



Clinical Safety & Effectiveness Cohort # 13

**Improving hepatitis B vaccination rate in the Chronic
Kidney Disease (CKD) patient population being treated
at the Texas Diabetes Institute**



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The Team

- Division
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- Sponsor Department: (Medicine) Nephrology

Aim Statement

- The aim of the project is to improve the number of chronic kidney disease patients vaccinated (starting series 1) for hepatitis B at the Texas Diabetes Institute (TDI) Friday Renal Clinic from the current rate of 10.5% to 80% by January 10, 2014.

Project Milestones

- Team Created 8/31/13
- AIM statement created c. 9/13
- Weekly Team Meetings 9/6/13 – 1/10/14
- Background Data, Brainstorm Sessions,
Workflow and Fishbone Analyses 8/8/13- 11/15/13
- Interventions Implemented 10/18/13
- Data Analysis 11/20/13, 1/3/14
- CS&E Presentation 1/17/14
- Graduation Date

Background: KDOQI guidelines

- All adults who are at high risk of progression of CKD and have GFR < 20 mL/min/1.73 m² should be immunized against hepatitis B and the response confirmed by serological testing

4.6.4: We recommend that all adults who are at high risk of progression of CKD and have GFR < 30 mL/min/1.73 m² (GFR categories G4-G5) be immunized against hepatitis B and the response confirmed by appropriate serological testing. (1B)

- Provide HBV vaccine to people with CKD who are likely to require RRT. Although the recommendation is to give the HBV vaccine during more severe CKD (GFR < 15 mL/min/1.73 m²), it may be preferable to give this earlier to maximize the chances of achieving immunity; there are data to support this practice.⁶⁴⁰ This would also ensure that all patients are immunized against HBV before receiving a transplant. As protective antibody levels may fall, this should be checked (possibly annually) with booster doses given if appropriate.

Hepatitis B vaccine. Widespread hepatitis B virus (HBV) vaccination at the onset of dialysis has led to a marked reduction of HBV infections in people with ESRD, although improved screening of blood products and dissemination of recommendations for reducing the spread of HBV infections in dialysis units have also likely contributed.⁶⁴⁷ Among people with moderate to advanced CKD, hepatitis B vaccination responsiveness has been shown to range from approximately 60 to 80% depending on the dosage, number of administered vaccines, and study population. Although findings have been inconsistent as to whether the level of GFR affects vaccine responsiveness in people with CKD^{640,642} those with higher GFR are more likely to respond with seroconversion factors.⁶⁴⁰

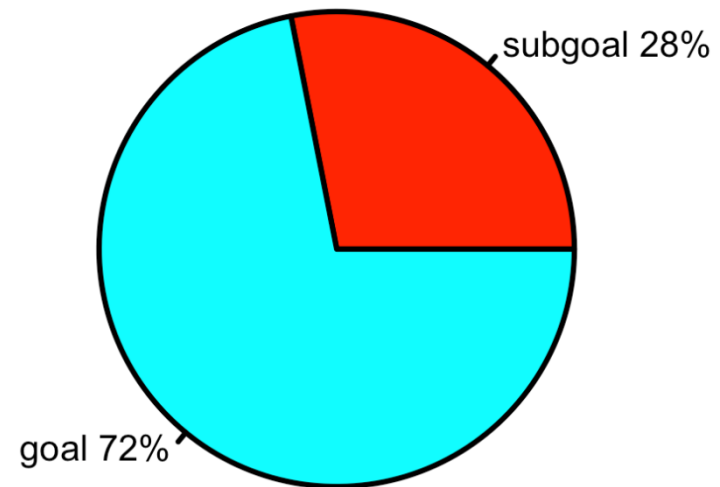
Background

Chronic hepatitis B is a risk factor for liver failure, cirrhosis and liver cancer.

Approximately 620,000 people die annually from hepatitis B virus-related liver disease.

Hepatitis B vaccination is an effective intervention in preventing this infection.

Hepatitis B seroconversion

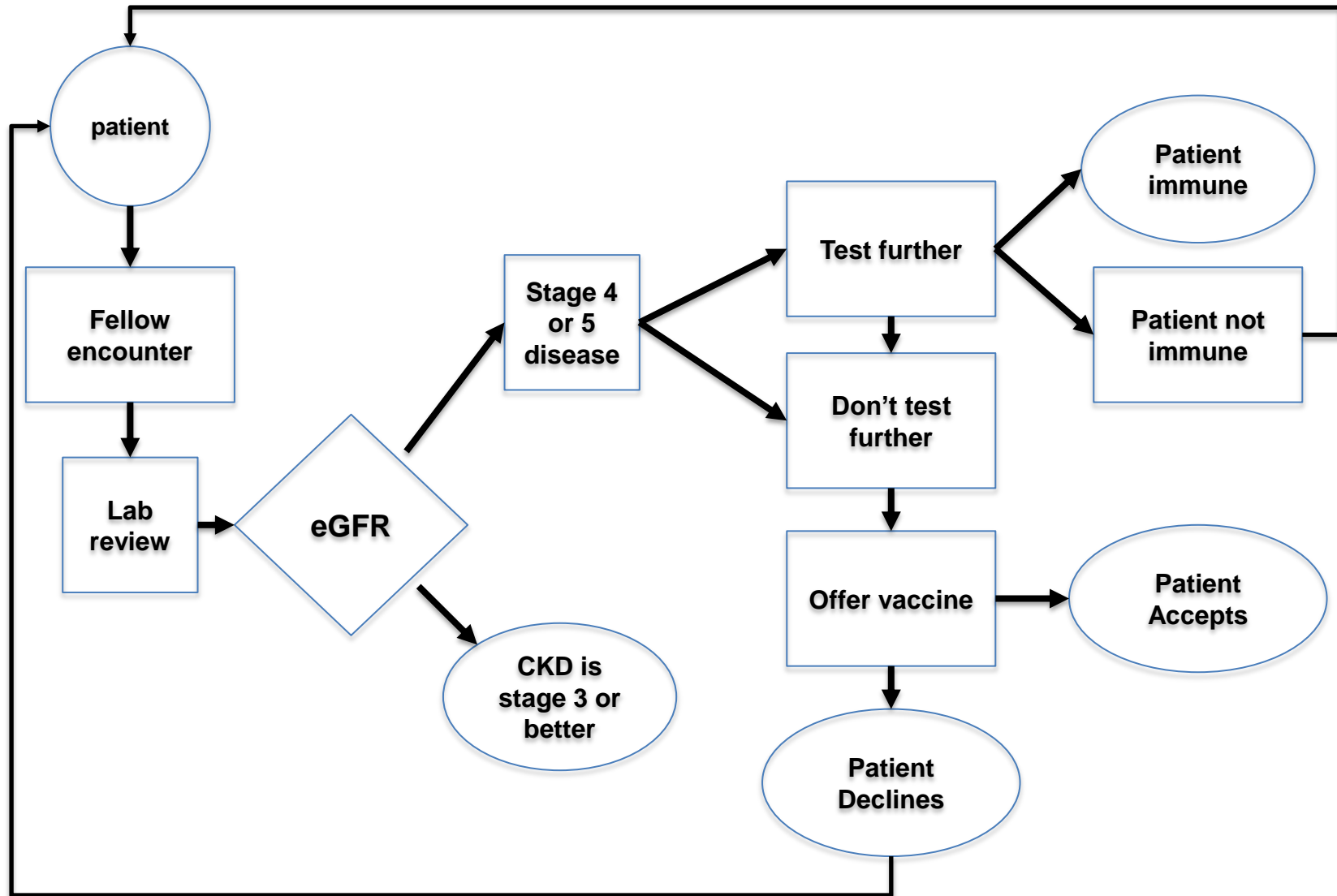


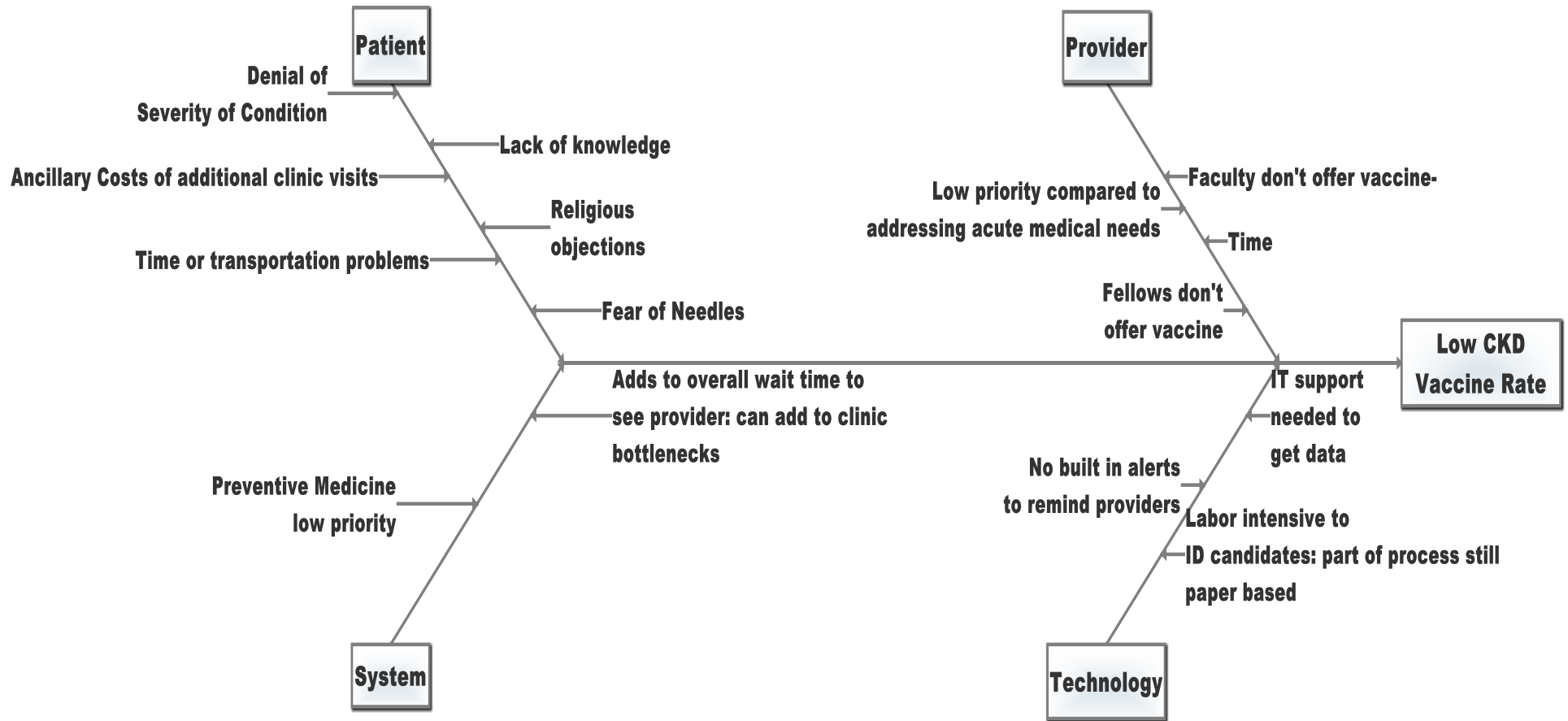
The UH has 5 dialysis units. The number of patients that are non-responders to vaccination is not insignificant. In the end of 2013, I obtained the numbers of current non-responders or those patients currently receiving vaccinations. (Optimally, chronic kidney disease patients should have already been vaccinated prior to initiation of dialysis.) University Hospital Northwest had 12 non-responders out of a total of 121 patients. Among the total, 45 patients were in the process of being vaccinated. University Hospital Southeast had 22 patients with titers < 10 IU/L out of 88 total patients. University Hospital West had 21 patients with titers < 10 IU/L out of 147 patients. This translated into 100 patients with sub-goal titers out of 356 total patients, i.e. 28%.

Primary Seroconversion in ESRD is Poor

- While on dialysis, 76.7% of patients who receive hepatitis B vaccination will seroconvert with an antibody titer > 10 IU/L
- However, only 53.5% will have an adequate response (i.e., titer > 100 IU/L).

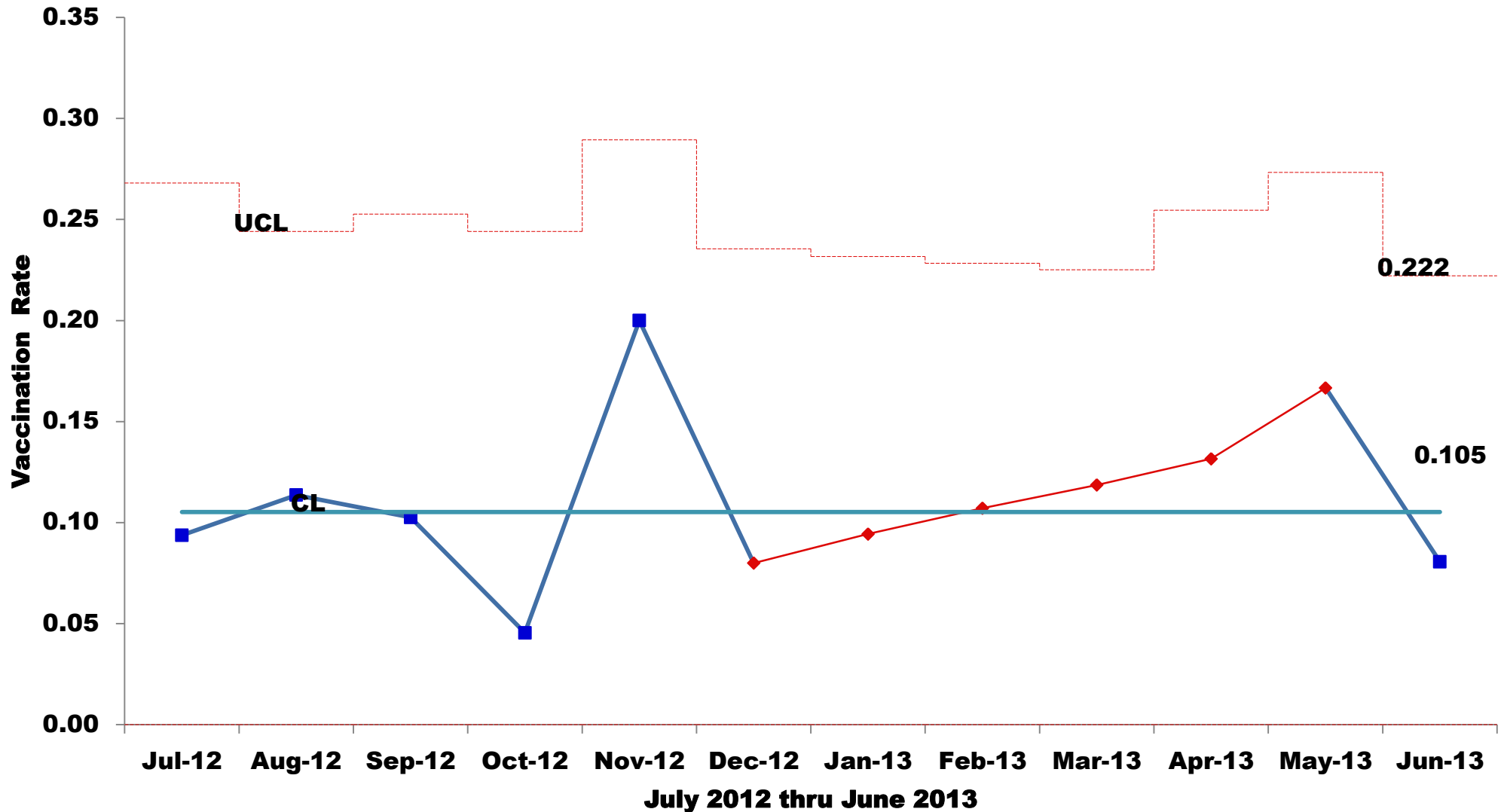
Past Work Process: Hepatitis B Immunization in CKD Patients



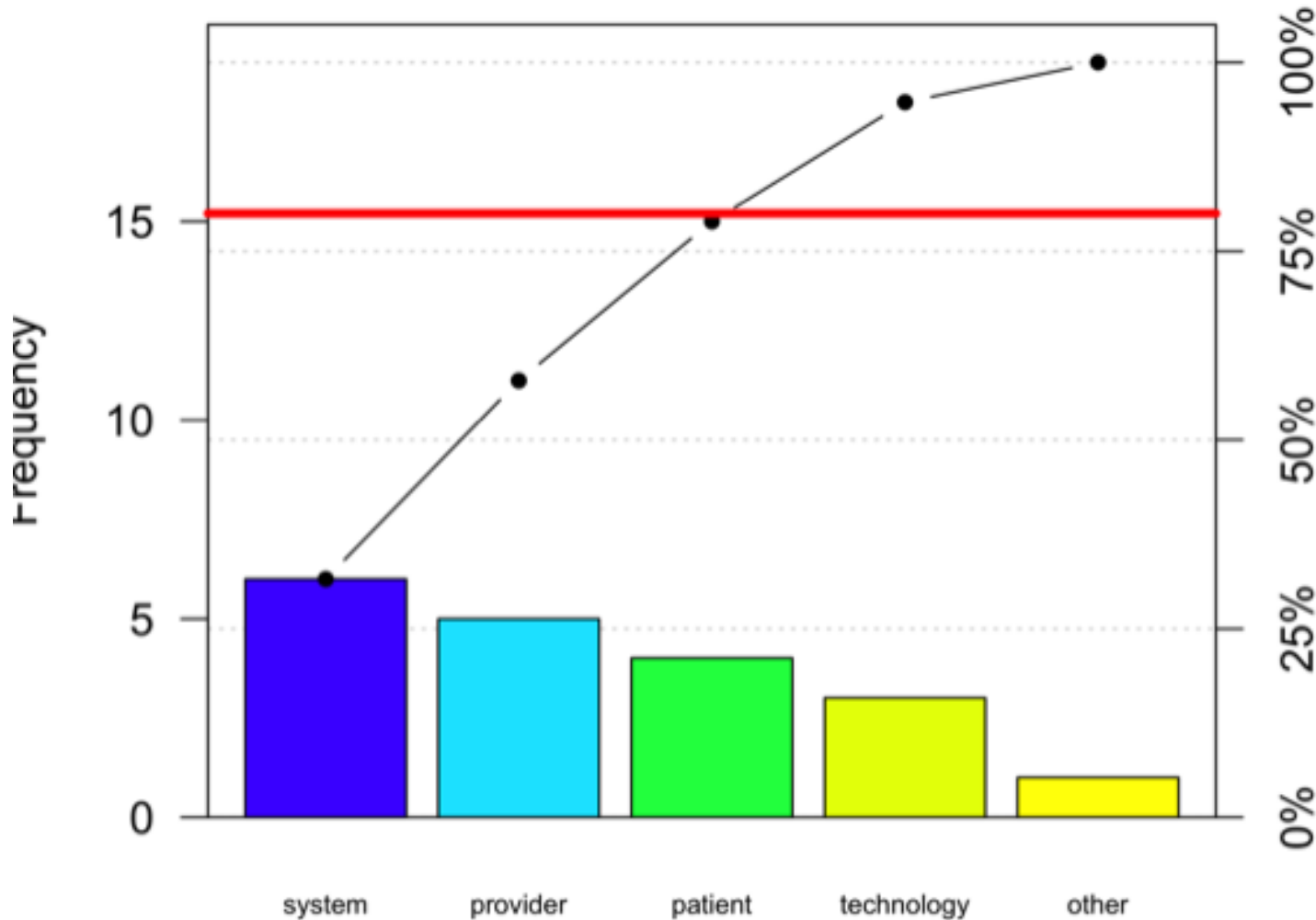


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Pre-Intervention HepB Vaccination Rate for Stage 4 and 5 CKD Patients



Obstacles for Vaccination



Data were obtained from faculty, fellows, and staff at the Friday TDI clinic. I grouped the main categories of my fishbone, and asked which was the most important. System 6, Provider 5, Patient 4, Technology 3 and other 1 as of 11/16/13.

Intervention

Plan

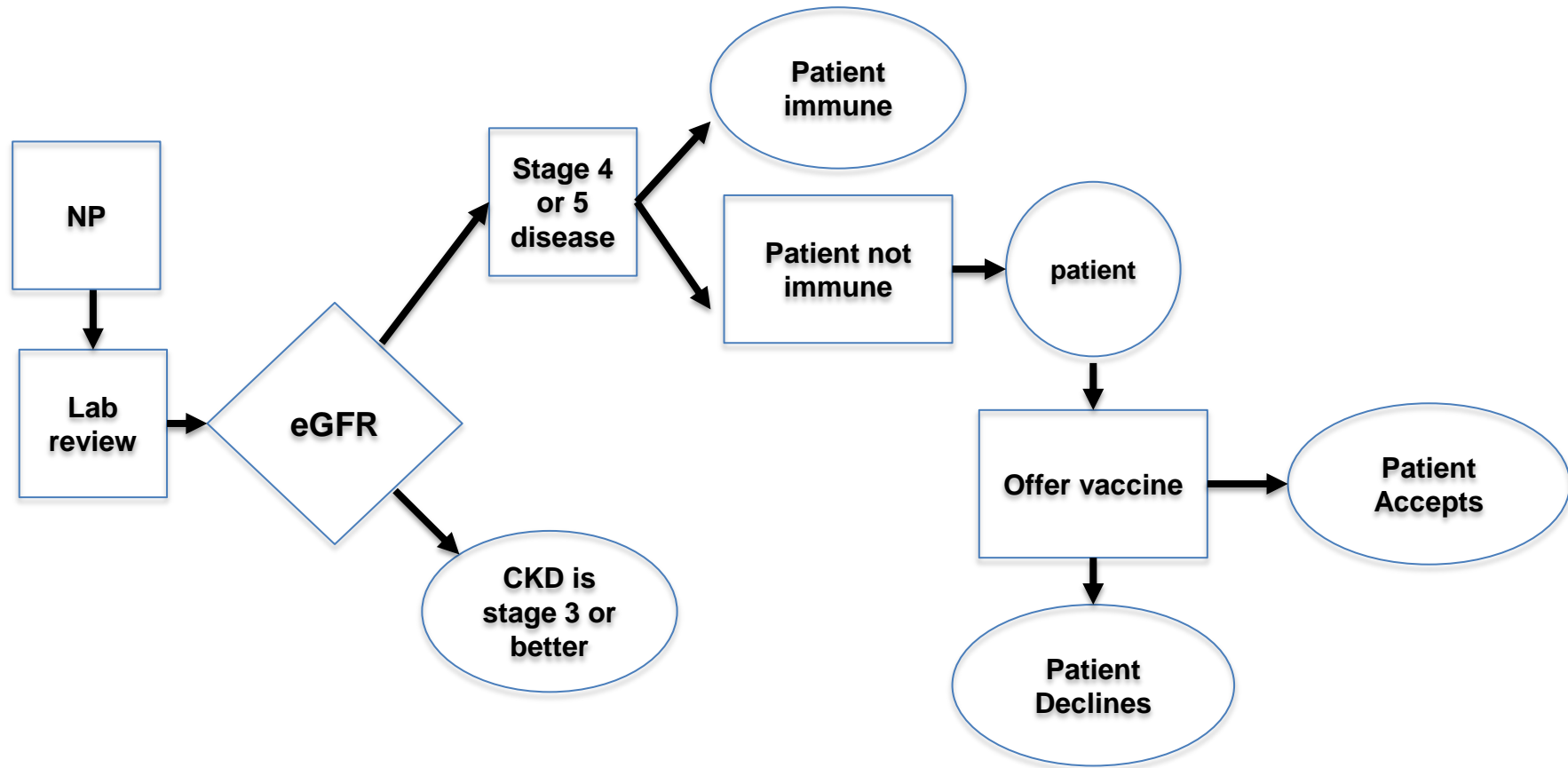
1. Obtain baseline data
 - Obtain IDX data in spreadsheet fashion
 - Meet with IT (Lisa Wammack, Dr. Powell) to obtain data
 - Analyze data for Hep B vaccination, Hep B S Ab titre level
2. Nurse practitioner assumes responsibility for the clinic's patient vaccination status
 - Patients are screened for CKD stage, proteinuria/albuminuria stages prior to clinic
 - Orders are ready prior to the clinic day
 - Have vaccine ready prior to clinic

Implementing the Change

Do

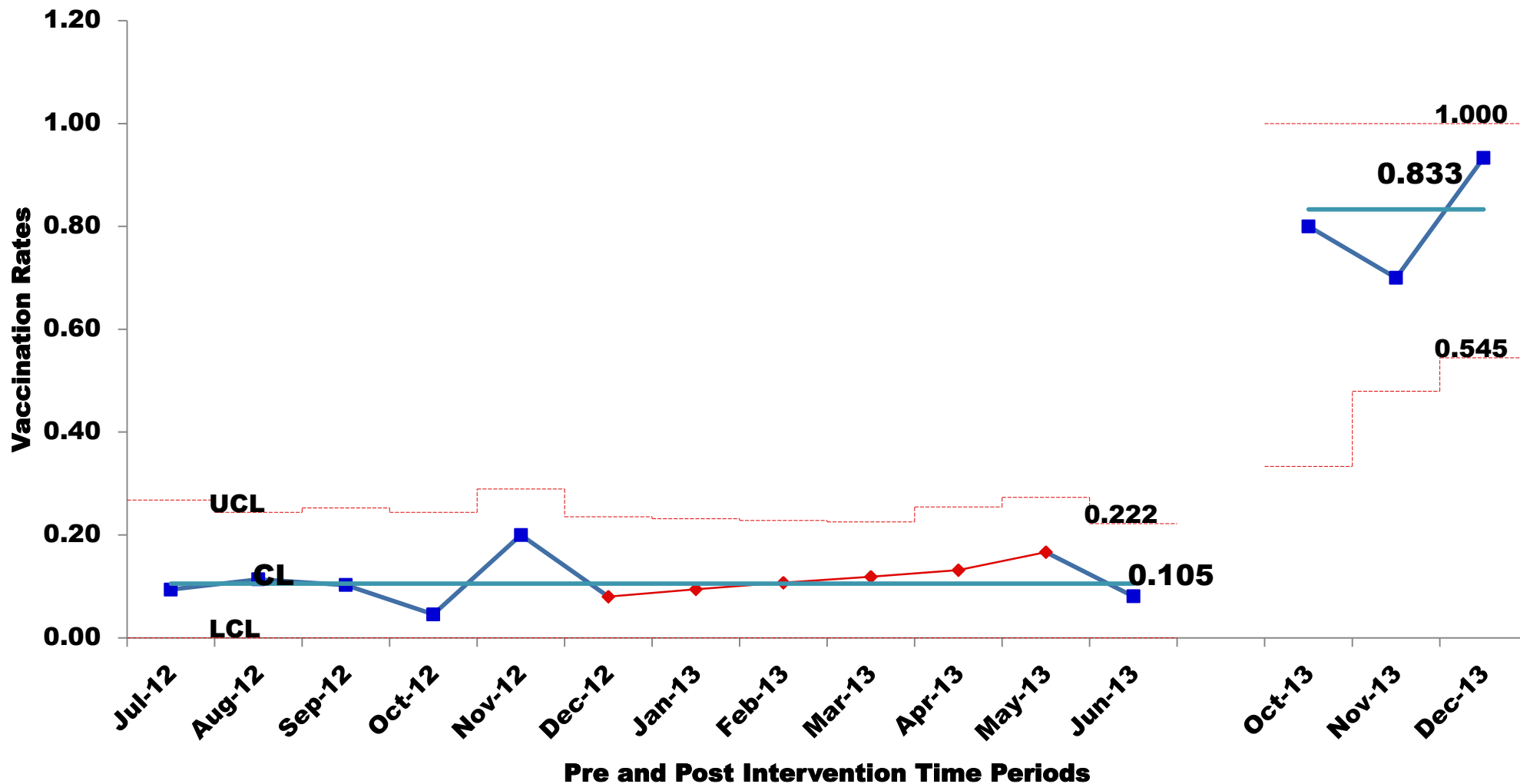
- Patients were screened for CKD 4,5 prior to the clinic (i.e., absolute indication for vaccination)
- Orders written (by NP) prior to encounters
- Clinic staff (RNs) planned to provide vaccinations (ordered from pharmacy)

New Work Process: Hepatitis B Immunization in CKD Patients



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Pre and Post Intervention Vaccination Rates for CKD Stage 4 and 5 Patients



Return on Investment

Costs of vaccination in CKD clinic

series	order	vaccine	cost	clinic	frequency
	1	vaccination	1	\$195.00 outpatient clinic	once
	1	vaccination	2	\$195.00 outpatient clinic	once
	1	vaccination	3	\$195.00 outpatient clinic	once
	1	HepB Sab		\$119.00 outpatient clinic	once

\$704.00 Total

Costs of vaccination in dialysis unit

series	order	series	cost	clinic	frequency
	1	vaccination	1	\$195.00 dialysis unit	once
		HepBSAg		\$117.00 dialysis unit	monthly
	1	vaccination	2	\$195.00 dialysis unit	once
		HepBSAg		\$117.00 dialysis unit	monthly
		HepBSAg		\$117.00 dialysis unit	monthly
		HepBSAg		\$117.00 dialysis unit	monthly
		HepBSAg		\$117.00 dialysis unit	monthly
		HepBSAg		\$117.00 dialysis unit	monthly
	1	vaccination	3	\$195.00 dialysis unit	once
					after
		HepBSAg		\$117.00 dialysis unit	completion

\$1,404.00 Total

There are 100 patients in the UH dialysis units with titers < 10 IU/L. Successful immunization in the outpatient clinics could translate into a difference of \$70,200 without purchasing new software and without hiring new staff.

If an individual fails to seroconvert, surveillance hepatitis B surface antibodies need to be measured monthly, translating to \$1,404 annually per patient (not to mention the costs borne when a patient becomes afflicted with chronic hepatitis B infection – isolation dialysis, additional co-morbidity and risk of progressive liver disease, alteration in transplant status)

Conclusion/What's Next

1. From 7/1/12 to 6/30/13, hepatitis B immunization was being initiated in only $11 \pm 4\%$ of those who had an absolute indication (i.e., $\text{GFR} < 30 \text{ mL/min/1.73 m}^2$).
2. Our interventions increased this rate to $81 \pm 12\%$
3. Successful seroconversion will translate into an absolute savings of \$700 per patient, and then \$1,404 annually for the duration the patient is on hemodialysis if they fail to convert (20-40% of patients).

Thank you!



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