

Innovating for Improvement

A Nurse-led Approach to Personalised,
Coordinated, Multidisciplinary Care in New
Haemodialysis Patients

Royal Liverpool and Broadgreen University Hospitals NHS Trust



About the project

Project title: A nurse-led approach to personalised, coordinated, multidisciplinary care in new haemodialysis patients

Lead organisation: Royal Liverpool and Broadgreen University Hospitals NHS Trust

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Contents

About the project	2
Part 1: Abstract.....	3
Part 2: Progress and outcomes	4
Part 3: Cost impact.....	15
Part 4: Learning from your project	18
Part 5: Sustainability and spread	21
Appendix 1: Resources and appendices.....	24

Part 1: Abstract

We implemented a new, nurse-led pathway for patients commencing haemodialysis, a time of significant physical and psychological distress. The pathway comprises a combination of mandatory and personalised interventions, delivered over the first 6 sessions of dialysis. This pathway was designed to improve communication and coordination of care delivered by a large, complex multi-disciplinary team. The primary aims were to reduce early mortality and minimise patient distress.

This pathway was implemented at the Royal Liverpool & Broadgreen University Hospitals NHS Trust for new patients requiring haemodialysis for chronic kidney disease. We see 100-120 new patients each year, with 93 patients starting on this pathway during the evaluation period.

To deliver this project we assembled a unique, multi-skilled team comprising clinicians, patients, innovation and improvement specialists and business intelligence expertise. The pathway was implemented electronically with a robust data collection and analysis process, enabling automated, real-time reporting.

Successful implementation of this pathway has:

- Reduced 90-day mortality from 5.1% to 2.9%
- Reduced patient distress from an average score of 4.3 (week 2) to 2.4 (Week 8)
- Increased the number of patients being listed for transplant (by 90 days) from 21% to 26%
- Increased the number of patients with a plan for home therapy (at 90-days) from 8.5% to 26%
- Reduced the average length of stay for admitted patients from 12.2 to 8.75 days

This project was undertaken with the primary aim of improving quality and safety, but has also released significant cost-savings of around £400k per annum.

The New Starter Dialysis Pathway has now been embedded into routine care at our unit.

Part 2: Progress and outcomes

Intervention

Our intervention comprises a nurse-led pathway for new starter dialysis patients delivered over the first 6-dialysis sessions (approximately 2 weeks) (Fig 1). All patients received mandatory interventions; personalised interventions were delivered as appropriate, depending upon each patient’s clinical situation and personal circumstances. Within 6 weeks patients were seen in clinic for early consultant review, supported by provision of an electronic summary of the patient’s status, treatment plan and choices, which is shared with the patient and their GP.

This pathway has been implemented electronically on our in-house Patient Electronic Notes System (PENS, a paperless record system).

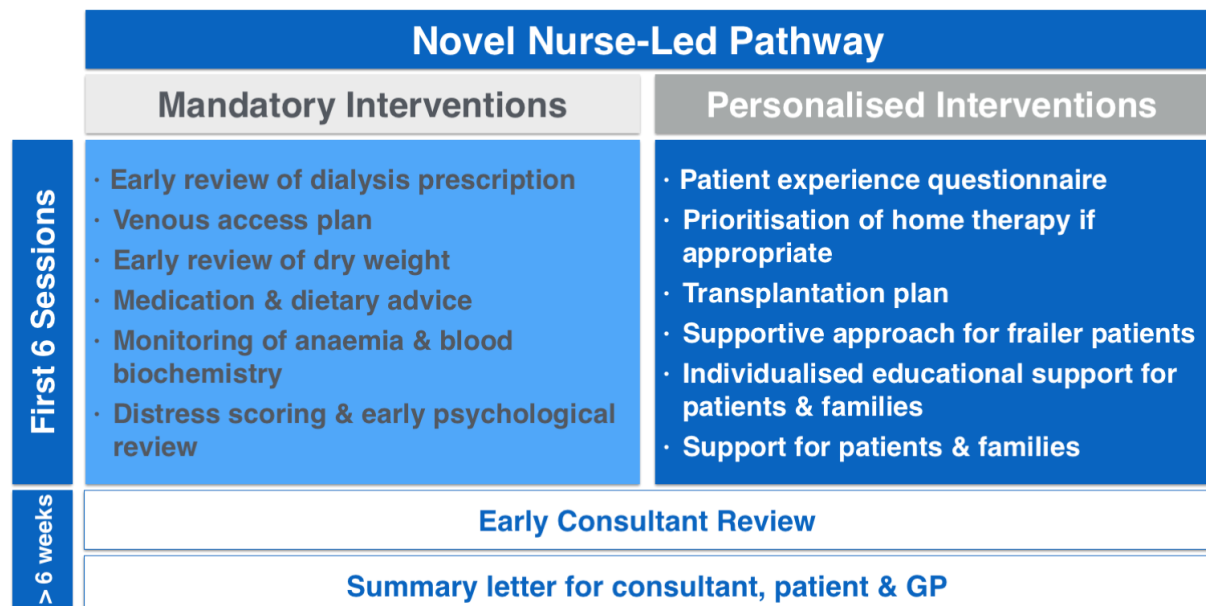


Figure 1: New Starter Dialysis Pathway

We designed this pathway to address variation in care quality, outcomes and experience for patients new to dialysis. The novelty of this approach was confirmed through engagement with various regional and national clinical networks and through review of the literature. Previous strategies have either focused on single clinical issues (e.g. anaemia, vascular access) or have focused on in-centre dialysis care with little attention to home-care and transplantation. Some examples from the US have been delivered over a much longer time period (90-120 days) in a resource-intensive manner. There has never previously been a strategy that tackles the issue of patients commencing dialysis in a holistic manner that combines mandatory interventions with patient-centred optional interventions under a single approach.

Evaluation Method

This project was executed as a quality improvement project using an adaptive, iterative process. The evaluation effectively comprised a quality improvement cohort study using a retrospective, in-centre cohort of patients as a baseline control from the previous calendar year. The possibility of undertaking a future cluster-randomised control trial or a step-wedged trial design exists and we have been encouraged to pursue this by peers.

Measuring Impact

Our aim was to develop the ability to quickly and continuously access data (in a semi-automated fashion) using as many existing data sources as possible. During project design we engaged a member of our Business Intelligence team to advise and assist with the data collection and analysis process. This team is typically tasked with analysing data and generating reports on wider operational aspects of the organisation and this was the first time that they had become involved in a project that was looking at the quality of care in a specific patient cohort.

During project set-up we mapped out all of the data sources that would supply the information we required and determined the feasibility of extracting data from each system. In some cases this was not possible due to the age or reliability of the system and so for some data we developed manual collection processes. Our Business Intelligence team developed a bespoke project dashboard that enabled us to track project measures over the course of the project (Figure 2 for example page of project dashboard) and which was available on our network to the core project team 24/7. This dashboard proved invaluable in the quality control and project monitoring process, enabling us to quickly spot any missing data and query any outlying results.



Figure 2: Project Data Dashboard

Data Analysis

Data was analysed and presented using a descriptive approach as advised by our in-house statistician. Interim data was peer-reviewed for presentation at the 2017 British Renal Society Conference. We have also been invited to deliver a 30-min presentation at the 10th UK Annual Dialysis Conference in September 2017, where the data will be subjected to some scrutiny.

Adjustments to the Measurement Plan

Slight adjustments to our outcome measures were made in response to challenges with acquiring certain baseline data and as a result of stakeholder engagement. Adjustments included:

- Additional time points (weeks 0,2,4 and 8) for measuring patient distress as a consequence of our patient engagement activity.
- Extension of time point (from 8 weeks to 90 days) for measuring definitive vascular access, to fit more realistically with the surgical process and patient

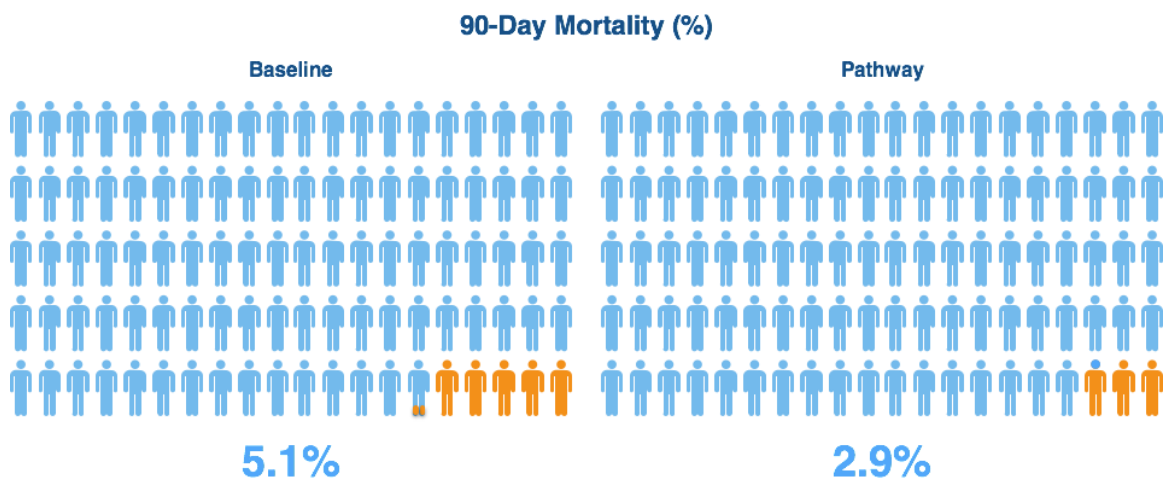
recovery

- Extension of time point (from 8 weeks to 90 days) for measuring the percentage of patients with a plan for home therapy due to waiting times for home therapy training.
- The ability to demonstrate a change in the percentage of patients achieving all Renal Association blood biochemistry and adequacy targets is not possible due to the high variability in the quality and integrity of the baseline data.
- The measure of % of patients being seen in clinic within 6-weeks was adjusted to average time interval to first clinic review as this proved easier to capture (it could be automated).

Impact

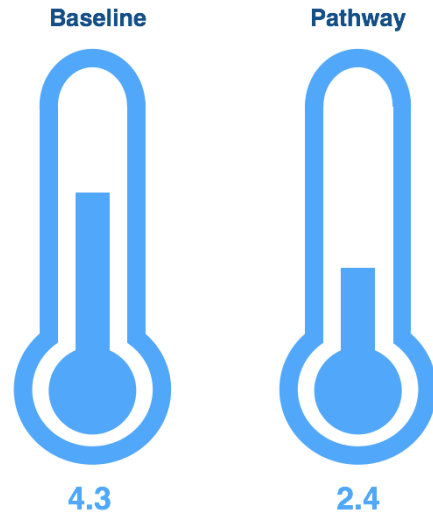
Outcome Measures

90-day unadjusted mortality



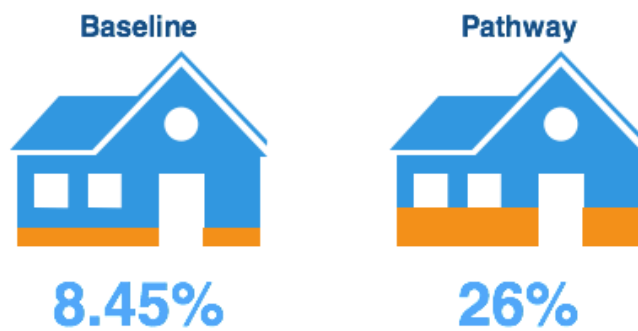
Patient Distress Score at week 2 and week 8 (of their dialysis treatment plan)

Average Patient Distress Score at Weeks 2 and 8



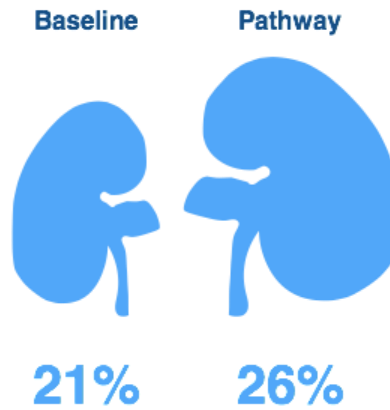
% patients with a plan to commence home dialysis or self-care at day 90

% Patients with Plan for Home Therapy at Day 90



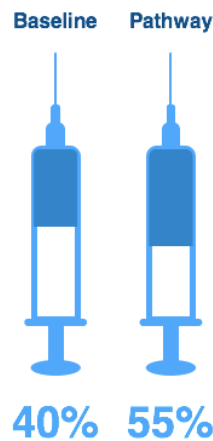
% patients listed for transplant or in work-up at 90-days

Patients Listed for Transplant or in Work-Up at Day 90 (%)



% patients with definitive vascular access at day 90

Patients With Definitive Vascular Access at Day 90 (%)



% patients achieving all Renal Association blood biochemistry and adequacy targets

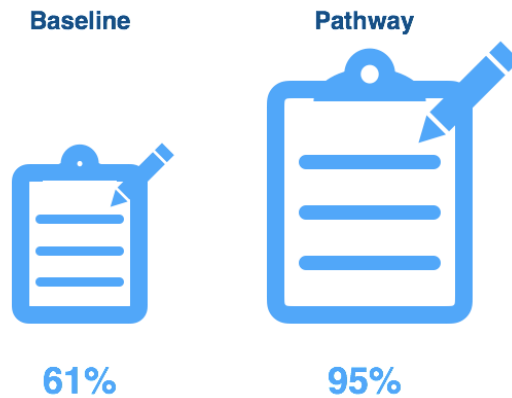
In hindsight, this measure was perhaps overly ambitious and indeed challenging to demonstrate as the baseline data showed great variability due to patients previously not having blood tests completed on time. It was not possible to determine the true percentage of patients that were achieving the targets. Whilst we have still collected this data we decided that this was perhaps more indicative of process improvements;

implementation of the pathway now means that patients are getting tested and we can quickly identify those patients that have missed particular tests, and establish if they are within target or not. Patients not achieving target can then be managed more appropriately. We believe this to be a good achievement in itself.

Process Measures

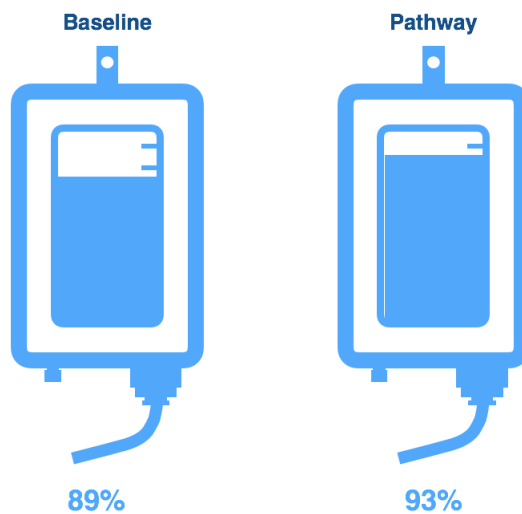
% patients with documented transplant status at 90 days

Patients With Documented Transplant Status at 90 Days (%)

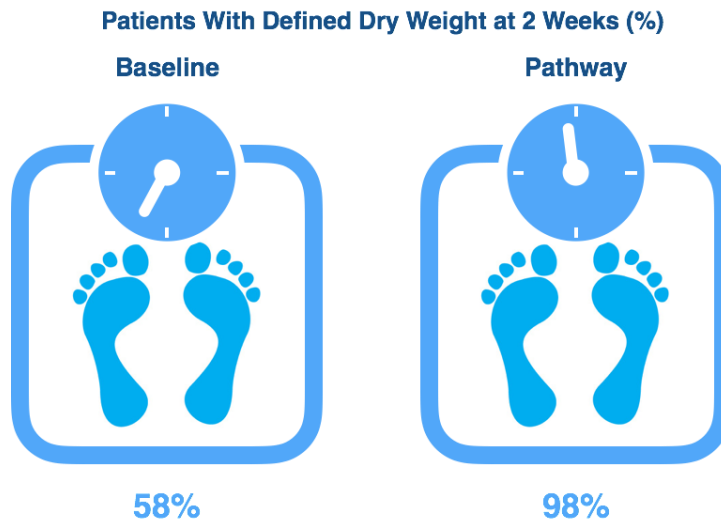


% patients dialysing through a line with plans for definitive access

Patients with Plan for Definitive Vascular Access by Day 90



% patients having early prescription and dialysis parameter review



Average time to first clinic review (days)



% patients with evidence of shared decision-making regarding treatment modality preference

Establishing a baseline with respect to this measure wasn't straightforward and would require intensive resource to scrutinise the records of the historic cohort of patients. Therefore, we elected to drop this measure. In most cases it can be assumed that there was no overt reference in the patients' notes and so the baseline was effectively zero. Under the new pathway every single patient (100%) that enters the pathway now has a complete record (validated by the Nurse Lead) that enables production of a summary letter for consultant review at clinic. The pathway documentation records that a discussion has been held with the patient about choice of treatment-modality.

Qualitative Data

To capture patient experience feedback in a systematic manner we implemented a Patient Reported Experience Measure (PREM) questionnaire that was based upon the PREM used in the UK Renal Registry annual patient survey.

We administered the survey when the patients first entered the unit and started dialysis and at 90 days. We analysed this qualitative data using a weighted scoring methodology to enable us to easily visualise patient satisfaction. Patient satisfaction was overall very positive (Figure 3).

[Return To Dashboard](#)

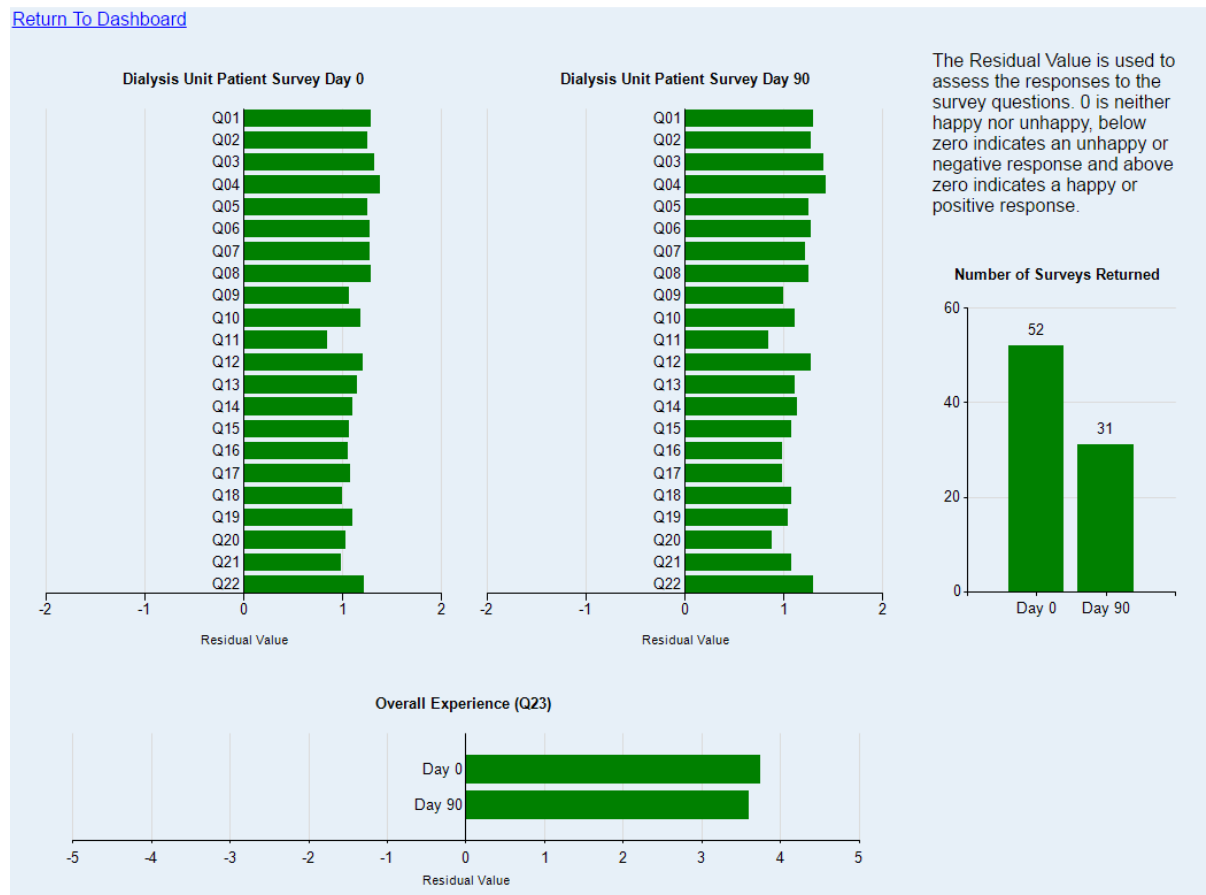


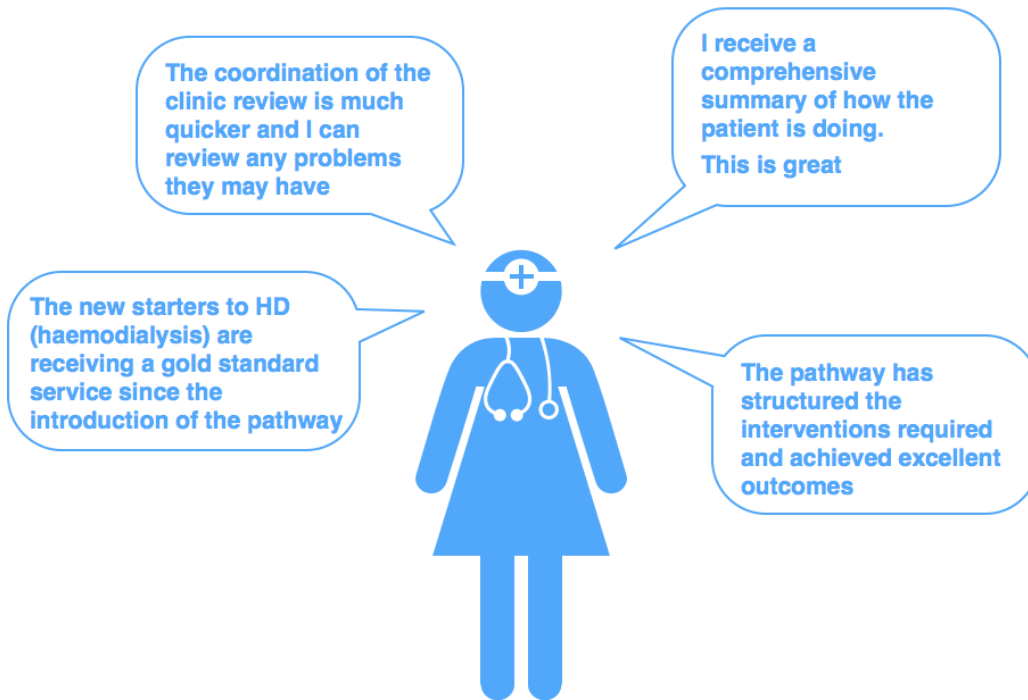
Figure 3: Qualitative data derived from Patient Reported Experience Measure

We also invited patients and staff to provide comments on the service. Some examples are provided:

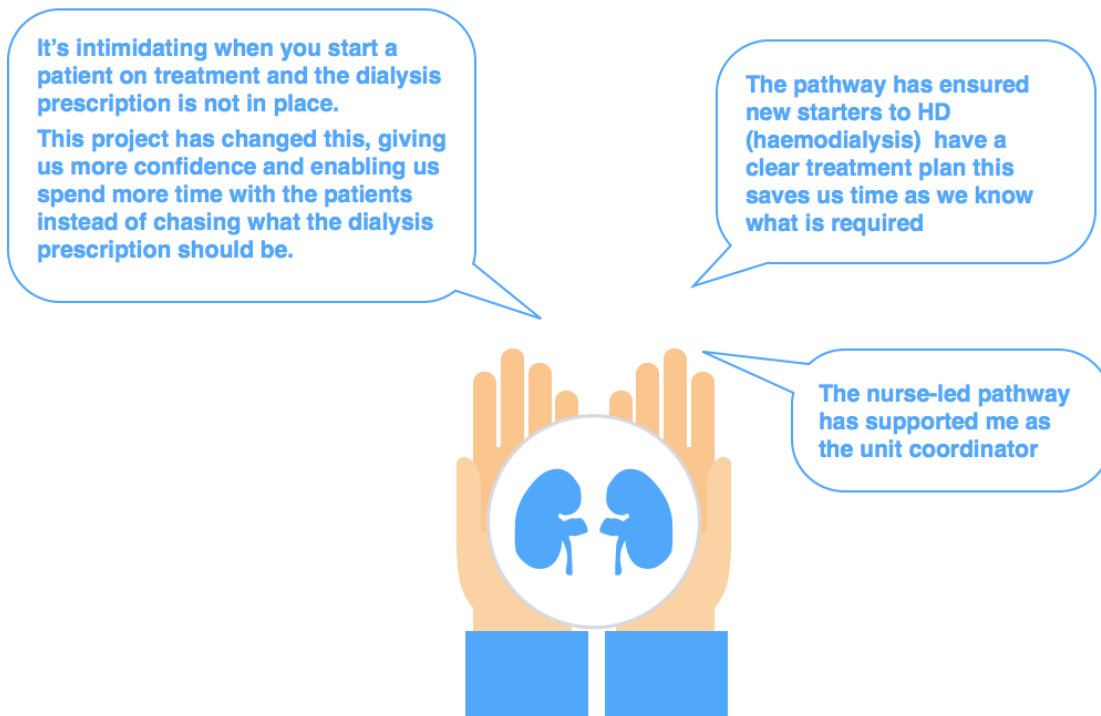
Patient Feedback



Renal Consultant Feedback



Nursing Team Feedback



Part 3: Cost impact

In England, dialysis is a specialist commissioned service and is overseen by the National Programme of Care and Clinical Reference Group for Internal Medicine. In-centre dialysis, home dialysis and transplantation are all specialist commissioned services.

Treatment for complications associated with dialysis and acute admissions are usually reimbursed via the local Clinical Commissioning Group

The indicative cost of maintaining a patient with end-stage renal failure on in-centre haemodialysis is £35,000 per patient per year.

During this project we have estimated the likely cost-savings that may be released assuming that patients do progress to receiving a transplant or remain well enough to commence home dialysis. We have undertaken this analysis in collaboration with our Service Improvement & Excellence Team that comprises a team of skilled Lean Practitioners.

In this project, projected cost savings include:

- Transplantation - an additional 2 patients listed for transplant. Transplantation is estimated to save around £24k per patient per annum potentially releasing a recurring saving of £48k per year
- Home care – an additional 12 patients have elected to undertake home dialysis. Home therapy is around half the cost of in-centre dialysis and so it is estimated that a saving of around £210k per annum will be made.
- Length of Stay – we have reduced the average length of stay for patients admitted to hospital during the first 90 days from 12.2 to 8.8 days. We have estimated that this would save around £144k per year.

Total savings are estimated at approximately £400k per annum (Figure 4).

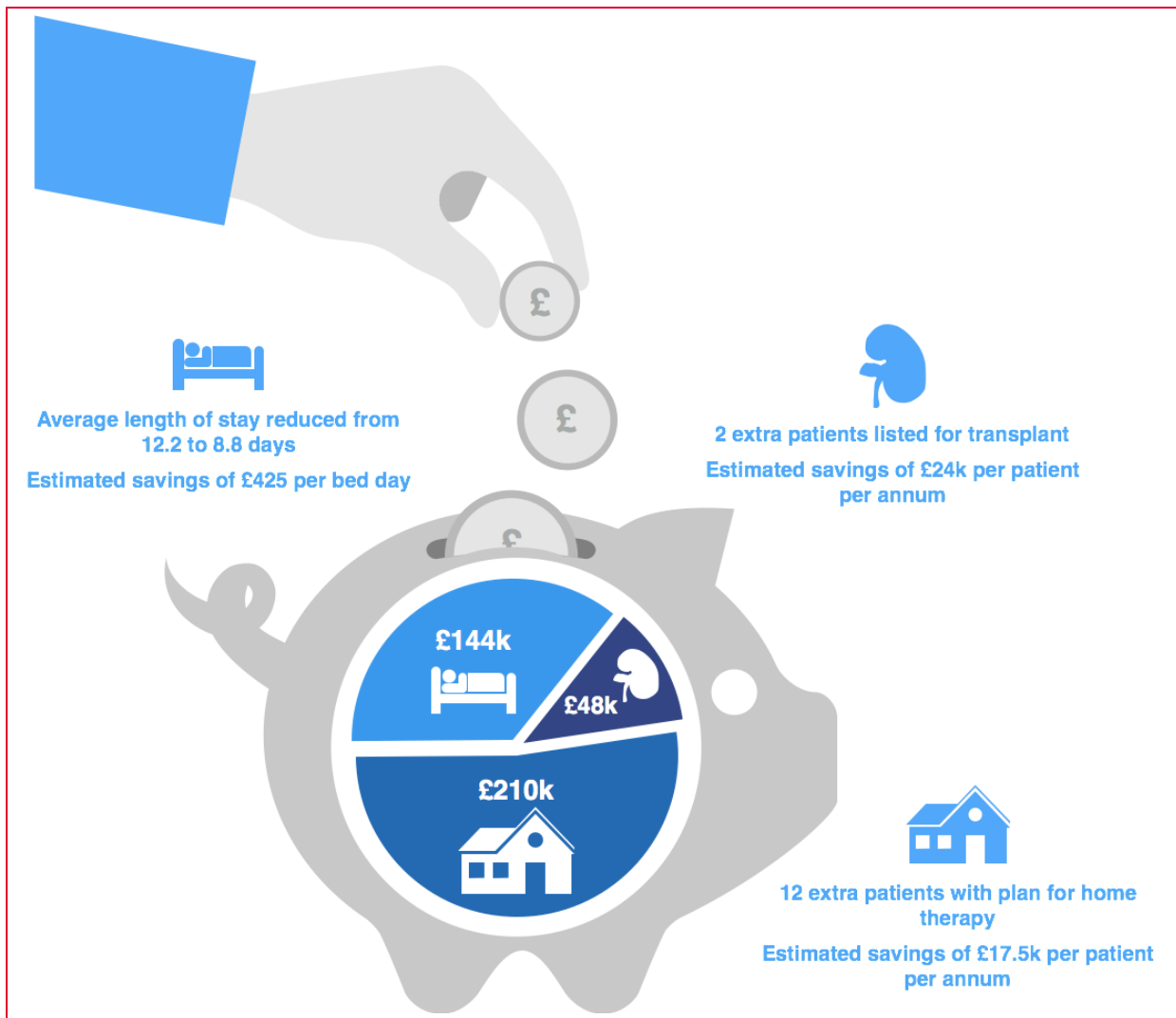


Figure 4: Estimated cost savings of approximately £400k per annum

We are continuing to follow outcomes for a period of 12-months and this data will help to better quantify the actual cost-savings as we hopefully see patients convert from ‘having a plan’ to actually receiving a transplant or initiating home therapy.

Future Sustainability

The key to success of this pathway is that we have leadership for delivery of the pathway, with that person responsible for:

- delivery of the pathway (over the first 6 sessions),
- coordination of patient care – ensuring the patient cannot slip through the cracks
- quality control

To continue delivery of this pathway we have estimated that it will require around 0.5FTE of a senior nurse such as an Advanced Nurse Practitioner, who must be able

to undertake examinations, perform diagnosis and prescribe.

The improved quality, safety and estimated cost-savings arising from the project have enabled us to justify continuation of the role (undertaken by the project's Nurse Lead). We have now developed a job description that is focused around the concept of a 'transitional care nurse'; our department has funded that position and the project Nurse Lead has now stepped into that role.

Part 4: Learning from your project

We have been extremely pleased at the way in which this project has progressed and the outcomes we believe we have delivered. We have gained a lot in terms of learning about improvement and this model for project delivery has now been adopted elsewhere in our organisation too.

Learning

Key learnings that we consider broadly applicable to any innovation project include:

Project Team

The diverse set of skills provided by the project team has been critical to delivery of the project. We could not have achieved what we have to date without sourcing expertise from outside our own clinical area, such as from the Business Intelligence team, innovation specialists and service improvement expertise.

We found it invaluable to involve our data analysts (Business Intelligence team) in the project design in terms of agreeing the measures. This expertise was critical to designing the data collection process and we learned that you should never assume that it will be possible to obtain data - even if it is collected in some system it may not be feasible to extract and use.

Stakeholder Engagement

It has been helpful that, in our organisation, supporting innovation is a high priority. Nevertheless, we have still found that bringing stakeholders into the clinical environment is an effective way to motivate them to help. We have done this both physically and virtually (via video).

The data are also a very powerful tool for motivating others to work with you and to support change. We found this very effective when we encountered some barriers as it helped to explain why we were making the changes we were.

We have also found that by constantly talking about the project and reminding senior management and executives about the work that we have managed to make the project strategically important to the organisation. The project was, for instance, highlighted in a number of important reports (including CQC inspection report) as a good example of innovation, which has made it easier to garner and maintain support; it becomes more difficult for the project to be de-prioritised.

Patient Communication

During the project we were surprised to discover how little time that we as clinicians and carers spent talking to patients. In this project, we have observed that patient distress and fear can be alleviated by more time being available to talk to patients.

An aspect of the pathway involves patient education, monitoring of distress and patient engagement; whilst undertaking these activities the Project Nurse Lead has had time to talk to patients to better understand their concerns and found that some distress can be alleviated by simply being able to answer certain questions early on in their dialysis treatment. Uncertainty is one of the drivers of fear and distress.

Challenges

A number of significant challenges did present and did threaten the ability to deliver the project and outcomes

Culture and Response to Change

For this project a member of nursing staff was released from her role as ward manager to undertake this project (as Project Nurse Lead) and her position back-filled. As a popular and well-respected member of staff, it was natural that staff on the dialysis unit continued to approach the Project Nurse Lead, when they had queries about patients or issues on the unit. This created some friction with the new ward manager whose support was vital to the success of the project. We addressed this issue by actively engaging with the new ward manager to inform her about the project and to try to draw her interest in its outcomes. We also ensured that a firm approach was taken to staff in re-directing their queries and ensuring they communicated with the new ward manager. As the project progressed the role of 'New Starter Nurse' evolved and staff became much more certain about roles and responsibilities in respect of new dialysis patients.

Human Resource

Staff absence due to long-term sickness meant that for a long period in the project we had no dedicated psychologist to whom patients experiencing distress could be referred. This created a significant risk in respect of our goal of reducing patient distress. Whilst we escalated our concerns, there was no solution that could be quickly implemented, as there was no capacity to fill that gap with a suitably trained replacement. We did however continue to refer patients to the service, which served to demonstrate demand for the services. This issue did resolve as the staff member returned to work but is acknowledged as a risk in the future once more.

Other Gaps or Weaknesses in the System

This project resulted in patients being accelerated towards particular services or clinics, which emphasised capacity and efficiency issues elsewhere in the system. For instance, our push to get new patients seen in clinic earlier had a knock-on effect in terms of capacity for established (and in some cases sicker) patients. Clinic capacity has always been an issue but our project threw a bright spotlight on the problem. Our Directorate has started to look at re-organising the clinics and in part this issue may be helped by increased numbers of patients electing to receive dialysis (and attend clinic) at the satellite units. However, the efficiency of the

process of transferring patient to satellite-unit care is also sub-optimal and may require some re-design. We had to ensure that we remained focused on the project and did not get distracted by other problems that are identified as a consequence of the project. We have taken the view that these represent future improvement opportunities, which require a separate project to be designed.

We also have found that despite our intention to schedule all dialysis slots for new starters during the daytime that this is still not always possible – in part due to slot availability but in some cases due to patient choice. Patients that start outside of the typical 9-5 working day may not always be able to easily see a dietician or have more detailed discussion about their care due to staff working patterns. Staff are being exceptionally flexible and will try to see patients after the end of their shift, however this does create a sustainability issue. In part this is being addressed through development of more informative patient materials and through separate referrals. A key benefit of the pathway is that now the dialysis team knows if the patient has been referred to another service (e.g. psychology or dietetics) and can coordinate access if it is not possible immediately.

Part 5: Sustainability and spread

Sustainability

The New Starter Dialysis Pathway is being sustained beyond the project and our organisation has already committed the resource to do so due to the resulting improvements in patient care and safety. Our department did not even contemplate stopping the pathway. Additionally, none of the nursing staff wanted the pathway to stop due to the improved quality of information and communication and the confidence it gave them when starting patients on dialysis. Resourcing of the nurse role has been justified through confidence in the likely cost-savings being delivered. To sustain the New Starter Dialysis Pathway, we are currently in the process of slimming down the pathway documentation and data collection process to make it easier and more efficient for the pathway to be administered. Parts of the pathway documentation (on our PENS system) were intended solely for data collection purposes for the project and will not be required for continued monitoring of the pathway. We have a good understanding of what measures are useful for quality control purposes and so we can remove unnecessary measures from the pathway and the dashboard. The dashboard will be maintained with minimal input from our Business Intelligence team due to the process being mostly automated. Our plan also involves training of the senior coordinators of the dialysis unit to undertake the process for new starters to further embed this into the unit and to reduce the reliance on just one individual for starting of patients.

Recognition

This project has already received significant interest from the kidney care community across the UK.

Internally, the project has been shortlisted in two categories for our Make A Difference Awards <http://makeadifferenceawards.co.uk/categories>.

We presented the interim data as a poster at the annual British Renal Society Conference 2017 and received good feedback from attendees.

On the back of presentations and social media activity we have received initial interest from a number of other units and kidney care units across the UK, including NHS Lothian, KQuiP (Kidney Quality Improvement Partnership) and have been invited to present at the 10th UK Annual Dialysis Conference in September 2017. We have also had an abstract accepted at the American Society of Nephrology Kidney Week 2017.

Scale-Up

Whilst we do not have plans to change the general shape and concept of the

intervention we do aim to implement and test this intervention elsewhere.

We are currently in the process of planning how we could replicate and test this intervention at other sites. We have a number of potential opportunities to explore in this regard including:

- Aintree University Hospital NHS Foundation Trust with whom our Trust will be merging in 2018
- NHS Lothian – following a teleconference held with their Chief Quality Officer
- Salford Royal NHS Foundation Trust who expressed an interest in hearing about the project outcomes from the start of the project

With these potential partners we plan to explore the possibility of designing and executing a scale-up project for which we will need to source further funding. We will be submitting an application to The Health Foundation's Scaling Up Improvement scheme.

Spread

We have good access to clinical and improvement networks with whom to engage to explore the best ways to share the outcomes and learning from this project. These networks include the Cheshire & Merseyside Kidney Care Network, ReMEC and KQuIP.

In terms of replication, we have identified the following key elements of our intervention:

- Pathway – the pathway and process are entirely replicable. All of the clinical interventions should be offered to patients anyway; the pathway ensures they are delivered on time and monitored.
- Pathway documentation – the document templates can be adopted electronically or on paper. Whilst we have employed an in-house system it would be feasible to adapt the templates onto other EPR-like systems. This may require support from IT departments
- Data collection and analysis – other Trusts would not be required to use our Coeus Business Intelligence Platform and could use their own information systems. We have identified what measures are important for quality control purposes and most Trusts would be recording this data anyway. This will require support from local information teams.
- Description of tasks for nursing staff – this would be replicable assuming that resource can be made available. In our case study we have made it clear that overall responsibility for patients on the pathway must be held by a single

individual or small team to ensure that patients do not start to fall through the cracks.

Further Milestones

Over the next 3 – 6 months we plan to:

- Finalise our project toolkit in a format that is easily accessed and distributed e.g in an electronic format
- Develop a case study for the NICE Local Practice collection
- Draft and submit a manuscript for publication e.g. for BMJ Innovations or BMJ Quality & Safety
- Continue following-up patients for 12 months to see if positive outcomes continue.

These further activities will be resourced internally.

Appendix 1: Resources and appendices

A number of videos were produced to announce the launch of the new pathway

- Patient <https://www.youtube.com/watch?v=dPg2CSj46x0>
- Nurse Lead https://www.youtube.com/watch?v=O6-061ajt_s
- Project Consultant Lead https://www.youtube.com/watch?v=-HzDXK0_DgE
- Dialysis unit manager <https://www.youtube.com/watch?v=fr79zl795G4>

A video was then produced to update on progress at the mid-point of the project as data started to come through.

- https://www.youtube.com/watch?v=n0c_9N1EA3A

A poster was presented at 2017 British Renal Society Conference.



Quality Improvement Pilot Evaluating A Novel, Personalised, Nurse Led Pathway For Patients Commencing Haemodialysis Shows Improved Outcomes

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Introduction, Aims, Methods

Introduction: Commencing haemodialysis (HD) is a time of significant physical and psychological distress, with a high incidence of hospitalisation. Despite good pre-dialysis care many patients experience a suboptimal start to HD. Mortality is at its highest within the first 90 days of commencing dialysis.

Aims: To develop, test and evaluate the impact of a novel, personalised nurse led pathway for patients commencing HD in a range of patient centred process and outcome measures (see below).

The intervention and methods: Sequential PDSA cycles were used to develop a nurse led pathway for the first 90 days of HD. To coordinate the delivery of both mandatory and personalised interventions (Table 1). Patient experience was monitored using a patient satisfaction survey and patient distress was recorded at 2 weeks, 4 and 8 using the validated Patient Distress Thermometer (Renal).

An electronic pathway was developed in our electronic patient record to facilitate this, as well as automated real-time data uploads to a bespoke quality dashboard designed in collaboration with the Business Intelligence team (Fig 2). This has allowed real-time data review and interactive improvements to the pathway.

Historic baseline data was retrospectively collected for 78 patients commencing HD from July 2015-June 2016. Our prospective pilot will recruit patients from July 2016-June 2017, and we report 90 day follow-up data for the first 7 patients.

QI Intervention and Baseline Demographics

Novel Nurse Led Pathway		Control group	New pathway	
Mandatory Interventions	Personalised Interventions	Patients (n)	78	37
Early review of dialysis prescription	Patient experience questionnaire	Mean age (SD)	58.4 (15.6)	56.2 (16.1)
Access plan	Priority of home therapies appropriate	% Male	62%	51%
Early review of dry weight	Transplantation plan	% Diabetic	45%	27%
Medication and dietary advice	Supportive approach for frail patients	Mean GFR starting HD (SD)	8.6 (2.7)	6.8 (2.2)
Anaemia and blood biochemistry	Individualised education support for both patients and families			
Distress score and early psychology review	Support for both patients and families			
	Early consultant review			
	Production of update letter for patient consultant and GP			

Table 2: Baseline demographic data for historic control group and patients in pilot study.



Fig 2: Screenshot of bespoke project Quality Dashboard illustrating charts for key outcome measures.

Table 1: Components of nurse led pathway.

Results

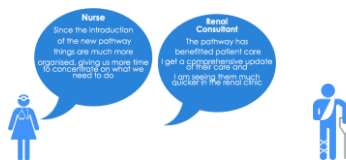
Table 3A: Improvements in process measures in pilot group

	Control Group	New pathway
% with documented transplant status at 90 days	61%	91%
% with definitive vascular access plan at 90 days	89%	94%
% with defined dry weight at 2 weeks	58%	97%
Time interval from start of review to first HD	98 days	40 days

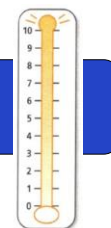
Table 3B: Improvements in outcome measures in pilot group

	Control Group	New pathway
% listed for transplant or in work-up at 90 days	21%	31%
% with definitive vascular access at 90 days	40%	56%
% with plan for home therapy at 90 days	8.5%	20%
Days spent in hospital in first 90 days	12.2 days	8.6 days
Unadjusted 90 days mortality	5.1%	2.7%

Fig 3: Qualitative outcomes: representative patient and staff quotes



Patient distress diminished from 3.3 (week 2) to 2.4 (week 8).
Patient feedback has been strongly positive.



Conclusions and Next Steps

Our data suggest that this nurse led pathway reduces patient distress and improves their experience. Clinical outcomes have improved with reductions in early mortality and hospitalisation, as well as improved uptake of home therapies. The rate of definitive vascular access has increased and more patients are being worked up for (or listed for) transplantation. We have already recruited 4 patients to the pilot and will continue to recruit until the end of June 2017. We will review outcomes at 90 days and 1 year. Our intention is to seek further funding to test and scale this concept beyond our single centre.



Where we all make a difference