

Project RED: Quality and Design-Method Approach to Improving ESRD Outcomes

Mayo Clinic

Setting & Background

Lead Organization: Mayo Clinic, Division of Nephrology and Hypertension

Key Partners: Mayo Clinic Center for Innovation

Health Care System Structure & Organization: Mayo Clinic Health System is a family of clinics, hospitals, and health care facilities. Mayo Clinic has more than 100 care sites with 22 hospitals serving over 70 communities in Iowa, Georgia, Wisconsin, and Minnesota. It provides integrated primary and specialty care to approximately 1.5 million patients each year.

Target Population: Patients with chronic kidney disease (CKD)

EHR: Mayo currently uses a homegrown GE EHR that is interoperable across inpatient, outpatient, and dialysis units within the Midwest practice but is in the process of transitioning the entire enterprise to Epic.

Data Sources:

- Kidney disease registries: separate registries for 1) dialysis, 2) transplant, and 3) CKD. Patients are identified by ICD-9 codes and laboratory results, drawn from the EHR.
- Focus groups with patients and clinicians

Time period: 2011 to present.

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Introduction

In 2011, Mayo's Division of Nephrology and Hypertension began Project Re-Engineering Dialysis (RED), a quality and design-methods approach to improve end-stage renal disease (ESRD) patient outcomes by creating high-value, patient-centered care across all settings. Project RED focused on designing and implementing an accountable care system with processes to manage all care required by ESRD patients enrolled in Mayo Clinic's dialysis services network. Overall aims of the program were to improve patient-centered outcomes (functional status, quality of life, survival) by reducing errors, improving transitions of care

across settings, and implementing patient-centered care and education/communication. Simultaneously, the program aims to meet external regulatory agencies' and Mayo's quality, safety, and service goals.

The team drew on seven years of patient data to determine where to most effectively deploy resources. Formative research indicated the following findings.

- 60% of patients initiate dialysis therapy in the hospital.
- 50% of the cost of care is related to hospitalizations—either for start of dialysis or death.
- Only 16% of ESRD patients start dialysis with a functioning arteriovenous (AV) fistula or graft.
- Patients remaining on in-center hemodialysis at Mayo longer than 6 months were more likely to be male and/or have DM.

Based on this analysis, Project RED aims to:

- Decrease the hospitalization rate;
- Decrease catheter use at hemodialysis start;
- Decrease costs in outpatient clinics;
- Increase patient satisfaction; and
- Increase patient-centered outcomes.

Methods

Key elements for developing and implementing Project RED include:

- Establishing and maintaining the Project RED team;
- Identifying patients with CKD and ESRD from the EHR;
- Conducting qualitative research with patients and caregivers;
- Identifying themes from EHR data and qualitative research;
- Evaluating potential interventions against identified patient needs; and
- Implementing and monitoring interventions.

Establishing and Maintaining the Project RED Team

Mayo's Division of Nephrology and Hypertension's partnered with the Mayo's Center for Innovation to create a multidisciplinary Project RED team including nephrology physicians, advanced practitioners (nurse practitioners, physician assistants), allied health professionals (nurses, dietitians, social workers, pharmacists), quality improvement staff, systems and procedures staff (for project management), and a design engineer.

The design engineer had no previous clinical experience and was trained at the New York School of Design. She was brought in to “think outside the box” and to focus on systems issues related to patient care. The engineer worked with Project RED full-time for approximately one year and was available for ongoing consulting (approximately 0.3 FTE).

To facilitate meeting goals and timelines and engage major stakeholders, the project management team organized into an Executive Oversight Group and four working groups to focus on: 1) outpatient and transitions of care for ESRD; 2) inpatient care; 3) outpatient CKD care; and 4) patient education. The working groups are co-led by a physician and a non-

physician clinician/leader (e.g., nurse practitioner, physician assistant, dietitian) and are made up of additional clinicians and allied health or support staff as appropriate.

The Project RED team meets weekly for 1.5 hours. Each working group meets separately and reports back to the full Project RED team. To ensure diffusion across Mayo Clinics, the Project RED team meets monthly with heads of all CKD Clinic sites and Dialysis Unit Directors to oversee implementation and efficacy of interventions. The Project RED team reviews a dashboard showing the status of interventions across all care sites and shares monthly progress reports with leadership. Individual Clinic, Hospital and Dialysis Unit heads can share implementation challenges with the Project RED team to ensure these issues are addressed.

Identifying Patients with CKD and ESRD from the EHR

The Mayo CKD Clinic tracks all CKD clinic (n = 1,000/year), dialysis (n = 450), and transplant (n = 174/year) patients who receive care within the clinic. Mayo's EHR includes automated alerts to primary care providers that encourages referral to the CKD clinic when a patient receives an eGFR result < 25 ml/min/1.73 m². Once referred to the CKD Clinic, patients are included in the CKD Clinic registries. Additionally, Mayo's EHR is linked to the Renal Data system, which includes data for all patients who receive dialysis throughout the system. These data are pulled from the EHR and the dialysis machine and nursing documentation. Providers and quality improvement staff can query patient data going back 7 years.

Conducting Qualitative Research with Patients and Caregivers

An interview/observation process was conducted to develop a thorough understanding of patient and caregiver needs, motivations, and aspirations. The design engineer carried out qualitative observation and interviews with patients preparing for or treated with dialysis or kidney transplant within the Mayo Clinic Dialysis Services, as well as with their caregivers. Patients with diverse co-morbidities, ages, and genders were included. Eighty-one (81) patients and 21 caregivers participated in interviews/observation. As part of the observation, the design engineer met with patients and caregivers in their homes and attended medical and dialysis appointments. Interviews were conducted primarily in a one-on-one setting (with one focus group) using open-ended questions to evoke similarities and differences in expectations and perceptions across subsets of patients. Pre-specified frameworks for the structured interviews, observations, and focus group were created around patient demographics and six analytical stages in the care continuum: prevention; presentation; diagnosis; treatment; recovery; and care management.

Identifying Themes from EHR Data and Qualitative Research

Using information from the interviews/observations and EHR data (demographics, medical data including dialysis or CKD-related quality metrics and disease trajectory, hospitalizations, all outpatient visits), the engineer developed eight patient personas. The eight personas are available on the [Managing Chronic Disease Populations through Health Information Technology Wiki](#). Based on the personas, five patient needs were identified:

- **Shared Decision Making:** Non-paternalistic discussion between the patient and the care team around goals within the community.
- **Collaboration and Empowerment:** Effectively exchanging information to set up mutual understanding and success for the entire community.
- **Open and Honest Communication:** Transparency of cost, data, modalities, and delivery of care.

- **Improved Education Intervals and Interpretation:** Real-time information that has a tighter feedback loop translated on the patient level to gain maximum usability of information.
- **Clarified External Relationships:** Mutual understanding of team member roles and activities that would support their capacity to maintain workload for the future state. Note patients and their family units as active members of team.

Evaluating Potential Interventions Against Identified Patient Needs

The Project RED team conducted detailed process mapping of current and future ideal states to identify potential interventions for pilot testing using Plan-Do-Study-Act (PDSA) cycles. The team evaluated proposed interventions against the patient needs identified through qualitative research. Only interventions that supported patient needs were moved forward.

Implementing and Monitoring Interventions

Improvement strategies for selected interventions were integrated in electronic information flows, clinic and hospital workflow, and educational materials, establishing consistency among care teams and improved patient transitions. Key interventions included:

- Standardization of hospital care and hospital care team communication.
 - ESRD patients admitted to a designated inpatient unit.
 - Inpatient dialysis registered nurse and nurse practitioner as part of the unit multidisciplinary care team.
 - Standard understanding of roles and expectations for all members of the care team, including patients.
 - EHR tools developed to communicate CKD care plans.
 - Standard admission orders implemented for all ESRD patients.
- Handoffs and transitions between care settings enhanced by consistent integrated flow of information.
 - Twice-daily multidisciplinary huddles between the inpatient ESRD care team and the appropriate outpatient dialysis unit multidisciplinary care teams to review every hospital admission and conduct a root cause analysis. The huddles are based on the patients' assigned outpatient unit and include the social worker, the nurse practitioner/physician assistant or sometimes the physician, the in- and outpatient nurse liaisons, and the dialysis scheduler. The huddles also discuss the patient's inpatient progress, care plan including medication changes, and anticipated dismissal date and disposition.
 - Dialysis registered nurse and/or nurse practitioner participate in dismissal rounds with the inpatient unit teams.
 - Just-in-time patient educational material "Quick Start" with essential information for the patient as they transition into the outpatient setting (diet/fluid restrictions, access care, emergency contact numbers and names, outpatient appointments, medication guidance/reconciliation).
 - All in- and outpatient clinicians have access to complete patient data within the EHR.
 - The "Ask Mayo" website provides treatment information (e.g., FAQs) and a list of nephrologists available to primary care clinicians for just-in-time consultation during patient appointments.

- Expansion of multidisciplinary dialysis care teams to include pharmacists and palliative care specialists.
 - A palliative care presence was established in the dialysis unit to facilitate discussion of end-of-life issues with patients on a regular basis.
 - Pharmacists participate in provider dialysis rounds and conduct medication reconciliation when a patient starts dialysis, is dismissed from the hospital, or has a significant change in status or clinical concern as identified by the outpatient dialysis nurse, nurse practitioner, physician assistant, or nephrologist. Once on dialysis, the Pharmacist Medication Therapy Management is conducted at least annually.
- Development and implementation of patient preference-focused education materials and decision aids for patients with CKD and ESRD based on findings of the qualitative research.
 - The materials include cards for each renal replacement therapy modality that address specific lifestyle needs (e.g., travel, diet) and cost of care.
 - Materials are accessible through the EHR.
- Education programs for patients with earlier CKD have evolved dramatically under Project RED. One-on-one, nurse-led education has been replaced by group and one-on-one classes led by a nurse practitioner and a dialysis nurse.
 - Patient education is documented through a multi-authored sheet in the EHR that enables tracking of what education was provided and who provided the education.
- EHR alerts to all providers if GFR < 25 ml/min/1.73 m² to consider CKD clinic referral.
- Standardizing care processes for patients with earlier stage CKD.
 - Evidence-based practice CKD care algorithm is available electronically for all providers.
 - Alerts integrated into the EHR to highlight need for CKD care (e.g., referral to nephrology, avoiding PICC if GFR less than 20ml/min/1,73m²).
 - Provision of CKD management information through the “Ask Mayo” website.

Results

- Decrease in in-hospital dialysis starts due to the implementation of standardized CKD care processes and patient-focused CKD and ESRD education leading to non-urgent dialysis starts for those with progressive or advanced CKD.
- Decreases in the number of 30-day readmissions, in-hospital dialysis sessions, total hospital days, hospital days per 1,000 outpatient runs, total admissions and admissions per 1,000 outpatient dialysis runs between 2011 and 2013.
- Decrease in percent of CKD patients who start dialysis with a catheter.

Facilitators

Including the voice of the patient. According to Project RED team members, the patient perspective was the most critical element to the project. Often, the needs patients expressed were very different from the team's expectations. The clinicians would not have been aware of the patient perspective, which was presented in the personas. These perspectives drove development of the various interventions.

Outside perspective. The design engineer helped Mayo look at the delivery of care at both the systems level and through a thorough analysis of patient needs and motivations.

Institutional support. Mayo supported Project RED, providing in-house resources (information technology, data analysts, allocating clinician time) and bringing in the design engineer.

Additional Resources

- **The Project RED Patient Personas**, available in the [CKD PHM Tools & Resources section](#) of the [Managing Chronic Disease Populations through Health Information Technology Wiki](#).

References

- Feely M, Hildebrandt D, Edakkanambeth Varayil J, Cook K, Williams A, Swetz K, Mueller P. Prevalence and contents of advance directives (AD) among patients with end-stage kidney disease (ESKD) receiving in-center hemodialysis. *Am J Kidney Dis.* 2015 Apr; 65(4):A34