



A Basic Informatics Curriculum for Pathology Residents: Design and Implementation

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Background / Rationale / Need

- Informatics tools provide the foundation for effective communication in medicine.
- In anatomic and clinical pathology laboratories, informatics serves as a critical infrastructure for communicating orders; documenting specimen processing, analysis, and diagnosis; and communicating results to the electronic medical record.
- Numerous, emerging informatics technologies and domains are becoming widely used within pathology, including the expansion of whole slide imaging to meet analytic and diagnostic functions, the storage and analysis of massive data sets by molecular techniques, and the emergence of expert systems and other artificial intelligence tools.
- Informatics topics are tested on the annual pathology residency in-service (RISE) examinations and on the American Board of Pathology (ABP) examination.
- This report describes the design and implementation of a pathology residency curriculum at a single institution focusing on basic, foundational informatics knowledge and skill sets.

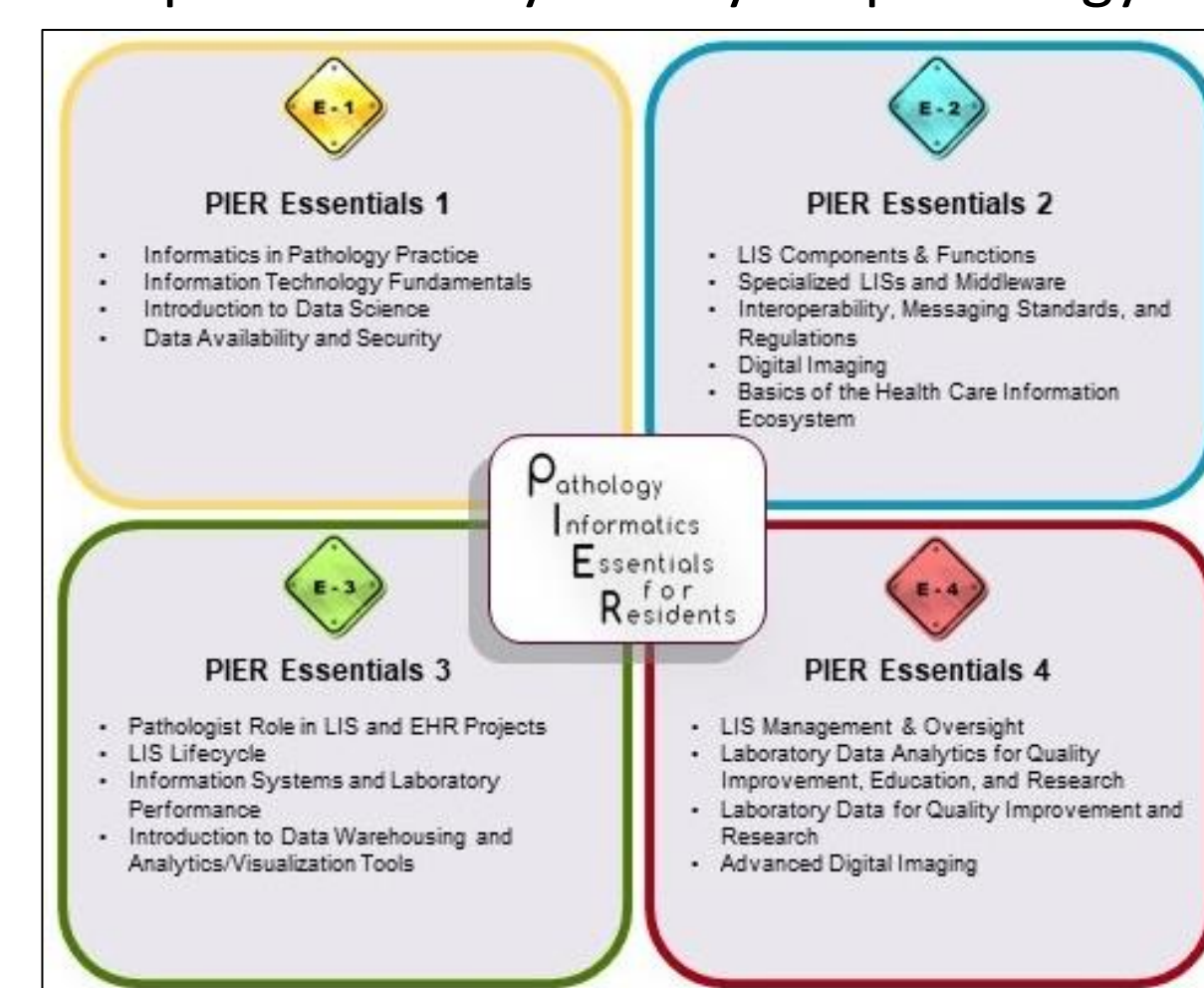
Methods

- The Pathology Informatics Essentials for Residents (PIER) resources, compiled by the Association of Pathology Informatics and Association of Pathology Chairs, were used as a framework for an informatics curriculum.
- Based on PIER, a four-week, elective, basic pathology informatics curriculum was designed and implemented by faculty for pathology residents.
- Resident satisfaction with the rotation was evaluated using the SurveyMonkey.com platform.
- Resident performance on (1) informatics rotation pre-tests and post-tests and (2) annual pathology RISE examinations was documented.
- A literature search was conducted with key words including pathology informatics, residency, education, and training.

Results

- Based on PIER, a four-week, elective, basic pathology informatics curriculum was designed and implemented by faculty for pathology residents.

Pathology Informatics Essentials for Residents (PIER): Curriculum Construct



- Critical components of the curriculum included:
 - A pre-test and a post-test
 - A series of lectures by a pathologist with American Board of Pathology certification in Clinical Informatics
 - Links and PDF downloads of faculty-vetted textbook chapters and journal article reading to cover key topics
 - Database basics
 - Networking
 - Terminologies
 - Standards
 - Communication protocols
 - Laboratory information systems vs. electronic medical records
 - A required lecture given by residents on a topic of their choice
 - Visits to various laboratory settings to review informatics implementations and tools in daily practice

Results - Continued

Pathology Informatics Curriculum Content: Canvas Learning Management System Content

Canvas Learning Management System Access:

- Pathology Informatics Essentials for Residents (PIER) resources
- Faculty-Vetted Articles and Book Chapters
- Faculty Lectures
- Resident Lectures
- Research Projects

Focus of Curriculum

SPECTRUM OF TRAINING IN PATHOLOGY INFORMATICS

FOCUS OF PROPOSED LEARNING OBJECTIVES AND SKILL SETS

Cur: Knowledge and Basic Proficiency | Advanced Training During Residency | Pathology or Informatics Fellowship or Advanced Degree

Lecture Content: Examples – LIS Overview / Relational Database / Middleware Topics

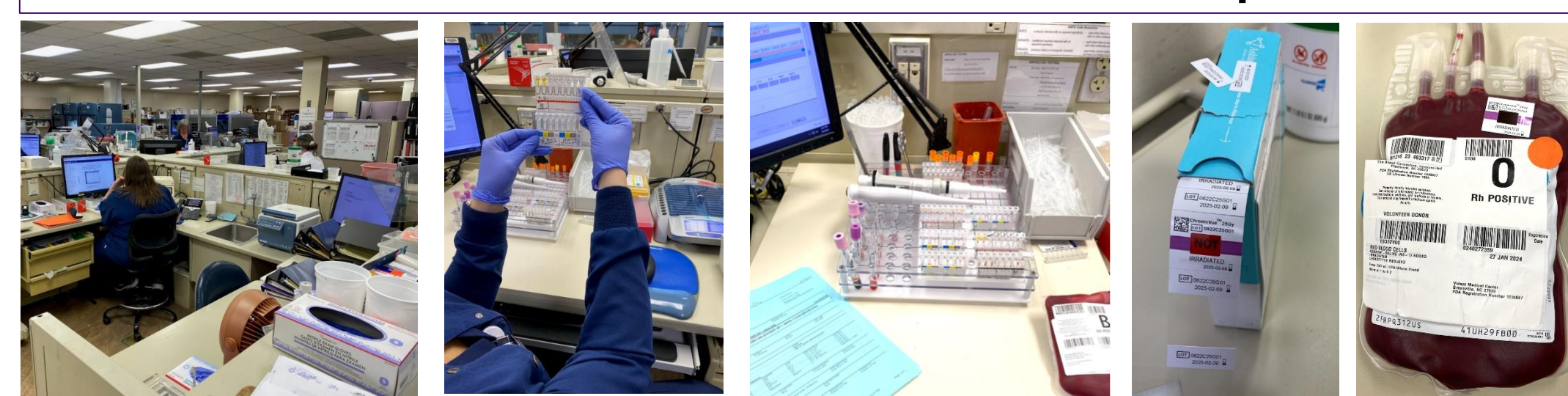
Hematology Laboratory & Middleware

WAM vs. Data Innovations Middleware; Flags; Auto-verification; Rules; Critical Values; Digital Imaging and AI Interpretations



Blood Bank: Best of Breed Non-Epic Software

Blood Bank Software (FDA Approved): WellSky HCLL Blood Bank Module – Best of Breed: Interfaced with Epic



Assessment: Pre-Test / Post-Test Examinations Administered in Canvas

Assessment: Results

Informatics Elective Testing	Pre-Test Average Score	Post-Test Average Score	Pathology Resident In-Service Exam (RISE)	2018	Not Separately Reported*
2022 and 2023 Elective Rotations N = 6 Residents	65%	91%	Average Score For ECU Residents Against National Results * Reported in Laboratory Management Section	2019	40%
				2020	45%
				2021	80%
				2022	90%
				2023	80%
				2024	50%

Survey

• Likert scale scores of 4 (agree) and 5 (strongly agree) were combined

Response Rate	100% (7/7)
Rotation useful and educational	100%
Primary goal of covering critical topics met	100%
Visits to laboratories to see informatics in action useful	100%
Rotation effectively prepared me for in service and board examinations	100%

Positives	Opportunities for Improvement
<ul style="list-style-type: none"> Great background in informatics. Effective. Great opportunity to gain knowledge in a wide array of informatics-related topics as well as learning about lab management. Great rotation. Love pre-test and post-tests to assess knowledgebase. 	<ul style="list-style-type: none"> A little more about digital pathology and AI in pathology and barriers to greater implementation would be useful. Additional hands-on experience in digital pathology and whole slide imaging. Additional site visits would be beneficial ... chemistry, microbiology, AP labs.

Literature Search

Pathology Informatics Curriculum Construct

- Several consensus groups have recommended the construct of a pathology informatics curriculum
 - For Pathology Residents^{1,2,3}
 - For Informatics Fellows^{4,5,7}
- Vetted informatics resources are also available from PIER and from the Association of Pathology Informatics
 - PowerPoint templates for lectures
 - Curated lists of articles and books

Conclusions

- Informatics tools are essential for the function of the anatomic and clinical pathology laboratories.
- Given the primacy of informatics in pathology practice and informatics assessment on resident in-service and board examinations, it is critical that residents acquire a working knowledge of basic informatics topics.
- Residents felt that the rotation met PIER content objectives and was effective at communicating key pathology informatics concepts; giving a lecture was felt to be an effective educational activity.
- Designing and implementing an informatics-specific curriculum for pathology resident physicians can positively impact their informatics knowledge, as evidenced by the results of pre-test and post-test rotation examinations as well as scores on nationally administered in-service training examinations.
- Future Goals: Involvement in validation, interfacing, and use of new anatomic pathology virtual slide and cytology imaging devices and software; visits to additional informatics implementations in clinical pathology (microbiology, chemistry) and anatomic pathology.

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