The CAP Cancer Case Summaries: From Paper to PC*

George Birdsong, MD, FCAP & Philip Foulis, MD, MPH, FCAP
Pathology Informatics 2012

*For Mac Users: From Paper to “Cool”

www.cap.org
Agenda

• Introduction
• History of CAP Cancer Protocols
• Translation into Electronic Checklists (eCC)
• Challenges & Process Solutions
• Issue Management & QA
• Synoptic Reporting
• What’s next? Projects & Collaborations
CAP Cancer Protocols

- The 65 CAP Cancer Protocols consist of 81 cancer case summaries (checklists)
  - Utilized in pathology reporting
  - Explanatory Notes

- Compilation of standards
  - AJCC 7th ed.; WHO Blue Books

- www.cap.org/cancerprotocols

- Provides required data elements (RDE) for cancer reporting
  - Inclusion of RDEs in pathology report mandated for accreditation by ACoS-CoC & CAP LAP

Protocol for the Examination of Specimens from Patients with Primary Carcinoma of the Colon and Rectum

Well-differentiated neuroendocrine neoplasms (carcinoid tumors) are not included.

Based on AJCC/UICC TNM, 7th edition
Protocol web posting date: October 2000

Procedures
- Excisional Biopsy (Polyectomy)
- Local Excision (Transanal Disk Excision)
- Colectomy (Total, Partial, or Segmental Resection)
- Rectal Resection (Low Anterior Resection or Abdominoperineal Resection)

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For the Members of the Cancer Committee, College of American Pathologists

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## CAP Cancer Protocols - History

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>&quot;Guidelines for Data to Be Included in Consultation Reports on Breast Cancer, Bladder Cancer, and Hodgkin’s Disease” was the first set of cancer protocols published in a CAP publication.</td>
</tr>
<tr>
<td>1992</td>
<td>Richard L. Kempson, MD, published “The time is now: checklists for surgical pathology reports” in Archives of Pathology &amp; Laboratory Medicine.</td>
</tr>
<tr>
<td>1994–1998</td>
<td>Protocols for gastrointestinal lymphoma and carcinomas of the prostate, colon, lung, ovary, breast, head and neck, ampulla of Vater, esophagus, stomach, exocrine pancreas, and bladder were published in Archives of Pathology &amp; Laboratory Medicine.</td>
</tr>
<tr>
<td>2001</td>
<td>American College of Surgeons Commission on Cancer (COC) develops Standard 4.6 that requires for COC accreditation the reporting of the scientifically validated elements listed in the CAP cancer protocols. Implementation of Standard 4.6 gets deferred to 2004 to allow institutions time to integrate these elements into their reporting informatics systems.</td>
</tr>
<tr>
<td>2003</td>
<td>2003 edition of Reporting on Cancer Specimens: Case Summaries and Background Documentation 3rd edition (Carolyn Compton, MD, PhD, editor) contained 42 protocols. Protocols were updated in conjunction with the 6th edition of American Joint Committee on Cancer (AJCC) Cancer Staging Manual. First version of the SNOMED CT (Systematic Nomenclature of Medicine—Clinical Terms)—encoded cancer checklists (paper-based version only).</td>
</tr>
<tr>
<td>2004</td>
<td>COC Standard 4.6 is in effect requiring COC-accredited institutions to report the scientifically validated elements listed in the CAP cancer protocols. CAP Laboratory Accreditation Program (LAP) revises accreditation checklist question ANP:12350 recommending that laboratories include all the scientifically validated elements listed in the CAP cancer protocols in definitive cancer reports (phase 2). This is a recommendation in the note not a requirement.</td>
</tr>
</tbody>
</table>

Amin, Arch Pathol Lab Med 134, March 2010
## CAP Cancer Protocols → eCC History

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>CAP Cancer Committee forms 11 cancer review panels encompassing the major subspecialties of surgical pathology. These panels contain 10 to 20 multidisciplinary members who review existing and develop new CAP cancer protocols. Centers for Disease Control and Prevention (CDC) releases <em>Report on the Reporting Pathology Protocols for Colon and Rectum Cancers Project</em>. Atlanta, GA: Department of Health and Human Services (HHS), CDC, National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP); 2005. This project focused on implementing and improving the reporting of information from the SNOMED CT-encoded CAP colon and rectum cancer checklists.</td>
</tr>
<tr>
<td>2006</td>
<td>The Centers for Medicare and Medicaid Services (CMS) accepts the complete reporting of cancer based on the CAP breast and colon protocols as the bases for newly developed pay for performance initiatives. The AJCC includes members of the CAP cancer review panels on its disease-site task forces to develop the elements of the 7th edition of the <em>AJCC Cancer Staging Manual</em>.</td>
</tr>
<tr>
<td>2008</td>
<td>CAP establishes the Diagnostic Intelligence and Health Information Technology (DIHIT) Committee and also forms under it the Pathology Electronic Reporting Taskforce (PERT) with a mission to “advance the implementation of the CAP Cancer Checklists using health information technology.”</td>
</tr>
<tr>
<td>2009</td>
<td>CAP updates 55 protocols for the 2009 edition of <em>Reporting on Cancer Specimens</em> (Mahul B. Amin, MD, and M. Kay Washington, MD, PhD, editors) in conjunction with the release of the <em>AJCC Cancer Staging Manual</em> 7th edition. CAP cancer protocol review panel (CPRP) lead pathologists are actively engaged in the formulation of AJCC staging systems. The entire body of the CAP cancer protocols are available on cap.org, and additionally, the breast, colon, prostate, lung, and melanoma protocols are published in <em>Archives of Pathology &amp; Laboratory Medicine</em>. CAP LAP releases 2 new accreditation checklist questions requiring a self-audit for the completeness of cancer reports based on the CAP cancer protocols (phase 1) and the inclusion of a synoptic section with the staging elements (phase 0). COC offers commendation for COC-accredited institutions that include a synoptic section in definitive cancer reports with the scientifically validated elements listed in the CAP cancer protocols. First release of the XML version of the CAP electronic cancer checklists (eCCs), which includes SNOMED CT codes. The Canadian Association of Pathology endorses the use of the CAP cancer protocols for reporting cancer in Canada. The CAP creates the Pathology &amp; Laboratory Quality Center that will assist with the development and distribution of CAP guidelines and white papers.</td>
</tr>
</tbody>
</table>

Amin, *Arch Pathol Lab Med* 134, March 2010

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2012: 81 case summaries
Cancer Committee

- Maintains current & produces new protocols
- 22 pathologist, clinician and registrar members
- Receives and responds to content issues
  - Coordinated releases with eCC
  - Project involving protocol author review of eCC
  - Liaison to AJCC for issues involving checklists

PERT Committee

- Oversees eCC maintenance and development
- 19 pathologists, registrars and public health members
  - Meets weekly via GTM and in person twice yearly
- Respond to user and vendor questions and issues
  - Align eCC and CAP Cancer Protocol content
eCC Development → Practice

- CAP Cancer Checklist
- eCC Template Editor
- eCC XML Output
- Data Entry Form (DEF)
- Data Repository
- Path Report
- Cancer Registry

Sent to vendor

Sent using HL7 Messages
Base Template

• Maps common areas of checklists to a standardized template
• Promotes consistency and serves as base for new checklists
• Allows for queries of common data elements across checklists
• Release for users and vendors planned for future release
Challenges of Paper → eCC Conversion Process

Free text options in paper not options in eCC

Example A

*Distance from closest margin ____ mm*

- On paper, can write in or dictate “> 5”
  - In electronic format, need finite numeric descriptors for accurate structured reporting
- Solution
  - Add discrete field to report “greater than X” mm
  - Work with protocol authors to determine relevant “X” value for each tumor site
Challenges of Paper → eCC Conversion Process

Ability in paper to expand upon published format

Example B

For prostate biopsy cores, Histologic Grade section (Gleason Score) may repeat as needed for the total number of positive specimens

• On paper, can write in or dictate for each section
  ▪ In electronic format, need built in rules to accommodate repeating sections

• Solution
  ▪ Build repeating section and conditional reporting functionality into newer versions of eCC XML
  ▪ Work with vendors to help them implement rules
Challenges of Paper → eCC Conversion Process

**eCC Question-Answer Set (QAS) structural variants**

**Added responses**

- **Paper format**
  - Other Attached Tissue Margin (specify):
    - ___ Not applicable
    - ___ Cannot be assessed
    - ___ Uninvolved by invasive carcinoma
    - ___ Involved by invasive carcinoma

- **eCC XML format**
  - Other Attached Tissue Margin
    - ☐ Not applicable
    - ☐ Specify tissue margin
      - ☐ Cannot be assessed
      - ☐ Uninvolved by invasive carcinoma
      - ☐ Involved by invasive carcinoma

**Technical roll up features**

- **Paper format**
  - If all margins uninvolved by invasive carcinoma:
    - Distance of invasive carcinoma from closest margin: ___ mm
      - Specify margin: _______________

- **eCC XML format**
  - All margins uninvolved by invasive carcinoma
    - Distance of Invasive Carcinoma from Closest Margin (mm)
      - 
      - Specify Margin Closest to Invasive Carcinoma
Challenges of Paper → eCC Conversion Process

Establishment of close relationship between PERT & Cancer Committee

• Direct communication between authors and PERT
• Participation in F2F meetings

User & vendor interaction

• Differing implementations of eCC by vendor
• Produce educational material and regular updates
  ▪ Webinars for users & vendors
  ▪ eCC Newsletter
  ▪ 1:1 meetings with CAP staff
  ▪ Phone & email feedback
• Keep lines of communication open
Workflow Process: User Submitted Issues

SOP for eCC Clients Issue Request Submissions

- eCC client sends a request to Sue Krauser (STS Professional Team) by email or via phone
  - Licensing Request
    - Licensing needs to be renewed
      - Yes: Sue sends eCC Licensing
      - No: Sue follows up with the Client next year
  - Content Request
    - Issue needs further action
      - Yes: Jeffery Karp (eCC Team)
      - No: eCC Team
    - Sue sends the email to Jaish Mirza (eCC Team)
  - Technical Request
    - Issue needs further action
      - Yes: Jeffery Karp (eCC Team)
      - No: eCC Team
    - Sue sends the email to Jeffery Karp (eCC Team)

Done

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Hello, Attached please find the Silverberg information that I received from my GYN Pathologist in support of being able to use the Silverberg Histologic Grade as opposed to the WHO Histologic Grade for the Ovarian Cancer Checklist. If you require further support documentation or discussion please contact Dr. XYZ for clarification.

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**Issue Document: Content Focus**

**User Request**

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**Original Message**

Hello, Attached please find the Silverberg information that I received from my GYN Pathologist in support of being able to use the Silverberg Histologic Grade as opposed to the WHO Histologic Grade for the Ovarian Cancer Checklist. If you require further support documentation or discussion please contact Dr. XYZ for clarification.

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**Issue Form Generation & PERT-CaCte Discussion**
In the Intrahepatic Bile Duct checklist, the Microscopic Tumor Extent section is multiple choice. However, there are several answer selections here that are mutually exclusive. For example...
Quality Assurance Review Process

Phase 1
- Comparison of paper with electronic template

Phase 2
- Comparison of electronic template with XML

Phase 3
- Evaluate flagged issues and fix problems
Cancer Pathology Reporting in Ontario

Some facts and figures:

- About 400 pathologists submit cancer pathology reports to CCO from 100 cancer treating hospitals.
- 92% of cancer pathology reports are electronically sent by Ontario labs and hospitals.
- Over 100,000 electronic cancer pathology reports are received each year at CCO.
CCO Involvement in eCC Quality Assessment

- Primary user and submitter of feedback
- CCO review of near-final eCC annual release
- Responses and errata come through PERT and/or Cancer Committee primary protocol author
- Integral to production of October 2011 release
- Examples of previous issues
  - Bladder TURBT – Conditional reporting
  - Extrahepatic Bile Duct – Repetition of QAS
### Bladder TURBT – eCC Before & After

#### Histologic Grade (Note C)

**Urothelial Carcinoma (WHO 2004 / ISUP)**
- Not applicable
- Cannot be determined
- Low-grade
- High-grade
- Other (specify)

**Adenocarcinoma and Squamous Carcinoma**
- Not applicable
- Cannot be determined
- GX: Cannot be assessed
- G1: Well differentiated
- G2: Moderately differentiated
- G3: Poorly differentiated
- Other (specify)
CAP eCC Summary

- Standards Based
- Synoptic Report Completeness & Accuracy
- Interoperable XML format
- Customizable to Workflow
- Encoded to ICD-O3 & SNOMED CT
- Data Mining & Transmission
- Rules-Based Mapping to CSV2
- Version Control

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...and now, here’s some really cool stuff
“I am telling you that my bias is that structured discrete data will be the new currency in medicine.”

- Structured data and standardized vocabularies
- IT systems will need to aggregate data to determine outcomes
- New ways to manage patient care with increased safety and efficiency
- Demands granular, standardized, and structured data

-Mick Glant, M.D.
Medical Director Orchard Software Corporation 9/20/12
Health care is the ONLY industry on earth that has gone into mass adoption of technology that LOWERS productivity. Nothing wrong with properly digitized health information, but the technology given to doctors is a scandal. And anyone with more than a few years in IT, or who uses email, knows that manual input of information by humans into computers is extremely error prone.

- Rob Tholemeiser
  HealthData Management 10/1/12
Interpreting Complex Notes

- Succinct
- Standardized
- Comprehensive
- ‘Clear’ to reader
- Minimal extraneous information
- Based on evidence and ‘Best Practice’
The Problem with Language/Synoptic Reports

SPECIMEN: Right fallopian tube, Left fallopian tube, Right ovary, Left ovary

PROCEDURE: Right salpingo-oophorectomy, Left salpingo-oophorectomy

LYMPH NODE SAMPLING: Common iliac, External iliac, Obturator, Inguinal

TUMOR SITE: Left fallopian tube

RELATIONSHIP TO OVARY: Fused

STATUS OF FIMBRIATED END: Closed

TUMOR LOCATION: Fimbria, Ampulla

SPECIMEN INTEGRITY: Left, Ruptured

TUMOR SIZE: Greatest dimension: 3.0 cm

HISTOLOGIC TYPE: Serous carcinoma

Tubal intraepithelial carcinoma, SPECIFY TYPE: Serous type

HISTOLOGIC GRADE: G2: Moderately differentiated

MICROSCOPIC TUMOR EXTENSION: Uterus

LYMPH-VESTORAL Invasion: Not identified

LYMPH NODES:

COMMON ILIAC: Number examined: 2, Number positive: 1
EXTERNAL ILIAC: Number examined: 3, Number positive: 2
OBTRATOR: Number examined: 4, Number positive: 0
INGUINAL: Number examined: 4, Number positive: 2

PATHOLOGIC STAGING (pTNM [FIGO]):

PRIMARY TUMOR (pT): pT3 [III]
REGIONAL LYMPH NODES (pN): pN1 [IIIC]

LYMPH NODES EXAMINED: 13
LYMPH NODES INVOLVED: 5

DISTANT METASTASIS (pM): pM1 [IV]: Distant Metastasis

SPECIFY SITE(S), IF KNOWN: Liver

ADDITIONAL PATHOLOGIC FINDINGS: None identified

ANCILLARY STUDIES:
p53 IMMUNOSTAINING: Positive

CLINICAL HISTORY: BRCA1/BRCA2 family history
So What is the Problem/Solution?

- Need for structured data
- Analysis of presentation of information
- Better metrics on ‘efficiency’ of:
  - Data entry
  - Data analysis
- Ability to reflect complexities of individual patients
- Real-time analysis of outcomes and reduction of data
- IT enhances rather than ‘hinders’ care
Human Factors and Cognitive Engineering
Human Factors and Cognitive Engineering

• Interdisciplinary approach to designing systems oriented to effective human interaction

• Cognitive load
  o Provide guidelines intended to assist in the presentation of information

• Poka-yoke
  o ‘Mistake-proofing’ eliminate defects by preventing, correcting or drawing attention to human errors as they occur

• Kaizen: Continuous improvement
Why Consider a Checklist / Synoptic Report?

START UP/TAXI
STOW TOW BAR
LATCH CANOPY
HEADSET / INTERCOM - ON
SEATS & BELTS SECURE
GND - ON
CHECK CONTROLS
FUEL SELECTOR ON - MAIN TANK
SET THRUST PLAN AND FUEL TANKER ON GND
CENTER HORIZONTAL GYRO
MASTER SWITCH RIGHT - ON
CICA SPEED BRAKE SWITCH CONFIRM - UP
COMM RADIO ON AND SET PROPERLY
GLIDE B.C. - APPOXER
CALL CLEARANCE - TAXI
MIXTURE - RICH - TURN CLOCKWISE UNTIL SET
THROTTLE S/NOSE TO TURN OFF THE STOP
BRAKE - APPLY FUEL PRESSURE
MAIN SWITCH BODY - ON PRIME 5-6 SECONDS COLD 3-5 SECONDS HOT
BRAKES APPLIED - CLEAR PROP - START ENGINE
CHECK OIL PRESSURE
ALTERNATOR FIELD - ON CHECK AMPMETER
Definition: Synoptic

• Derivation Greek
  o ‘Sunoptikos’, from ‘Sunopsis’, general view

• Definition (*Merriam-Webster*)
  o Affording a general view of the whole
  o Manifesting or characterized by comprehensiveness or breadth of view
  o Relating to or displaying conditions as they exist
Synoptic Reports: Quality Issues & Efficiency

Quality – The 4 “C”s

- Consistency
- Completeness
- Comprehensive
- Consensus

Efficiency

- Transcription
  - Errors
  - Time
  - Corrections
- Pathologist Generated
- Interpretation
Missing information: Implication

- **Mistakes**
- **Treatment**
  - Delays
  - Incorrect treatment
  - NO treatment
- **System efficiency**
- **Erosion of confidence in diagnosis**
- **Inability to find the data in text**
### Pathology Report Completion Rates

<table>
<thead>
<tr>
<th>Disease Site</th>
<th>Synoptic Report Format</th>
<th>Narrative Report Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>95%</td>
<td>54%</td>
</tr>
<tr>
<td>Colorectal</td>
<td>93%</td>
<td>39%</td>
</tr>
<tr>
<td>Lung</td>
<td>96%</td>
<td>90%</td>
</tr>
<tr>
<td>Breast</td>
<td>93%</td>
<td>71%</td>
</tr>
<tr>
<td>Endometrium</td>
<td>91%</td>
<td>79%</td>
</tr>
</tbody>
</table>

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## Comparison: Reporting Survey

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Synoptic</th>
<th>Narrative</th>
<th>No preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity of results</td>
<td>86.3%</td>
<td>8.2%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Reducing need for further explanation</td>
<td>72.6%</td>
<td>16.4%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Consistency of reporting</td>
<td>98.6%</td>
<td>1.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Overall completeness</td>
<td>84.9%</td>
<td>9.6%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Aiding in the staging process</td>
<td>87.3%</td>
<td>4.2%</td>
<td>8.5%</td>
</tr>
<tr>
<td>Streamline cancer registry collection</td>
<td>97.3%</td>
<td>1.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Meeting CoC/CAP accreditation</td>
<td>83.3%</td>
<td>1.4%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Communication to patients</td>
<td>65.3%</td>
<td>11.1%</td>
<td>23.6%</td>
</tr>
<tr>
<td>Data collection for research</td>
<td>95.9%</td>
<td>2.7%</td>
<td>1.4%</td>
</tr>
</tbody>
</table>
Time to Complete Abstracts

Lewis A. Hassell, University of Oklahoma Health Science Center NAACR (2009)
Synoptic Report: Input & Output

INPUT
• Required entries
• Consistency checks
• Suggestions for diagnosis and/or confirmatory testing
• Input INDEPENDENT of Output
• Input fields generate other output fields
  o Calculations summary information

OUTPUT
• Coding – SNOMED CT, ICD-O3, CPT, ICD-9/10
• Discrete Data Elements
• Formatted report INDEPENDENT of Input
Future Direction: Works in Progress

- New eCC XML with expanded logic rules
  - Pilot checklists end 2013
  - Incorporate into all checklists 2014
  - Continue to co-release current XML

- eFRM (electronic Forms and Reporting Module)
  - Vendor software version
  - Desktop application/web browser version
    - Provides option for customized synoptic reports
  - Provides standardized template for DEF user interface
  - Beta release for user testing early 2013
Cancer Biomarker Reporting Workgroup (CBRW)

- Evaluate current cancer biomarker laboratory reporting variances
- Determine the standards for tumor marker use in pathology reporting
- Determine the standards for molecular marker reporting from laboratories to cancer registries
- Create stand-alone Cancer Biomarker Reporting data entry templates
Why Divide the Cancer Protocols?

- Use expertise of molecular pathology
  - Display
  - Granularity of content
  - What is necessary vs. up-and-coming

- Work with timing of biomarker result availability

- Standardize reporting of molecular testing results

- Allow for more agile changes to protocols
  - Either ‘traditional’ or tumor biomarker
  - Can combine input from cancer protocol and CBRW templates into integrated report (Input/Output issue)
Conceptual Approach to an ‘Über-document’

Integrated Disease Report

Pathology (Anatomic)
Clinical Laboratory
Pharmacy
Radiology
Problem List
Oncology Notes
Radiation Therapy

“Snapshot” Case Summary Report
Quick, easy multidisciplinary reference
Autopopulated with most current, relevant clinical data
Applications outside of cancer care
Accessible by all treating physicians and providers
Potential for use in quality measures and surveillance
CAP Organizational Collaborations

Making a world of difference in cancer care
# Acknowledgements

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- Samantha Spencer, MD
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