Oral Abstracts

Tuesday, September 24

4:00 p.m. – 5:30 p.m.
Conference Room A of the Feinberg Pavilion

The Epidemiology of Risk of Missed or Delayed Diagnosis of Cancer Among Undiagnosed Patients Presenting to Primary Care Physicians

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Background: Worldwide, most patients with cancer first present to a non-specialist doctor (typically a primary care physician). Whether doctors suspect cancer promptly in order to initiate timely investigations and/or specialist referrals has important implications for patient experience and patient safety. There is currently limited appreciation of how the risk of missed / delayed (hereafter 'delayed') diagnosis of cancer varies between different patient groups.

Methods: We used data from both a national patient survey (n=13,035, 18 different types cancers) and a (doctor- or nurse-led) national clinical audit survey (n=41,299, 24 cancers). The two surveys used very different sampling frames and data collection methods. Multivariable analysis was used to profile variation in two outcome measures: The primary care interval (number of days from presentation to referral) and the number of pre-referral consultations – both measures are correlated.

Results: There is wide variation in the risk of delayed diagnosis of cancer. Patient-reported data indicate that delayed diagnosis is more frequent among younger patients, those belonging to racial/ethnic minorities and women. Both patient-reported and audit data indicate that delayed diagnosis of cancer is relatively common (30% to 50%) for cancers that tend to present with atypical symptoms (including multiple myeloma, pancreatic, stomach, ovarian and lung cancer, Figure 1). By contrast, delayed diagnosis is relatively rare (<10%) for cancers with relatively specific 'symptom signatures' such as breast cancer and melanoma (Figure 1). There are also interactions of cancer by socio-demographic characteristic, particularly for gender by urinary tract (bladder or renal) cancers).

Conclusion: The findings can help inform strategies for reducing diagnostic error or delay. For 'difficult-to-miss' cancers it may be possible to use measures of delayed diagnosis (such as number of pre-referral consultations) as performance indicators to compare different (regional, state, or national) healthcare systems. For 'easy-to-miss' cancers, the development of new point-of-care tests is critical. For cancers with intermediate level of diagnostic difficulty, clinical decision support tools may be useful. Combining the three approaches and further stratifying improvement initiatives by socio-demographic characteristic may also be justified.

Why Do Patients Present With Advanced Colorectal Cancer? - A Retrospective Study of Delays in Diagnosis Leads to Rapid-Cycle Quality Improvement

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Background: When colon cancer is diagnosed at an advanced stage, cure rates are lower. To learn why advanced stage presentations occur and how we can prevent them, we first conducted a retrospective study of 61 patients presenting with stage III or IV colorectal cancer (CRC) during 2010-11. We used these findings to devise and implement interventions to help ensure diagnosis at an earlier stage.

Methods: Patients were selected from the Southern California region of Kaiser Permanente, an integrated delivery system that manages 3.6 million members. Electronic health records were reviewed to identify all prior CRC screening tests and potentially related prior symptoms and lab test abnormalities for up to the past ten years. The interventions were added to an existing outpatient safety net program that electronically searches our databases for diagnostic errors and triggers appropriate interventions.

Results: Retrospective chart review found the following reasons for presentation at advanced stages. Eleven patients experienced rectal bleeding with the bleeding falsely attributed to hemorrhoids. Five patients had iron-deficiency anemia without gastrointestinal workup. Two patients had positive immunological fecal occult blood tests (iFOBT) without colonoscopy. 17 patients had not undergone CRC screening. 12 patients had presumed false negative CRC screening (4 by iFOBT, 3 by sigmoidoscopy , and 6 by colonoscopy). In 11 cases, there was no opportunity for an earlier diagnosis. Using this information, we rapidly developed two separate programs to detect rectal bleeding and possible iron deficiency anemia not properly worked up. 118 outpatients aged 55-75 with rectal bleeding but no subsequent colonoscopy were identified using ICD9 codes 569.3x and 455xx. Their charts were reviewed by a gastroenterologist. 82 were referred for colonoscopy. We found 1 carcinoid tumor, 5 tubular adenomas, 9 hyperplastic polyps, and 14 non-neoplastic diagnoses including hemorrhoids and diverticular disease. 206 outpatients aged 55-75 with presumed iron deficiency anemia and no subsequent colonoscopy were identified during a recent quarter based on microcytosis, normal renal function, and hemoglobin < 14 g/dl and red cell count (RBC) < 4.7M/microliter (males) or hemoglobin < 12 g/dl and RBC < 4.2M/microliter (females). 128 of these patients were referred after gastroenterologist review for colonoscopy. 8 tubular adenomas, 18 hyperplastic polyps, and 29 non-neoplastic diseases were detected.

Conclusion: Rapid-cycle improvement allowed findings from a retrospective chart review study to be rapidly incorporated into the outpatient safety net program. Further study will be needed to determine its impact on the stage at diagnosis.

Oral Abstracts (continued)

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The Causes and Effects of Delay to Surgical Diagnosis

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Daryl Wall, FRACS, Royal Brisbane and Women's Hospital
Jennifer Allen, BSc, Royal Australasian College of Surgeons
Robert Ware, PhD, University of Queensland School of Population Health

Background: A retrospective cross-sectional analysis (Jan 2009 to December 2012) to assess the causes and effects of delays to surgical diagnoses in patients who died in public and private hospitals participating in the Australian Audits of Surgical Mortality.

Methods: Deaths (n=10,881) were assigned to one of two groups (no delay versus delay). Statistical analyses were performed for both groups and expressed as frequencies and Odds Ratios (OR) with 95% confidence interval (CI).

Results: Delay was experienced in 10.1% (828/8,218) of deaths. The primary source of delay was medical units at 34.8% (350/1,006). The most frequent cause of delay was attributed to diagnostic support services or their misuse (58.9%). This was most frequently due to the inexperience of staff (23.9%). General surgery (gastrointestinal) patients were twice as likely to be delayed at 11.6% (679/5,842) of cases compared with 6.3% (149/2,376) of cases from all other surgical specialties (OR1.97, 95% CI 1.64-2.36). Delays in surgical diagnoses resulted in increased risks for being treated in ICU (OR 1.36, 95% CI 1.31-1.85), for unplanned return to theatre (OR 1.40, 95% CI 1.16-1.70), and for post-operative complications (OR 1.11, 95% CI 1.00-1.22). Delay had an effect on median length of hospital stay for all surgical patients: median (interquartile range) 8 days (IQR 3 -17) for delayed patients versus 7 days (IQR 2 - 17) for non-delayed patients

Conclusion: Delayed patients experienced increased risk of being treated in ICU, of having unplanned return to theatre and for having post-operative complications. Patients from general surgery are at increased risk of delay compared with other surgical specialties. Consultant input in delayed general surgical patients should be standard.

A Comprehensive Approach to the Issue of Pathologic Diagnosis Quality and Accuracy in Vietnam

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Background: Pathologic diagnoses for patients in developing nations, if available, are prone to errors due to many challenges. Improper, inadequate or non-sampling of tissue, substandard processing or reagents, and incomplete diagnostic tools or un-validated stains hamper the pathologists, who themselves may suffer from incomplete training and resources to render an accurate diagnosis. The diagnostic quality gap results in waste of healthcare and human resources.

Methods: We devised a multifaceted, multi-year effort to improve the diagnostic quality of pathologic diagnoses in Vietnam. These include 1) educational and training interventions and assessments directed at practicing pathologists, educator pathologists, and technical personnel; 2) promotion of intra-country and international case consultation capabilities using telepathology and other tools; and 3) promotion of improved supply chain and management efforts to enhance laboratory materiel quality. The telepathology consultation system is designed to engage all stakeholders in an equitable manner so that the benefits accrued and costs incurred are distributed in a manner to make the program sustainable.

Results: A total of nine in-country educational events over the past four years, presented at four different sites and involving 12 international experts, have been attended by a very high percentage of practicing Vietnamese pathologists. Consultation cases handled by the local and international experts have begun to grow, and the number of pathologists submitting cases for consultation has increased. Metrics on diagnostic concordance between primary and referral diagnosis for patients seeking second opinion or definitive care in major centers are being collected as a surrogate for diagnostic quality. Web-based instruction directed at pathologists and some technical personnel have been viewed by approximately 50 individuals in Vietnamese laboratories. Digital microscopy performance improvement cases, in a self-assessment format, have been sent directly to 10 pathologists at major centers, and forwarded indirectly to approximately 100 others, with encouraging responses. Translation issues have been minimal.

Conclusion: Vietnamese pathologists and pathology laboratory technical staff welcome the intellectual and moral support and educational contributions of committed international colleagues, and recognize the quality gap issue as significant. Collaboration in designing means of increasing access for patients to high quality pathology diagnostic services depends upon trust in the level of commitment from all parties. Digital pathology tools, if properly sited and supported, offer the chance to significantly change the quality of pathologic diagnosis available to patients in developing countries, and to elevate the performance of local pathologists.

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Checklists to Reduce Diagnostic Errors: A Randomized Controlled Trial

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Mark A. Graber, MD, National Human Genome Research Institute

Background: Diagnostic checklists have been proposed to help decrease diagnostic errors, but they have not been systematically studied in practice.

Methods: Fourteen family physicians and emergency physicians were randomized to use a diagnostic checklist vs. provide usual care with no checklist. The checklists consisted of differential diagnoses for 63 presenting symptoms in primary care, such as headache, abdominal pain, and dizziness. Checklist physicians reported their primary diagnosis and differential diagnosis to the investigator, following the history and physical exam. They then read aloud the checklist for the patient's presenting symptom and reported any changes in the primary diagnosis or differential diagnosis. No-checklist physicians reported their primary and differential diagnosis after the history and physical but then cared for their patients as usual. One month after the patient encounter, the principal investigator reviewed the medical records and telephoned patients to determine the final diagnosis. The primary outcome was diagnostic error. Diagnostic error was defined as a meaningful discrepancy between the chart diagnosis and the final diagnosis. Meaningful was defined as a discrepancy that potentially could have altered the patient's management plan.

Results: The 14 physicians saw 100 patients with acute complaints in an emergency department and a family practice clinic (range 2 to 10 patients per physician). The most common complaints were abdominal pain (n = 17), back pain (n = 10), and cough (n = 10). The most common final diagnoses were musculoskeletal back pain (n=9), urinary tract infection (n = 7), and viral upper respiratory infection (n=6). Checklist physicians made 7 diagnostic errors after seeing 53 patients (7/53 = 13%); no-checklist physicians made 10 diagnostic errors after seeing 47 patients (10/47 = 21%) (odds ratio = 0.56; 95% confidence interval, 0.20 - 1.58). None of the diagnostic errors led to mortality or serious morbidity. Examples of diagnostic errors included a chart diagnosis of dermatitis vs. a final diagnosis of head lice; and a chart diagnosis of urinary tract infection vs. a final diagnosis of kidney stone. The primary diagnosis was changed after the checklist review in 2 patients. Among checklist physicians, the number of diagnoses in the differential increased from a mean of 4.3 to 6.5 diagnoses per patient (paired t test, $P < .001$). The mean time to review the checklist was 80 seconds (standard deviation 41 seconds).

Conclusion: The diagnostic checklists used in this study did not significantly improve diagnostic accuracy.

Does Collaboration Lead to Fewer Diagnostic Errors?

James Carlson, PhD, PA-C, Rosalind Franklin University of Medicine and Science

Background: Physician Assistants (PA) and physicians frequently collaborate to make diagnostic and treatment decisions. Unfortunately, missed and delayed diagnoses occur with relative frequency and pose a substantial threat to patient safety. Active reflection is a suggested strategy to improve diagnostic accuracy, but it is not well studied in either physician or Physician Assistant (PA) education. Reflective strategies thought to reduce the incidence of missed or delayed diagnoses include the use of diagnostic reminder systems (DRS) and collaboration with other providers when making diagnostic decisions. This study compared the impact of two different forms of reflection on PA student diagnostic accuracy during a series of standardized patient (SP) cases; use of Isabel PRO (a web-based DRS) and interprofessional discussion with a resident physician.

Methods: Sixty-five (n=65) first year PA students (PAS-1) completed a series of four SP cases. SP case presentations were designed to include diagnoses frequently missed in actual settings. After each case, PAS-1 subjects submitted their diagnostic decisions and suggestions for further testing. PAS-1 subjects were then divided into two treatment groups; a) Isabel-PRO treatment group (n=38) where PAS-1 subjects were allowed to use a web-based DRS to augment their diagnostic decisions and b) Resident-discussion treatment group (n=27) where PAS-1 subjects engaged in interprofessional discussion with a resident to augment their diagnostic decisions. PAS-1 diagnostic decisions were reported as a diagnostic accuracy score (DAS). DAS scores were reported pre-intervention (Pre-Isabel DAS or Pre-Resident DAS) or after intervention (Post-Isabel DAS or Post-Resident DAS). Pre and Post measures were compared within treatment groups and final DAS was compared between treatment groups.

Results: Statistically significant improvements were noted in PAS-1 diagnostic decisions after using Isabel PRO. PAS-1 diagnostic decisions did not significantly improve after resident discussion. Additionally, PAS-1 subjects tended to be more overconfident in their diagnostic decisions after resident discussion. Resident subjects made more accurate final diagnostic decisions if the PAS-1 subject they discussed the case with had more accurate initial diagnostic decisions.

Conclusion: Interprofessional discussion while making diagnostic decisions may be helpful at improving diagnostic accuracy, but it should not be assumed that collaboration will correct for cognitive biases that are known to lead to diagnostic errors in individual providers. The results of this study suggest that it may be advisable for both individuals and collaborative groups charged with making diagnostic decisions to use evidence based diagnostic reminder system when engaging in clinical reasoning activities.

Poster Presentations

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