Clinical autopsy (CA). DNR or CPR?

Ramon P. Pujol Farriols. MD, PhD
INTERNAL MEDICINE
ESIM-Sardinia
June 2014
The beginning of CPC

- 1st CPC 1924
- A study of 3,000 autopsies
  
  
  JAMA 1912;59:2295-

- Diabetes, Typhoid > 90% concordance
- Cirrhosis, Endocarditis, Bronchopneumonia, Acute Nephritis < 50%

MGH

Richard Cabot 1868 -1939

Etherdome-MGH

Figure 1-10  William Osler performing a postmortem dissection at the Blockley Mortuary, Philadelphia, around 1886.
1994  A visit to the ‘temple’
DNR or CPR?

1. Why is CA in crisis?
2. What can we miss out on?
3. How to redirect the situation?
4. Is it only a problem for clinicians?
5. Which is the opinion of Y.I?
Traditional strengths of CA

- Research
- Mortality statistics
- Quality control
- Information to relatives
- Medical education
Evolution of CA in North American Hospitals
Evolution of CA in European Hospitals

Year:
- Grenoble
- Clinic-BCN
- HUBellvitge

%:
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
Why this decrease in CA?

- No availability on week-ends: 17.5%
- Lack of relative’s permission: 15.9%
- Difficulties to approach relatives: 13.3%
- Refusal of Pathology department: 11.9%
- Delayed report from the Pathology dpt.: 10.9%
- Inconclusive data from the CA: 10.4%
- **Clinical diagnoses are definitive and CA is unnecessary**: 10.2%
- Doctor on duty not aware about the case: 5.1%
- Fear of being sued: 2.7%
- Excessive bureaucracy: 2.1%

*Survey done with 102 doctors at the Hospital de Bellvitge, June 1997*
## Accuracy of clinical diagnoses

<table>
<thead>
<tr>
<th>Study</th>
<th>Accuracy</th>
<th>N of CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britton, 1974</td>
<td>43%</td>
<td>383</td>
</tr>
<tr>
<td>Fowler, 1977</td>
<td>36%</td>
<td>1000</td>
</tr>
<tr>
<td>Sandritter, 1980</td>
<td>58%</td>
<td>1096</td>
</tr>
<tr>
<td>Cameron, 1981</td>
<td>39%</td>
<td>1152</td>
</tr>
<tr>
<td>Pounder, 1983</td>
<td>33%</td>
<td>100</td>
</tr>
<tr>
<td>Scottolini, 1983</td>
<td>31%</td>
<td>100</td>
</tr>
<tr>
<td>Goldman, 1983</td>
<td>22%</td>
<td>300</td>
</tr>
<tr>
<td>Landefeld, 1988</td>
<td>23%</td>
<td>230</td>
</tr>
<tr>
<td>Sarode, 1993</td>
<td>32%</td>
<td>1000</td>
</tr>
<tr>
<td>Veress, 1994</td>
<td>39%</td>
<td>3042</td>
</tr>
<tr>
<td>Szende, 1994</td>
<td>43%</td>
<td>2000</td>
</tr>
<tr>
<td>Nichols, 1998</td>
<td>45%</td>
<td>176</td>
</tr>
<tr>
<td>Zarbo, 1999</td>
<td>40%</td>
<td>2479</td>
</tr>
<tr>
<td>Fusco Fares, 2011</td>
<td>56%</td>
<td>409</td>
</tr>
<tr>
<td>Tejerina, 2012</td>
<td>18.5%</td>
<td>834</td>
</tr>
<tr>
<td>Kuijpers, 2014</td>
<td>23.5%</td>
<td>460</td>
</tr>
</tbody>
</table>

% of CA showing unexpected major findings contributing to death

N of CA:
Meta-analysis 1980-2004

- 13,930 CA
- Discrepancies 30-63%
- 1/3 wrong certificates

Roulson et al. Histopathology 2005;47:551
Less CA = More discrepancy

Current situation in the majority of hospitals

Shojania KG. Et al. Changes in rates of autopsy-detected diagnostic errors over time. JAMA 2003;289;2849
What can we miss out on?
82 y. female

- **Past medical history:**
  - HBP, DM-2, DLP
  - Paroxismal AF
  - Stroke, 5/2007
  - HCV

- **Main complaint:** shortness of breath, cough, ankle edema over one week.
82 y. female

- **Physical ex.**: jugular distention & reflux, bilateral edema.
- **Lab tests**: 
  - Hb 10.4 VCM 83, creatinine 174 mmol, D-dimer 2.176 µg/L. pH 7.47 pCO₂ 35, pO₂ 62, CO₃H 26.4, satO₂ 93%.
- **EKG**: SR at 80 pm. RBBB.
82 y. female

• **CT:** RHF; no signs of PE in main vessels, doubts in a segmentary branch. Bilateral pleural effusion.

• **Pulmonary V/Q scan:** low probability of PE.

• **Cardiac US:** EF: 60%, RV (46 mm), PAP 92 mmHg (4/2007 de 35 mmHg). Cava vein low mobility, no pericardial effusion.

• Tx. heparin

• **48 h. later:** bruising, anemia, jaundice, low platelet count, LDH ↑. Shock.
Multiple pulmonary emboli of papilar adenocarcinoma

X 40

X 100

Subacute pulmonary hypertension following multiple neoplastic PE from genital tract.

Cytokeratin 7 stain
Presentation of case

- Male, 77 y.
- Severe epilepsy since 10 y.-old
- Post-op. pulmonary embolism, 50 y.-old
- Chronic bone pain
- Small-cell lymphoma, 9 m. before. Clinical improvement on Chlorambucil
Presentation of case

- Bilateral pleural effusion
- Generalized edema
- Xanthelasma
- EKG: low diffuse QRS voltage
- Lab tests
  - Acute phase reactants
  - Hypoalbuminemia
  - Hypoxemia
Presentation of case

- Pleural fluid, exudate, inflammatory, cultures neg.
- Pericardial fluid, similar
- Pneumothorax & pericardial tamponade
- Died after 4 weeks
Figure 1. Chest X-ray
Figure 2. CT-scan
CT-scan Prior to admission. December 2009
CT-scan Prior to admission. December 2009
Erdheim-Chester Disease
- Bone marrow
- Pericardial effusion (250 ml) & infiltration of pericardium and epicardial fat
- Perirenal and periaortic
- Meningeal enhancement and tumoral nodules
- Pleural effusion (R 150 ml; L 100 ml) and infiltration of visceral pleura
Erdheim-Chester Disease

- First report in 1930 by Chester
- Non Langerhans form of histiocytosis
- Over 300 cases reported so far

Classification of Histiocytosis syndromes

1. Langerhans-cell Histiocytosis
   (prev. Histiocytosis X)
   - Eosinophilic granuloma
   - Hand-Schüller-Christian disease
   - Letterer-Siwe disease

2. Non-Langerhans-cell Histiocytosis
   - Hemophagocytic lymphohistiocytosis
   - Rosai-Dorfman disease
   - Reticulohistiocytosis
   - Erdheim Chester disease

3. Malignant Histiocytic disorders
   - Acute Monocytic leukemia
   - Histiocytic lymphoma
   - Malignant histiocytosis
Retroperitoneal

- Rarely symptomatic
- Dysuria, abdominal pain, enlarged kidneys
- CT-scan showing retroperitoneal and/or pelvic infiltration
Pericardium & large vessels

- Pericardium
- Myocardium
- Heart valves
- Coronary arteries
- Aorta & aortic branches
- Cava and pulmonary veins
- Systemic hypertension

“coated aorta”

Stiff pericardium
Deaths from 1994 to 1999

- Internal Medicine
- Critical Care Unit
- Emergency department
• Population data
• **Factors related with the practice of CA**
• Analysis of clinico-pathological discrepancy ("blind" clinical diagnoses)
• Aetiologies on discrepancy cases
• Specific analysis on people > 65 a.
Factors related with the practice of CA

<table>
<thead>
<tr>
<th></th>
<th>Autopsy n=266 (8,9%)</th>
<th>No autopsy n=2718 (91,1%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE (SD)</td>
<td>62.8 (16.6)</td>
<td>68.2 (16.5)</td>
<td>&lt;0,001</td>
</tr>
<tr>
<td>Mean stay (SD)</td>
<td>13.0 (16,1)</td>
<td>10,2 ( 6,5)</td>
<td>&lt;0,02</td>
</tr>
<tr>
<td>Men</td>
<td>170 (63,9)</td>
<td>1609 (59,2)</td>
<td>NS</td>
</tr>
<tr>
<td>previous admission (%)</td>
<td>106 (39.8)</td>
<td>1059 (39,0)</td>
<td>NS</td>
</tr>
<tr>
<td>Service (%)</td>
<td></td>
<td></td>
<td>&lt;0,01</td>
</tr>
<tr>
<td>MIV</td>
<td>98 (36,8)</td>
<td>716 (26,3)</td>
<td></td>
</tr>
<tr>
<td>MIR</td>
<td>104 (39,1)</td>
<td>667 (24,5)</td>
<td></td>
</tr>
<tr>
<td>URG</td>
<td>64 (24,1)</td>
<td>1335 (49,1)</td>
<td></td>
</tr>
<tr>
<td>Initial clinical diagnosis (%)</td>
<td></td>
<td></td>
<td>---</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>70 (26,3)</td>
<td>1177 (43,3)</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>82 (30,8)</td>
<td>538 (19,8)</td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>29 (10,9)</td>
<td>340 (12,5)</td>
<td></td>
</tr>
</tbody>
</table>
Global Discrepancy through time

Global (p = 0.001)
Immediate (p = 0.029)
Fundamental (p = 0.08)
Factors related with discrepancy. Logistic Regression

- variables considered:
  - Age
  - Length of stay (days)
  - Gender
  - Previous admissions
  - Service
  - Autopsy diagnosis

- **Age was the only factor related with higher likelihood of discrepancy** RR 1.04; IC 95%; 1.01-1.06
Prevalent Discrepancy Diagnoses

- Pneumonía: 14 patients
- PE: 12 patients
- Ca. Hematol: 6 patients
- MI: 4 patients
- Septic shock: 4 patients
More frequent causes of discrepancy

- Error interpreting clinical data: 36%
- Accurate anamnesis not possible: 12.4%
- Palliative decision: 12.4%
- Incomplete diagnostic plan: 11.3%
- Insufficient lab tests: 10.3%
- Lab tests driving to error: 10.3%
Improvements in Clinical Diagnostic Accuracy After a 5-Year Systematic Analysis of Clinical and Autopsy Discrepancies

To the Editor.—Clinical autopsies have contributed considerably not only to the development of medical knowledge, but also to the quality assurance of medical care. Surprisingly, in the last 6 decades, autopsy rates decreased from 50% during the 1950s to around 5% nowadays. (P < .001). Finally, 256 patients were available for analysis.

The discrepancy rate in the underlying and/or immediate cause of death showed a statistically significant decrease from 43.3% at baseline (first year of the study) to 25.9% in the fifth year (P = .001). Furthermore, the class I discrepancy (supposed adverse impact in prognosis) also showed a significant decrease from 30% to 17.2% (P = .03; see the figure). Advanced age was the only factor independently associated with a higher risk of discrepancy (relative risk = 1.04; 95% confidence interval 1.01–1.07). As happened in other studies, pneumonia was found to be the most frequent discrepancy. To provide a useful tool for improving clinical diagnostic accuracy, these procedures should be maintained over time.

MIQUEL VADILLO†
RAMON P. PUJOL, MD
XAVIER CORBETTA, MD
TERESA GÓRRIZ, MD
PÈRE RAMASA, MD
ROGER BERNAT, PhD
Departments of Internal Medicine, Intensive Care, and Pathology
Hospital Universitari de Bellvitge
Barcelona, Spain
Only a problem for clinicians?

Enrique Simonet. The autopsy-1890
Diagnostic Utility of Postmortem Fine-Needle Aspiration Cultures

Miquel Aranda, MD; Carmina Martí, MD; Marianna Bernet, MD; Francesc Gudiel, MD; Ramon Pujol, MD
La PAAF detecta menos veces patógenos, pero cuando lo hace tiene más valor.
How clinicians can improve their interest in CA?

- Realising that pathologists are also interested in it
- Obtaining quick reports on their autopsied patients
- Working together with pathologists on definitive diagnoses
- Training young doctors (residents, students) on CA request
- Including CA rate as one of the service incentives
- Fostering meetings between clinicians and pathologists
- Promoting research projects in this field
Recent papers

- Aline Fusco Fares et al. Discrepancias clínico-patológicas y hallazgos cardiovasculares en 409 autopsias consecutivas. Arq Bras Cardiol 2011;97:449-453
Recent papers

The value of autopsies in the era of high-tech medicine: discrepant findings persist.
Chantal C H J Kuijpers, Judith Fronczek, Frank R W van de Goot, Hans W M Niessen, Paul J van Diest, Mehdi Jiwa

Journal of Clinical Pathology 2014; 67:512-

Clinical diagnoses and autopsy findings: discrepancies in critically ill patients.

Crit Care Med 2012; 40:842-
"It may be more appropriate to save the autopsy rather than pronounce it DNR"

James E. Dalen
Editor