Global In-sourcing Using A Pathology Teleconsultation Network Platform

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Disclosures

• Shareholder (now divested): DigiPath, Inc.
Objectives

• At the conclusion of this activity, the learner should be able to:
  – Outline the opportunities and motivation for developing a global consultation and secondary opinion service
  – Discuss the significant logistical, cultural, political and technical barriers to realizing a global consultation service
  – Describe how digital pathology, in the form of web-based teleconsultation networks, enables a global consultation workflow
Background
Approach
Challenges
Future
Background

Approach

Challenges

Future
The Johns Hopkins Hospital

- Baltimore, MD
- Founded 1889
- Pathology surgical pathology caseload of ~80k cases per year
JHH Consult Service 2013 (Jan-Dec)

### Surgical Pathology

<table>
<thead>
<tr>
<th>Case type</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>26,482</td>
</tr>
<tr>
<td>Confirming</td>
<td>6,770</td>
</tr>
<tr>
<td>Total</td>
<td>33,252</td>
</tr>
</tbody>
</table>

### Cytopathology

<table>
<thead>
<tr>
<th>Case type</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>True</td>
<td>1,521</td>
</tr>
<tr>
<td>Confirming</td>
<td>687</td>
</tr>
<tr>
<td>Total</td>
<td>2,208</td>
</tr>
</tbody>
</table>
True consult volume: 1985-2014
Total hospitals in China: 2001-2012

- 2001: 16,197
- 2002: 17,844
- 2003: 17,764
- 2004: 18,393
- 2005: 18,703
- 2006: 19,246
- 2007: 19,852
- 2008: 19,712
- 2009: 20,291
- 2010: 20,918
- 2011: 21,979
- 2012: 23,170

Growth of private hospitals

- China recently deregulated pricing for private hospitals
- Number of private hospitals has increased from 5,403 in 2008 to 11,432 in 2014
- 46% of the all hospitals in China are now private
- Generally small hospitals with < 500 beds

Chinese Market

- **US**
  - Pathologists: ~ 17,000
  - Population: 320 M
  - 1 pathologist per 19,000 people

- **China**
  - Pathologists: ~ 20,000
  - Population: 1,400 M
  - 1 pathologist per 74,000 people

3.9x more pathologists per capita
China the hardest hit by global surge in cancer, says WHO report

Li Jing
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The world registered 14 million new cancer cases and 8.2 million deaths in 2012.

China is bearing the brunt of new cancer cases and deaths amid an alarming global rise in the disease in 2012, according to the World Health Organisation.
Chinese Market, cont.

• The potential Chinese consultation market is estimated to be around $1.3 billion
• Human tissue, including glass slides, cannot be sent out of China
• Language and payment create significant barriers
Chinese Market, cont.

• The Chinese National Cancer Registration Centre recorded an estimated 3.5 million new cases and 2.5 million deaths annually

• Cancer is now the leading cause of death in urban China

• Attributed to increasing environmental pollution and an increasingly Westernized diet and lifestyle
Chinese Market, cont.

• The potential Chinese consultation market is estimated to be around $1.3 billion
• Human tissue, including glass slides, cannot be sent out of China
• Language and payment create significant barriers
Background
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Approach

• Integrate digital pathology into our existing consultation service
• Increase awareness of the value of secondary diagnosis in China
• Increase awareness of Johns Hopkins Pathology in China
Wish list for features

- Web-based
- Vendor solution
- Hosted
- Easy to use for our admins and pathologists
- No LIS interfacing
- Pre-existing Chinese partners
- Facilitate language barriers
- Facilitate transfer of payments
Pro.Net

• Secure, cloud-based service
• Features include:
  – Digital Consultations
  – Social networking tools
  – Marketing options within profile
• Platform agnostic:
  – Leica/Aperio, Ventana, Omnyx, Simagis, Mikroscan
Xifin Pro.Net, cont.

- Collect all needed information for a consult request through direct input or upload
- Upload reports from your local LIS environment or direct input
- Built-in digital payment mechanisms
- Compatible with Chinese and other languages
Kindstar Diagnostics

• First and largest esoteric clinical laboratory conglomerate in China
• Over 3000 hospital clients, including 1100 level 3 hospitals
• Serving more than 600 cities, and 31 provinces
• Annual growth rate of over 50% in both sales and employees for the past 4 years
System Overview
Contributing Pathologists

Consultation Network

Consulting Pathologists

XIFIN PRO.NET
Pathologist and Groups
Pathologist Profile, cont.

- We have a Johns Hopkins Group on the network
- A group admin manages the group
- Consults are directed to the group or an individual pathologist
Johns Hopkins Medical Institutions
The Department of Pathology at The Johns Hopkins is preeminent nationally and globally in the study and treatment of human disease, and in professional training in all areas of pathology and laboratory science. Currently there are over 1,400 people in the department, which includes approximately 120 full-time faculty, 34 residents, 45 graduate students, over 100 fellows, and approximately 1000 staff. The Johns Hopkins medical laboratory provides world-recognized expertise in surgical pathology and cytopathology consultation. We offer the following services to serve our consulting physicians: • Broad expertise in virtually all specialties • Direct line to responsive central receptionist to handle inquiries • Prompt response • One to three-day turnaround on cases not requiring additional studies

Address
600 North Wolfe Street
Baltimore, MD 21287
USA

Consultation Fee Schedule
Consult Fee (0-5 Slides): $325.00
Consult Fee (6-10 Slides): $525.00
Consult Fee (>10 Slides): $0.00

Members Of This Group:

Anh Lam  Jonathan Epstein  Syed Ali  Lois Arend  Pedram Argani  Fred Askin

Serena Bagnasco  Justin Bishop  Michael Borowitz  Peter Burger  Ashley Cinino-Matthews  Toby Cornish
Requesting a Consultation
Identifying a Consultant

- Search the network for a consultant
- Filter by name, location or sub-specialty

Submit a request for consultation
Creating a Consultation Request

- Scanned WSIs are associated with case
- Patient and case information is entered
- Scanned documents and additional image files can be attached to the case
- A consult request letter is attached
- Chinese language localization of user interface
Receiving a Consultation
JH Admin Workflow

• Group Admin (Coordinator of our Consult Office)
  – An email is received from Xifin:
    • “You have received a new group consult request”
    • link to open the request

• On Xifin Pro.Net:
  – QA the information in the consult request form
    • WSIs must be attached
    • Minimum 2 identifiers
  – If information is missing, use “send message” function to request the missing information
  – Print the consult request form
JH Admin Workflow, cont.

- In our APLIS
  - Accession the case as a routine consult
  - Assign to the requested pathologist or based on service
  - Enter a gross description listing number of WSIs in the case
  - Print out working papers
  - Forward working papers to the assigned pathologist
JH Pathologist Workflow

• Internal working papers received

• In Xifin Pro.Net
  – Select the case from the Consultations Inbox
  – Open the case and Accept the consult
  – Review Case information and WSIs

• Write diagnosis on working papers & submit for typing
<table>
<thead>
<tr>
<th>ID</th>
<th>Requesting User</th>
<th>Group Name</th>
<th>Case Details</th>
<th>Request Date</th>
<th>Action</th>
<th>Status</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>16815</td>
<td>Joseph Nollar</td>
<td></td>
<td>1) MEDIAL BREAST CALCIFICATIONS 2) LATERAL BREAST CALCIFICATIONS - LT BREAST BIO....</td>
<td>02 Sep 2014</td>
<td>View</td>
<td>Accepted</td>
<td>Send Message</td>
</tr>
</tbody>
</table>
Consultation Request

**Patient Information:**
- **Patient First Name:** Judy
- **Patient Last Name:** Row
- **Unique Patient ID:** 23422233
- **Patient Sex:** F
- **Patient Date of Birth:** 09/01/1933

**Diagnosis:**

Dear Doctor Toby Cornish,

I have a(n) 81-year-old Female patient.

1) MEDIAL BREAST CALCIFICATIONS 2) LATERAL BREAST CALCIFICATIONS - LT BREAST BIOPSIES R/O CA

Sincerely,
Joseph Nollar

**Upload Attachments:**

- Choose File
- No file chosen

**Send | Save Draft**
JH Pathologist Workflow, cont.

• Typed case returned to pathologist
• In APLIS:
  – Review case, edit and release
  – Export final report as PDF file
• On Xifin Pro.Net:
  – Open the case
  – For diagnosis, type: “please see attached report”
  – Upload final report PDF as an attachment
  – Click the Send button
View WSIs in the Case
Entering the Diagnosis

Enter text diagnosis here

Attach final Report PDF here

Send report

Dear Doctor Toby Cornish,

I have an 81-year-old Female patient.

1) MEDIAL BREAST CALCIFICATIONS 2) LATERAL BREAST CALCIFICATIONS - LT BREAST BIOPSIES R/O CA

Sincerely,
Joseph Nolan
Challenges

• Lack of APLIS integration
• Human factors
• International barriers
• Special stains
• Volume
Lack of APLIS integration

• We wanted the digital cases in our APLIS, yet
• We elected for no integration with our APLIS
  – Uncertain about volume
  – Did not want to delay roll out
  – Workarounds are straightforward
• Resulted in:
  – No decrease in administrative overhead
  – Additional steps for the pathologist
Human Factors

• Would our pathologists be accepting of digital consults?
  – No pathologists refused to be part of the group despite being able to opt-out
  – Attitude is more one of curiosity

• Human issues remain
  – Forgotten usernames, passwords
  – Confusion about SOPs
International Barriers

• Language
  – We do have translation services at the hospital level, but are not using them
  – We receive information in English and return reports in English
  – The user interface of the software is localized for use in China

• Payment
  – The Network provider handles the collections
Special Stains

• How do we get additional stains on cases?
• Normally, we would request blocks or unstained slides
• Tissue can’t leave China
• Rely on the contributing lab to perform the stain
• No formal mechanism for this
• Use the “send message” function
Volume

- Case volumes have been low
- Low volumes make the process “occasional” rather than routine
Background
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Future

• Workflow improvements
• Improve marketing of consultation services abroad
• Branded consult site
• Additional Chinese Partners