it also places greater responsibility on individual services to lead implementation. As a result, adoption is likely to be iterative and stepwise, with a risk that some changes are not fully implemented. Understanding this balance between local ownership and scale is critical, and reinforces the importance of studying implementation in more detail to support wider spread and sustainability of impact

Staff are often working on sustainability improvement projects without dedicated time, which can delay progress. Limited staff capacity and competing clinical priorities were the most significant barriers to progress during the project. Even where there was agreement on improvement ideas, implementation was often slowed by lack of protected time and reliance on a small number of key individuals. This can be supported by aligning work with existing priorities (e.g. best practice clinical guidance, cost improvement) and with existing network and workplan structures. However, this highlights importance of managerial and policy mechanisms, rather than relying on individual champions or key staff in leadership roles.

Relationships and leadership

The pilot highlighted the importance of relationships, trust and informal leadership in enabling regional change. Those with strong established relationships through the network play essential bridging roles between centres, providing oversight, continuity, legitimacy, and maintaining momentum, though this can introduce dependency risks when capacity is limited. Involvement of these key individuals also facilitates shared decision-making with learning and outcomes being more naturally fed up to existing senior structures.

Local vs system level change

While the project aimed to explore barriers and enablers across multiple levels of the system, most actionable change identified through the pilot sat at local or regional level. The regional group prioritised changes within their direct control, such as reviewing testing practices, rather than those

requiring national policy or commissioning change. This does not suggest that system-level barriers are unimportant. Rather, it reflects the practical reality that, within existing capacity and time constraints, services are more able to act on locally owned processes than to influence wider system structures. This highlights the importance of complementary national support to enable sustained and scalable change, as has been provided by the UK Living Donation Network.

Taken together, these challenges highlight that while regions can play a critical role in enabling sustainable pathway improvement, their impact is constrained by wider workforce pressures and system priorities. National guidance and resourcing remain important in enabling these locally driven changes to be sustained and scaled.

5. Key learning

Across Phases 1 and 2, several consistent lessons emerged:

- **Variation is often hidden:** Direct comparison across services is essential to identify unwarranted variation and opportunities for improvement.
- **Regional collaboration adds value:** Structured, cross-site working enables shared understanding, peer learning and practical prioritisation of change.
- **Actionable change sits locally:** Services prioritise changes within their control, even where wider system barriers exist.
- **Tools enable but do not determine change:** Simple tools support discussion and analysis but must be used alongside clinical judgement.
- **Engagement depends on context:** Embedding work within existing networks is far more effective than standalone activity.
- **Sustainability supports engagement:** Framing sustainability and equity as part of quality improvement helps involve a range of stakeholders.
- **Capacity is a critical constraint:** Sustained improvement requires protected time, leadership and alignment with organisational priorities.

Together, these findings highlight that meaningful improvement depends not only on identifying opportunities, but on creating the conditions, through relationships, structures and support, needed to act on them.

6. What next

While national dissemination of Phase 1 learning and tools has raised awareness and interest, and the regional collaboration pilot enabled more detailed exploration of current practices and levers for change, limited staff capacity constrained the pace at which services could act on learning. This reinforces the importance of aligning sustainability improvement with existing clinical priorities, and of exploring how national guidance, commissioning and resourcing structures could better support local and regional efforts.

Learning from Phases 1 and 2 will continue to be shared with the wider sustainable healthcare and improvement community through this report, the CSH website, partner networks and events.

6.1 Next steps

1. National engagement and support

- CSH will continue to make available the calculator and toolkit to UK transplant services to support pathway review and improvement
- CSH plan to update the carbon calculator to include cystoscopy
- NHSBT, ESIT & UKLDN will promote continued engagement through communications and events.
- NHSBT plan to incorporate sustainability into national Living Kidney Donor workup guidelines.

2. Regional implementation

- Task and finish group will continue to progress the priority changes identified. Changes for reducing low value cystoscopy have now been adopted via regional pathway changes, and they are planning a DMSA audit.

3. Evaluation and learning

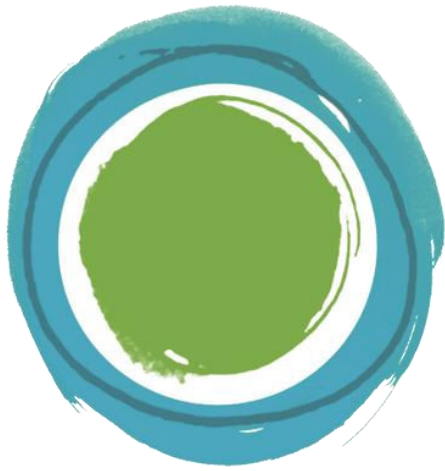
- CSH and Y&H to quantify longer-term measurement of impact of prioritised changes in the region, recognising it was not possible within the project timeframe to robustly quantify the carbon and social impact of pathway changes.
- Undertake formal evaluation of the context, actors, behaviours and outcomes through the UKRI-funded Green Healthcare Hub. This will be led by the University of Nottingham during 2026, to generate transferable learning. The evaluation will include where possible, the social, environmental and cost improvement impacts of changes identified during the pilot and explore how implementation learning can be applied across different care pathways to support the wider adoption of carbon-frugal care.

6.2 Recommendations

The following recommendations are aimed at national organisations, regional networks and Living Kidney Donor services to support the continued implementation, spread and sustainability of the learning generated through this programme

- National organisations, including NHS Blood and Transplant (NHSBT), the British Transplantation Society and relevant professional networks, should
 - maintain and strengthen the national community of practice for sustainable transplantation, enabling transplant services to share learning, spread innovation, maintain momentum and support implementation of identified pathway improvements.
 - continue to engage with sustainability and act on the project learning, ensuring that insights from the pilot inform future guidance, commissioning approaches, service specifications and resource planning.
- Living Kidney Donor services should embed sustainability within routine governance and improvement structures, including MDT processes, network meetings, quality improvement programmes and pathway review mechanisms, so that environmental sustainability becomes an integral component of service improvement rather than an additional requirement.
- National organisations, regional networks and provider organisations should ensure adequate capacity, leadership and improvement support for implementation, recognising that sustainable improvement in complex clinical pathways depends on dedicated time, structured collaboration and alignment with existing clinical priorities.

Sustainable improvement requires a combination of practical tools, strong relationships, effective leadership, structured collaboration and sufficient capacity. When these elements are brought together, meaningful progress in clinical pathways is achievable. The learning from this programme demonstrates both the opportunities and challenges of embedding sustainability into routine service improvement and provides a foundation for future action at local, regional and national levels.



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