**Supplemental Table 4**

**Consolidated Intervention Description, Targeted Testing, and Targeted Ordering Staff**

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| **Study** | **Intervention Description More detailed intervention descriptions in the evidence summary tables (ESTs)** | **Specific Targeted Testing** | **Personnel/Targeted Staff Ordering Testing \*** |
| Bindels et al. 2003 | Alert on non-adherence to guidelines for selected tests in relation to patient data | ESR, creatinine, CBC, glucose, cholesterol, TSH, alanine aminotransferase | General practitioners |
| Collins et al. 2014 | Guidelines alerts for platelet and cryoprecipitate blood orders in relation to patient data | Blood products (platelets and cryoprecipitate) | All physicians and nurse practitioners |
| Howell et al. 2014 | Guideline alert on guidelines for selected test | Pap test | Providers (clinicians) |
| McKinney et al. 2015 | Guideline alerts for red blood cell orders and display of relevant patient data | Blood products (red blood cells) | Staff (attending) residents and physician assistants |
| Nightingale et al. 1994 | Proposed guideline-based investigations protocols for indications/suspected conditions inputted by clinician | Alpha-fetoprotein, a1-antitrypsin, ant mitochondrial antibodies, ceruloplasmin, copper, ferritin, immunoglobulins, iron, smooth muscle autoantibodies, thyroid stimulating hormone | Senior and junior/new residents (house officers) |
| Poley et al. 2007 | Proposed guideline-based investigations protocols for indications/suspected conditions inputted by clinician | Multiple -- blood test in multi-clinical primary care setting -- individual tests not specified | General practitioners |
| Roukema et al. 2008 | Patient -specific diagnostic management advise based on patient data prediction rules | CBC and CRP | ED nurses and physicians |
| Tierney et al. 1988 | Appropriateness of elected testing for suspected condition inputted by clinician and test-positivity prediction rules | Electrolytes, CBC, Urinalysis, Urine Culture, TSH | University based Attending (faculty), residents (house officers) internists |
| Van Wijk et al. 2001 | Proposed guideline-based investigations protocols for indications/suspected conditions inputted by clinician | ESR, hemoglobin, hematocrit, glucose, CBC, creatinine, cholesterol, THS, GGT, alanine aminotransferase, potassium, aspartate aminotransferase, triglycerides, HDL, sodium, free thyroxine, alkaline phosphatase | General practitioners |
| Bansal et al. 2001 | Limiting of advance ordering of ABG to within 24 hours, with display of previous test results, to prevent multi-day test orders | Arterial blood gas | Intensive care staff-physicians (including attendings, and interns/residents) |
| Bates et al. 1997 | Display of test charges (charges from clinical database for tests ordered per admission) | CBC, PT, PPT, urinalysis, chemistry profile, urea nitrogen, creatinine, potassium, glucose, blood gas, magnesium, calcium, creatinine kinase, lipase, bilirubin, hematocrit, urine culture, blood culture | All physicians |
| Bates et al. 1999 | Redundant testing alerts in relation to test-specific testing intervals | Chemistry profile, aminophylline level, digoxin level, gentamicin level, tobramycin level, amikacin level, urinalysis, urine culture, stool culture, sputum culture, C. diff toxin assay, fibrin split products | All physicians |
| Bridges et al. 2014 | Redundant testing alerts in relation to test-specific testing intervals | Acute hepatitis profile | Clinicians |
| Fang et al. 2014 | Display of test cost and turn-around-time (mean cost per patient-day from laboratory database) | Multiple reference lab tests -- few examples provided, e.g. coccidiodes immunodiffusion | Attendings/residents |
| Feldman et al. 2013 | Display of test fees (charges per patient-day based on Medicare allowable fees) | 35 of the most frequent and 35 of the most expensive tests ordered -- some examples provided: basic and comprehensive metabolic panels, and ionized Ca. | All ordering providers |
| Georgiou et al. 2011 | Replacement of paper-based laboratory requests, with CPOE system | aPTT, PT/INR | Ordering physicians and other authorized clinicians |
| Horn et al. 2013 | Display of test cost (average Medicare reimbursement rates) for select tests | ALT, basic metabolic pane, BUN, Creatinine, Electrolytes, Ferritin, Glucose, HbA1c, CBC, Lipid profile, Pap smear, PSA, ESR, Strep throat screen, TSH, Tissue transglutaminase, Urinalysis, Urine Culture, Urine microalbumin | Primary care physicians |
| Hwang et al. 2002 | Replacement of non-CPOE with CPOE system | CBC, basic chemistry, serum electrolytes, stat lab testing | Physicians/residents |
| Kahan et al. 2009 | Limiting test availability by unbundling of select over-utilized tests in CPOE | Vitamin B12, folic acid, and ferritin | Primary care physicians |
| Le et al. 2014 | Limiting test availability by test removal from CPOE menu | Creatinine kinase, creatinine kinase-MB, and troponin T | ED physicians |
| Li et al. 2014 | Redundant testing alerts for tests ordered within 24 hours, with display of existing test orders and results | Any testing ordered more than once per 24-hours | Ordering clinicians |
| Lippi et al. 2015 | Redundant testing alerts in relation to test-specific testing intervals | CRP, glycated hemoglobin, beta-HCG, PSA, TSH, protein electrophoresis, total cholesterol, LDL-C, BNP, PCT, ferritin, vitamin B, folate, immunoglobulins, albuminuria | Physicians |
| Love et al. 2015 | Redundant testing alerts in relation to test-specific testing intervals, with display of most recent test results | Cardiac troponin I | Physician assistants, nurses, attendings, residents |
| May et al. 2006 | Redundant testing alerts for phlebotomy orders in which same test ordered as separate orders, and limits on recurring orders (24 hour window) | CBC, metabolic panel, hepatic panel, lipid panel, electrolytes | Physician assistants, nurses, attendings, residents |
| Olson et al. 2015 | Limit test availability by changing default "preselection" options in transfusion order set | Hematocrit, platelet count | Attendings, residents, fellows |
| Pageler et al. 2013 | Limiting of advance ordering of specific tests to within 24 hours | Multiple, including CBC, basic metabolic panel, comprehensive metabolic panel, sodium, potassium, chloride, bicarbonate, blood urea nitrogen, creatinine, glucose, calcium, total bilirubin, alkaline phosphatase | Physicians |
| Probst et al. 2013 | Limit test availability by changing default options in order sets for select testing ("opt-in" vs "opt-out" testing) | Multiple -- 61 tests, associated with the following conditions: bacterial pneumonia, febrile illness, failure to thrive, gastroenteritis, Kawasaki's disease, and pyelonephritis | Attendings, residents, medical students, nurse practitioners |
| Procop et al. 2015 | Redundant test alert for tests ordered within 24 hours | Any testing ordered more than once per 24-hrs; testing performed by regional hospitals | Ordering physicians |
| Shalev et al. 2009 | Limit test availability by limiting tests that can be ordered by check-box options for select testing | 51 tests, including ALT, creatinine, LDL, albumin, GGT, CMV, EBV ab, HBs Ab, FSH, progesterone, testosterone, sputum culture, occult blood, bilirubin, PT, PTT | Primary care physicians |
| Solis et al. 2015 | Limiting test availability by test removal from CPOE dropdown list of commonly used tests | PTT, PT/INR, Urine culture | ED physicians |
| Tierney et al. 1993 | Replacement of paper charts with CPOE system | Multiple routine testing, not otherwise specified | Attending (faculty), residents (house officers), medical students |
| Vardy et al. 2005 | CPOE structured with universal ordering routines | HbA1c, electrolytes, "hormones", "proteins", "liver function tests", "kidney function tests", CBC, "coagulation tests", lipidogram, "urine" | Primary care physicians |
| Waldron et al. 2014 | Redundant testing alerts in relation to a 48-hour minimum retesting interval | CRP | Attendings, junior doctors and nurse practitioners |
| Westbrook et al. 2006 | Replacement of paper-based order system with CPOE system | Albumin, AST, and total protein | Ordering clinicians |
| Baral et al. 2001 | CME lectures on appropriate use of select testing | T3, T4, TSH | Physicians |
| Chonfhaola et al. 2013 | Distribution of guidelines ot general practitioners on appropriate indications for select testing | Vitamin B12, and Folate | General practitioners |
| Dawes et al. 2015 | Education on guidelines and evidence for best practices for selet testing | Fetal fibronectin (fFN) | midwives/physicians (clinicians) |
| DellaVolpe et al. 2014 | Education on testing protocols for select testing, to consider clinical rationale and write indication for each order for select testing | Arterial blood gas | Internists, surgeons, trainees and attending |
| Eisenberg 1977 | Education program on appropriate use of select testing | PT | House staff (residents) |
| Gardezi et al. 2015 | Education on appropriate use of select testing, discouraging use of "tick box" method of selecting tests | Cardiac troponin I, cardiac troponin T | Clinical staff |
| Thakkar et al. 2015 | 2-month education consisting of didactic presentations and discussions at meetings, educational flyers, weekly email communications | CBC, basic and comprehensive metabolic panels, PT, PTT | Physicians, residents, physician assistants, nurse practitioners |
| Baker et al. 2003 | Feedback at 3-month intervals for 4 months on individual test ordering patterns for select testing, in relation to guidelines for appropriate test use | Lipids, thyroid function, rheumatoid factor, urine culture, plasma viscosity | General practitioners |
| Bunting et al. 2004 | Three feedback sessions over 2-year period on individual test ordering patterns and group comparison for select testing, in relation to guidelines for appropriate test use | Multiple - not specified | Community physicians |
| Gama et al. 1992 | Monthly feedback on individual test ordering patterns and expenditures and group comparison for select testing, in relation to guidelines for appropriate test use | Multiple - "chemistry tests" and "haematology tests" | Hospital physicians |
| Miyakis et al. 2006 | Group feedback strategy ordering patterns based on identification of factors associated with inappropriate utilization and the clinical usefulness of ordered tests | CBC, PT, PTT, plasma glucose, urea, creatinine, sodium, potassium, calcium, transaminases, GGT, alkaline phosphatase, bilirubin, total protein, albumin, creatine kinase, lactate dehydrogenase, total cholesterol, triglycerides, uric acid, amylase, arterial blood gas | Attendings and trainees (house staff) |
| Verstappen et al. 2004 | Individual feedback on test ordering routines for select testing with small group quality improvement meetings with discussion of guidelines | Cholesterol, potassium, sodium, creatinine, BUN, PSA, CRP, ALT, AST, lDH, amylase, GGT, bilirubin, alkaline phosphatase | General practitioners |
| Verstappen et al. 2004 | Individual feedback on test ordering patterns with small group quality improvement meetings (different experimental methodology) for select testing | Multiple - not specified | General practitioners |
| Winkens et al. 1992 | Biannual feedback reports on individual patterns of test ordering, with feedback on clinical rationality of test ordering | 46 tests across multiple areas: e.g. glucose, GGT, iron, acetone, amylase, RBC count, hemoglobin, pregnancy testing, worm egg cysts, vanillylmandelic acid | General practitioners |
| Aesif et al. 2015 | Requisitions for select send-out testing reviewed by clinical pathology house staff | Multiple nucleic acid tests, serology and culture: e.g. Borrelia spp, DNA; CMV DNA; EBV DNA; Enterovirus RNA; HIV-1, genotype; HIV-1 DNA; HBV DNA; HCV genotype; HCV RNA; HSV 1/2 DNA; JC virus DNA; Varicella zoster DNA; West Nile virus RNA | All ordering doctors |
| Barazzoni et al. 2002 | Review of select pre-operative tests ordered in relation to practice guidelines and patient profile checklists | Coagulation and chemistry testing, including testing for glycaemia, testing for azotemia, testing for creatinaemia | Nurses and physicians |
| Chu et al. 2013 | Review of select tests involving requirement for prior consultation by ordering clinician | CBC, electrolytes, coagulation profile, troponin, lipase, blood gas, type and screen, Crossmatch, CRP, Creatinine kinase, blood culture, HCG, magnesium, ESR, Paracetamol, Thyroid function test, Lactate, urea electrolytes, ethanol, D-dimer, INR, PTT, BNP | Interns/residents |
| Dickerson et al. 2014 | Review of select send-out tests by rotation of clinical pathologists, clinical chemists, and genetic counselor | "Genetic send-out tests" -- few examples provided, but include SCA1 gene testing, SCN1A gene testing, Fanconi anemia breakage studies, CHRNE gene testing | Ordering provider |
| Miller et al. 2014 | Daily review by genetic counselors of select genetic testing using a case management software program | Select molecular genetic testing: "complex germ line molecular genetic sequencing and deletion/duplication tests" | Health care providers |
| Baird et al. 2009 | Initiate reflex testing strategy for select testing | Ionized calcium (iCa) | Physicians and nursing staff |
| Bonaguri et al. 2011 | Autoimmune disease diagnostic algorithm with reflexive testing | ANA, anti-dsDNA, anti-ENA | Ordering clinicians |
| Froom et al. 2012 | Elimination of a laboratory-initiated reflex testing protocol for select testing | Dipstick urinalysis and elimination of reflexive microscopic urinalysis and urine cultures | Ordering clinicians |
| Tampoia et al. 2007 | Initiate reflex testing strategy for select testing | ANA, anti-dsDNA, anti-ENA | Ordering clinicians |
| Wu et al. 1999 | Initiate reflex testing strategy for select testing | Total cholesterol, triglycerides, HDL-C, LDL-C, apolipoprotein (a), and apolipoprotein B | Ordering clinicians |
| Baricchi et al. 2012 | Education + LTU (Multidisciplinary team developed recommendations for effective test use for select tests, clinicians trained about new laboratory profiles) | V Factor Leiden, G20210A gene mutation, TSH, FT4, Ft3, hemachrome, electrophoresis, serum/urine immunofixation, immunoglobulin measuring, creatinine, urinalysis, total cholesterol, HDL,LDL | General practitioners |
| Calderon-Margalit et al. 2005 | Education + Feedback + LTU (Multidisciplinary of guidelines for select test orders; education on over-utilization; group feedback on test ordering patterns) | Lipid profiles, troponin-T, troponin-I, CPK-MB, homocysteine, amino acid analysis, urinary organic acids analysis, lipase, magnesium, vitamin B12, folic acid, total iron binding capacity, ferritin, myoglobin, uric acid, hemoglobin A1C, urinary microalbumin. | All physicians (ordering medical staff) |
| Dowling et al. 1989 | Education + Feedback (Education on practice guidelines for select testing; individual feedback on test ordering patterns) | CBC, TSH | Family practice residents |
| Gilmour et al. 2015 | Education + Reflex (education on appropriate use of select testing and on need to provide clinical justification; initiation of a reflex testing protocol) | Free thyroxine (fT4) and free triiodothyronine (fT3) | Physicians |
| Hutton et al. 2009 | CPOE Modification + Education + LTU (Multidisciplinary guidelines for appropriate use of select testing; education of on over-utilization; redundant test alerts for tests ordered within 24 hours) | CRP | Ordering consultants only (senior physicians) |
| Janssens et al. 2015 | CPOE Modification + LTU (Stakeholder reorganization of select test panels in CPOE) | 82 chemistry and hematology tests in 60 panels consisting of 3 to 30 tests each | Medical specialist physicians,(cardiology, gastroenterology, geriatrics, gynecology, internal medicine, neurology, pediatrics, psychiatry, pulmonary diseases and surgery) |
| Kroenke et al. 1987 | Education + Feedback (Education lectures on appropriate use of select tests; individual feedback on test ordering patterns) | Urine culture, sputum culture, urinalysis | House staff (interns-first year residents) |
| Larochelle et al. 2014 | CDSS + CPOE Modification + Education (Dissemination of educational reference card; removal of select test from CPOE order sets; redundant order alert; guideline alerts for select testing) | Troponin, CK-MB, and CK | All providers, including internists and ED physicians |
| Lum et al. 2006 | Education + Test Review + LTU (Multidisciplinary determination of appropriate testing protocol for select test; education on testing protocol; review of serial test orders) | BNP (B-type natriuretic peptide) | Ordering clinicians |
| MacPherson et al. 2005 | Education + LTU (Multidisciplinary development of testing protocols; educational sessions on testing protocols) | CBC, electrolytes, glucose, calcium, phosphate, magnesium, urea and creatinine, blood type, liver function tests, thyroid function tests | Attending and house staff physicians ("registrars") |
| McNicoll et al. 2015 | Education + Feedback (Distribution of baseline test order rates; education on effective use of blood ordering, and on repeat labs for more than 3 days) | CBC, Chem 7 panel | Ordering clinicians |
| Minerowics et al. 2015 | Education + Feedback (Educational sessions on appropriate test utilization, with refresher sessions; weekly feedback on individual ordering patterns) | Includes most testing performed by core laboratory, as well as send-out testing | Internal medicine residents |
| Newman et al. 2015 | Education + Feedback (Education on indications for select testing; individuals ordering tests had weekly one-on-one feedback sessions) | Ionized calcium (iCa) | Hospitalists, nurse practitioners, physician assistants |
| Riley et al. 2015 | CPOE Mod + Test Review (CPOE modification restricting orders for select testing; daily review of orders by genetic counselors) | Multiple molecular genetic testing: GAA sequencing; hereditary neuropathy; complete ataxia; mtDNA analysis; DMD sequencing | Ordering clinicians |
| Roggeman et al. 2014 | CDSS + Education (Education on best practices on special transfusion requirements; alert in CPOE to review order against established guidelines) | Blood products (irradiated RBCs) | Physician, residents, nurses |
| Rosenbloom et al. 2005 | CDSS + CPOE Mod (alert on tests ordered more than 72-hrs in advance; display of recent patient data and indication of guidelines for testing) | Magnesium, Calcium, Phosphorus | Ordering clinicians |
| Samuelson et al. 2015 | CDSS + Reflex (Use of clinical prediction rule in order entry system prior to ordering select testing, and use of reflex rule for select testing) | Anti-PF4/heparin antibody, and Serotonin Release Assay | Ordering clinicians |
| Spiegel et al. 1989 | Feedback + LTU (Multidisciplinary development of appropriate test use criteria for select testing; feedback to medical teams on test ordering patterns) | CBC, urinalysis, PT, PTT | Medical house staff |
| Thomas et al. 2006 | Education + Feedback (Educational reminders on inappropriate uses of select testing; feedback on group test ordering patterns) | Autoantibody screening panel, carbohydrate antigen (CA)-125, carcinoembryonic antigen, ferritin, follicle-stimulating hormone, Helicobacter pylori, IgE, TSH, vitamin B-12 | Primary care physicians |
| Tomlin et al. 2011 | Education + Feedback (Education on testing guidelines through booklets and brochures for select testing; individual feedback on test ordering patterns. | CPR, ESR, FT4, FT3, TSH, faecal culture, faecal tests for Giardia and Cryptoporidium, ova and parasites | Primary care physicians |
| Vegting et al. 2012 | CPOE Mod + Education + Feedback (Unbundling of select test panels; education on cost of tests with posters and cards; six feedback sessions on individual ordering patterns) | Creatinine, Potassium, Sodium, GGT, Alkaline Phosphatase, ALT, AST, Urea, Bilirubin, Glucose, Calcium, LDH, Albumin, Triglycerides, HDL-C, Phosphate | Attendings and trainees (house staff) |
| Vidyarthi et al. 2014 | Education + Feedback (Education lectures on problem of test overutilization; feedback on individual test ordering patterns for select tests) | CBC, sodium, potassium chloride, bicarbonate, blood urea nitrogen, creatinine, magnesium total calcium, phosphorus, aspartate aminotransferase, alanine aminotransferase, total bilirubin, alkaline phosphatase, lactate dehydrogenase, GGT, PPT, albumin | Residents |
| Wang et al. 2002 | CDSS + Education + LTU (Multidisciplinary teams developed guidelines for select testing; educational sessions for guidelines; guidelines incorporated in order entry interface) | Sodium, potassium, chloride, carbon dioxide, serum urea nitrogen, creatinine, CBC, calcium, magnesium, phosphorus, arterial blood gas | Physicians, residents, and nurses |
| Warren et al. 2013 | CDSS + LTU (Multidisciplinary team protocol for send-out testing targeting overutilization; use of decision-support prompts in support of test ordering protocols) | Multiple - ranging from multiple myeloma FISH, to ESR | All ordering clinicians |
| White et al. 2013 | CDSS + CPOE Modification (Alert indicating recommended screening for select testing; modification of wording of order form and addition of link to guideline website) | Pap test | Ordering clinicians, physicians, residents, fellows, nurse practitioners |
|  |  |  | \* Listed as generally depicted by study authors. "Ordering clinicians" inputted when targeted staff was not otherwise specified. Terminology frequently varies in international settings, additional terminology clarification provided in (supplemental table 1 |
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