INTEGRATED DIAGNOSTICS & INTEGRATED DIAGNOSTIC SERVERS: THE PERSPECTIVE OF A PATHOLOGIST

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Challenges Diagnosticians Are Facing

✓ The EHR has replaced departmental systems (e.g., LISs, RISs) as clinicians’ main info. access point

✓ EHRs complex & poorly designed; EHRs inhibiting diagnosticians’ goal of optimal test utilization

✓ EHRs can’t provide practical tools to help clinicians find & organize important diagnostic information

✓ Hospital exec. officers, particularly CIOs, reluctant to share current control over hospital info. systems
Why These Challenges Are Important

✓ We are in the golden age of diagnostics but unable to fully exploit opportunities presented.

✓ For complex patients, the diagnosis of disease now major challenge; rx choices often simpler.

✓ Diagnosticians increasingly enabled to recommend therapy (e.g., cancer genomics).

✓ Next key step: enable diagnosticians to provide optimized diagnostic roadmap.
Problems with Current EHRs

- Too expensive; absorb capital from other IT projects
- Designed to generate bills, replicate paper record
- Don’t improve clinician productivity/efficiency
- Not amenable to rapid software changes
- Not optimized to run rules/algorithms/heuristics
- Shift power/influence to EHR vendors & exec. officers
Definition of integrated diagnostics

✓ Aggregate pathology & radiology test results for complex patients to achieve following goals:

✓ Enable analysis & interpretation of interim results to define most efficient path to final diagnosis

✓ Decrease time and cost of diagnosis by determining most efficient and effective sequence of testing

✓ Reduce the cost of diagnosis by eliminating irrelevant, unnecessary, and redundant tests

✓ All of these goals can be achieved by integrated diagnostic servers managed by pathology/radiology
What Is an Integrated Dx Server?

- Server under control of pathology & radiology; receives data for selected patients from LIS, RIS, PACS

- Initial focus should be patients with undiagnosed tumors; signal for new file on IDS will be start of tumor workup

- IDS determines fastest & least costly path to final dx based on analysis of positive test/procedure results

- IDS can report on interim basis to MDs or allow clinicians to select “reflex testing” option -- fewer test cycles

- Secret sauce of IDS: algorithms, heuristics, & business rules created & tested by pathologists/radiologists
Details about Heuristics/Algorithms/ Business Rules Deployed on IDSs

- Software tools for calculation, data processing, automated reasoning, and organizing hierarchical lists

- Enable processes on IDSs by which test results are analyzed and “next steps” are determined

- This software development based on deep knowledge, iterative steps, validation, and continuous testing

- No end point in IDS development; constantly under development because science/technology ever-changing

- Need professionals surveillance of all reports as quality check & to ensure continuing refinement of IDSs
New Hospital IT Architecture Required

- IDSs require adoption of new hospital computing model: federated, service-oriented architecture (SOA)
  - Federated architecture: *controlled sharing and exchange of information among autonomous components*
  - SOA: *each service can exchange information with any other service in the network without human interaction*
- Pathology/radiology departments will serve as demonstration sites for validation of federation/SOA models in hospitals
- This approach runs counter to current model with EHR as central source of information (i.e., services) for clinicians
Creating a Virtual Department of Diagnostic Medicine

• To create/manage an integrated diagnostic server, daily interactions required between pathologists & radiologists

• Process necessary to test & validate algorithms, heuristics, and business rules that analyze/manage test results

• One option: development of virtual departments of diagnostic medicine; will not jeopardize specialty status

• Political payoff in terms of monolithic political force to lobby for enhanced diagnostics & counteract power of central IT

• Movement toward IDSs will draw opposition from CIOs & from EHR vendors; calls value of EHRs into question
1. Seek source of funding for these projects: research grants, diagnostic hardware and software vendors

2. Create prototype integrated diagnostic servers using cancer patients; develop/validate necessary software

3. Develop enhanced informatics divisions in pathology and radiology; place more emphasis on fellowships

4. Prove hypothesis that IDSs can reduce time & cost of diagnosis; reflex approach will be the most efficient

5. After value proved, IDSs will be *irresistible* due to healthcare reform, reduced funding, cancer emphasis
Blog Note about Integrated Diagnostic Servers on Lab Soft News (11/18/2014)

Development of Integrated Diagnostic Servers by Pathology and Radiology

I have posted a number of previous notes about integrated diagnostics and integrated diagnostic centers (see: Integrated Diagnostics and Its Relationship to Digital Pathology: A Strategic Analysis; Revisiting Integrated Diagnostics and the Integrated Diagnostic Report; Diagnostic Delay Time (DDT) and Integrated Diagnostics; A Call for the Development of Integrated Diagnostic Centers). The basic concept of integrated diagnostics is to aggregate pathology and radiology results for specific patients in order to: (1) decrease the time to diagnosis by providing guidance about the most efficient path to arrive at a diagnosis and (2) enable the analysis and interpretation of interim test results by which the time to diagnosis is also reduced by reporting “next step” recommendations.

In order to pursue the goal of integrated diagnostics in a hospital, very close collaboration between pathology and radiology is necessary. I have suggested in the past that perhaps these two specialties could merge to form a new medical specialty of Diagnostic Medicine (see: Ten Reasons for Merging Pathology/Lab Medicine with Radiology). This latter note was posted in 2006, In the intervening eight years, I have come to understand that the creation of such a new specialty is highly unlikely.

The pursuit of the broad goal of integrated diagnostics in support of cancer diagnoses in a hospital requires the development of integrated diagnostic servers (IDSs) under the control of pathology and radiology. Under this scenario and when radiology or pathology departments first identify patients being worked up for a suspected but undiagnosed malignant lesion, a file will be created for that patient on the IDS and all subsequent pathology and radiology results for that patient will be copied to the server from the LIS, RIS, and PACS. This IDS is thus a component of a larger, proposed federated, service-oriented IT architecture (SOA) in pathology and radiology.

Installed on the IDS will be a complex set of heuristics, business rules, and algorithms developed within pathology and radiology that will analyze all available diagnostic information for each presumptive cancer patient and then recommend the next set of tests and radiology procedures that are necessary to arrive at a diagnosis in the least amount of time. Usually, these IDS recommendations are forwarded to the patient’s clinician. Under a reflex testing testing option if and when ordered by the patient’s treating physician, additional test and procedures orders can be ordered automatically by the IDS. This reflex testing option speeds up the time-to-diagnosis by reducing the number of test orderer cycles. I discussed an early form of the IDS report new operation in