

Supplemental Digital Content, containing two tables.

Note: The Supplemental Digital Content was not copyedited by *Archives of Pathology & Laboratory Medicine*.

Supplemental Table 1. Test Ordering Potential Quality Gap Completed Decision Aid

Consideration	Assessment
1. Quality gap is preventable or has potential targets for improvement	Examples: Prostate specific antigen (PSA), Vitamin D, 1, 25, dihydroxy Vitamin D, creatine kinase-MD fraction (CK-MB), ammonia (not applicable in outpatient), selected genetic tests
2. Strategies/interventions/practices could be employed to reduce the gap	Examples of initiatives already in place: --Best Practice Alert intervention in place for Vitamin D --PSA removed from routine screening per Choosing Wisely. Available at http://www.Choosingwisely.Org/ (Accessed April 17, 2018) --1, 25 dihydroxy vitamin D does not appear in drop-down order list --CK-MB removed from order drop-down list
3. Potential harms that might be associated with the intervention	Individuals in whom the test is indicated do not get testing
4. Intermediate surrogate outcomes that could be measured	Yes, time to diagnosis for those with and without intervention test
5. Long-term outcomes that could impact directly on patients or the healthcare system	Possibly – if indicated test is not done
6. Important at Kaiser Permanente Colorado (KPCO)	Genetic Tests: High dollar tests but low frequency and work being done in this area mostly in pre-testing at KPCO. Obsolete tests have been removed from lab listing (e.g., CK-MB)
7. Nationally important	High Choosing Wisely Recommendations/Initiative Centers for Disease Control and Prevention (CDC)/other expert input
8. Local healthcare system conducive to the intervention	Mixed
9. Feasibility of establishing baseline status	High
10. Baseline data indicate a gap in performance	--Examples: CK-MB: No longer a performance gap --Vitamin D: No longer a performance gap 1, 25 Dihydroxy Vitamin D: No performance gap

	--PSA: No longer a performance gap. Existing intervention effective. --Shift from amylase to lipase for pancreatitis already underway.
11. Availability of published standards/criteria to enable evaluation	Yes
12. Feasibility of assessing outcomes using Virtual Data Warehouse (VDW)	High for PSA, Vitamin D 25 Hydroxy, CK-MB, amylase, lipase
13. Relevant data in VDW	Yes, for selected tests
14. Data needed from outside VDW	Yes, for selected tests
15. Potential challenges	--Aligned with the Choosing Wisely campaign, Available at http://www.Choosingwisely.Org/ (Accessed April 17, 2018), KPCO is addressing inappropriate testing (e.g., low-risk PSA testing, 1, 25-dihydroxy Vitamin D testing, and CK-MB). Example: VDW data confirmed that in 2012 (before the KPCO Choosing Wisely initiative), 36,168 PSA results were found, while in 2015 (after the KPCO Choosing Wisely initiative), 19,498 PSA results were found. --Patient outcomes determined to be either difficult or not possible to define and measure. --For genetic testing, the scope and number of test types was large; clear agreement across national and local genetic testing guidelines was lacking.
CK-MB: Creatine kinase-MB fraction KPCO: Kaiser Permanente Colorado PSA: Prostate specific antigen VDW: Virtual Data Warehouse	

Supplemental Table 2. Diagnosis, Detection, and Documentation Potential Quality Gap Completed Decision Aid

Consideration	Assessment
1. Quality gap is preventable or has potential targets for improvement	Yes --Chronic kidney disease (CKD) --Diabetes/pre-diabetes --Anemia
2. Strategies/interventions/practices could be employed to reduce the gap	--Practice level intervention using the electronic health record (EHR) or lab decision support reminder to document diagnosis --Patient interactive voice response (IVR) lab test reminder intervention
3. Potential harms that might be associated with the interventions/practice	--Diagnosis or treatment for a condition that the patient does not have --Patient does not want the "label"
4. Intermediate surrogate outcomes that could be measured	Yes --Compliance with standards: Number (%) with diagnosis; Number (%) with lab tests completed --System: 1) Nephrology referrals (CKD); 2) Diabetes mellitus (DM) education (DM); 3) Time to diagnosis documentation after lab test result available (CKD, DM, pre-DM, anemia) --Clinical: 1) Number (%) on angiotensin converting enzyme inhibitor (ACEi)/angiotensin receptor blocker (ARB) (CKD); 2) Number (%) on metformin (DM)
5. Long-term outcomes that could impact directly on patients or the healthcare system	Yes, but likely measurable only over a timeframe that exceeds duration of current project --Cost effectiveness (CKD) --Prevention of disease progression (CKD; DM)
6. Important at Kaiser Permanente Colorado (KPCO)	Medium --Impacts large # of patients --Healthcare employer data and information set (HEDIS) implications --Many resources/efforts already in place --Contingent on supplemental work (in addition to SureNet initiative around missed diagnosis of CKD and in addition to DM and pre-DM initiatives that are already ongoing) --Underlying causes of anemia have high morbidity
7. Nationally important	Yes --High cost (CKD, DM) --High number of patients (CKD, DM) --High morbidity (CKD, DM)
8. Local healthcare	Yes,

system conducive to the intervention	--KPCO champions in place for CKD and DM/pre-DM demonstrate system support --Many resources already in place and KPCO may already be benchmark healthcare system for comparison (CKD and diabetes)
9. Feasibility of establishing baseline status	High: Required data in Virtual Data Warehouse (VDW)
10. Baseline data indicate a gap in performance	Yes
11. Availability of published standards/criteria to enable evaluation	Yes --CKD: Office of Disease Prevention and Health Promotion. Healthy People 2020: chronic kidney disease objectives. Available at https://www.healthypeople.gov/2020/topics-objectives/topic/chronic-kidney-disease/objectives (Accessed April 17, 2018) --CKD: Kidney Disease Improving Global Outcomes (KDIGO) guidelines. Available at http://kdigo.org/home/guidelines/ckd-evaluation-management/ (Accessed April 17, 2018) --Diabetes: American Diabetes Association. Available at http://care.diabetesjournals.org/content/38/Supplement_1/S8 (Accessed April 17, 2018) --Diabetes: Office of Disease Prevention and Health Promotion. Healthy People 2020: chronic kidney disease objectives. Available at http://www.healthypeople.gov/2010/document/pdf/Volume1/05Diabetes.pdf (Accessed April 17, 2018) --Pre-diabetes: American Diabetes Association. Available at http://care.diabetesjournals.org/content/suppl/2015/12/21/39.Supplement_1.DC2/2016-Standards-of-Care.pdf . (Accessed April 17, 2018)
12. Feasibility of assessing outcomes using VDW	High --Data in VDW --Experience using these lab and diagnosis data
13. Relevant data in VDW	Serum creatinine, glomerular filtration rate (GFR), glycosylated hemoglobin (A1c), age, diagnosis, proteinuria, hemoglobin
14. Data needed from outside VDW	No
15. Potential challenges	--Extensive ongoing efforts (e.g., to improve CKD diagnosis) have already resulted in gap reduction

	<p>--Interventions to reduce quality gap require developing and implementing electronic patient outreach and/or EHR alerts or messages. These intervention types require extensive collaboration across multiple teams of individuals, and development assistance and approvals from departments not currently all on the study team. Such activities have been collaboratively accomplished in other projects, but development timeframe must be coordinated with these other departments and is not up to the study team.</p> <p>--Providers consciously not assigning 1) CKD diagnosis to selected patient subsets (e.g., GFR 50 – 59 who are not at high risk of progression (e.g., multiple other comorbidities, very elderly), 2) DM diagnosis to selected patient subsets (e.g., very elderly).</p> <p>--Some intervention types (e.g., CKD diagnosis) would add to provider alert fatigue.</p> <p>--Initiatives led by departments other than clinical laboratory are underway. Impact of a laboratory-centric quality improvement intervention would be difficult to separate from the impact of other ongoing initiatives. Example: data extracted using linked VDW enrollment, death, diagnosis, and laboratory results tables indicated an existing initiative was effective at ensuring diabetes diagnoses were documented: among 6,154 patients who had initial and follow-up A1c result values of 6.5 percent or greater, 5,817 (94.5%) had diabetes diagnosis within one year.</p> <p>--KPCO leaders encouraged project Team to pursue a different topic for the laboratory quality improvement project because of the multiple ongoing efforts at KPCO.</p>
<p>A1c: Glycosylated hemoglobin ACEi: Angiotensin converting enzyme inhibitor ARB: Angiotensin receptor blocker CKD: Chronic kidney disease DM: Diabetes mellitus EHR: Electronic health record GFR: Glomerular filtration rate HEDIS: Health Plan Employer Data and Information Set IVR: Interactive voice response KDIGO: Kidney Disease: Improving Global Outcomes KPCO: Kaiser Permanente Colorado</p>	