

Graber
Appendix – The Incidence of Diagnostic Error in Medicine

Table 1: Diagnostic Error Rates in Specific Conditions

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| <i>Mikulin and Hardcastle (1987)(1)</i> | Gastric cancer | Of 83 patients with gastric cancer, the median delay in diagnosis was 7 weeks |
| <i>Lee et al (1987)(2)</i> | Myocardial infarction | In a prospective multicenter study of 3077 patients seen in the ER with chest pain, 477 had acute MI's, and of these 18 (4%) had been discharged from the ER without making the diagnosis |
| <i>Jones et al (1990)(3)</i> | Asthma | Of 187 children with asthma, diagnosis delayed in many and the length of delay was longer in older children |
| <i>Charlton et al (1991)(4)</i> | Asthma | <i>Of 212 children with asthma, the median delay in making the correct diagnosis was 3 years (or 7 office visits)</i> |
| <i>Schnetler (1992)(5)</i> | Oral Cancer | <i>Of 96 cases seen in 3 oral surgery departments, the referring general practitioner had made the correct diagnosis in only 52%.</i> |
| <i>Sorensen et al (1992)(6)</i> | Meningitis | <i>Of 177 patients with meningococcal meningitis, the diagnosis was delayed in 52%</i> |
| <i>McCarthy et al (1993)(7)</i> | Myocardial infarction | <i>In a multicenter study of 5773 patients seen in the ER with suspicious chest pain, the diagnosis of MI was made correctly in 1030 and missed in 20 (1.9%)</i> |
| <i>Lederle et al (1994)(8)</i> | Ruptured aortic aneurysm | Review of all cases at a single medical center over a 7 yr period. Of 23 abdominal aortic dissections, the diagnosis was initially missed in 14 (61%) |
| <i>Bleeker et al (1995)(9)</i> | Myocardial infarction | Of 300 patients admitted with myocardial infarction, the median delay from symptoms to admission was 84 minutes |
| <i>Paauw et al (1995)(10)</i> | HIV complications | Patients with classical complications were sent to 134 primary care physicians: Kaposi's sarcoma was noticed by 47% and misdiagnosed by 45%; Oral hairy leukoplakia was noticed by 56% and misdiagnosed by 59%; Lymphadenopathy was noticed by only 17% |
| <i>Beam et al (1996)(11)</i> | Breast cancer | 50 accredited centers reviewed blinded mammograms of 79 women, 45 of whom had breast cancer. The diagnosis would have been missed in 21% |
| <i>Burton et al (1998)(12)</i> | Cancer detection | Autopsy study at a single hospital: Of 250 malignancies, 111 were either missed or misdiagnosed, and in 57 cases the cause of death was cancer-related |
| <i>Burgess et al (1998)(13)</i> | Breast cancer | Of 132 patients with breast cancer, referral for definitive management was delayed in 32 (17%) |
| <i>Bouma et al (1999)(14)</i> | Myocardial infarction | Of 400 patients admitted with myocardial infarction, the diagnosis was delayed in female compared to male patients |
| <i>Meera et al (1999)(15)</i> | Parkinson's disease | Of 402 cases with presumed Parkinson's disease and on medications, only 53% had the disease on definitive evaluation |
| <i>Goddard et al (1999)(16)</i> | Retinoblastoma | Of 100 children with retinoblastoma, the diagnosis was delayed in 23% |
| <i>Van Schayak et al (2000)(17)</i> | Asthma | Of 1155 randomly-screened patients, spirometry suggested asthma in 86. Only 29 of these had ever complained of relevant symptoms to their physician, and of the diagnosis was missed in 6 (21%) |
| <i>Pope et al(2000)(18)</i> | Myocardial infarction | Of 10,689 patients seen for suspicious chest pain in 10 different ER's, 889 had acute myocardial infarction, of which 22 (2.3%) were mistakenly discharged from the ER |
| <i>Graff et al (2000)(19)</i> | Appendicitis | Retrospective study at 12 hospitals. Of 1,026 patients who had surgery for suspected appendicitis. 110 patients had no appendicitis at surgery; Of 916 patients with a diagnosis of appendicitis, the diagnosis was missed or wrong in 170 (18.6%) |
| <i>von Kodolitsch</i> | Ruptured aortic | In patients presenting with chest pain due to dissections of the proximal |

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| et al (2000)(20) | aneurysm | aorta, the diagnosis was missed in 35% |
| Kantola et al (2001)(21) | Tongue cancer | Of 75 cases, referral to specialty care was delayed in 35% |
| Pidenda et al (2001)(22) | Pulmonary embolism | Review of fatal pulmonary embolism over a 5 year period at a single institution. Of 67 patients who died of pulmonary embolism, the diagnosis was not suspected clinically in 37 (55%) |
| Levack et al (2002)(23) | Cancer-related spinal cord compression | Of 319 patients, the median delay in diagnosis was 18 days |
| Edelman (2002)(24) | Diabetes mellitus | Retrospective review of 1,426 patients with laboratory evidence of diabetes mellitus (glucose > 200 mg/dl or HgbA1c > 7%): There was no mention of diabetes in the clinical record in 18% of these patients |
| Shojania (2002)(25) | Pulmonary tuberculosis | Review of autopsy studies that specifically focused on pulmonary TB: Approximately half of these diagnoses were not suspected antemortem |
| McGinnis et al (2002)(26) | Melanoma | Second review of 5,146 biopsies: The diagnosis changed in 11% (1.1% benign to malignant; 1.2% malignant to benign; 8% change in tumor grade) |
| Gorter et al (2002)(27) | Psoriatic arthritis | Patients with classical psoriatic arthritis visited 23 rheumatologists: The diagnosis was missed or wrong in 9 visits (39%) |
| Lopponen et al (2003)(28) | Dementia | All 1260 patients in a small town were screened for dementia. 9% screened positive, but only 4% had been previously diagnosed |
| Goyal et al (2004)(29) | Bone cancer | Of 103 patients with osteosarcoma or Ewing's sarcoma at two hospitals, delayed diagnosis was associated with being seen by a general practitioner (vs ER physician) and in patients under 12 years of age |
| Jiwa et al (2004)(30) | Cancer | Of 56 patients with cancer, significant delays in diagnosis were encountered in 8 cases |
| Vasudev et al (2004)(31) | Testicular cancer | Of 180 men with testicular cancer, referral to specialty care was delayed in 60% |
| Kowalski et al (2004)(32) | Subarachnoid hemorrhage | Of 482 patients with subarachnoid hemorrhage at a single hospital, the diagnosis was initially wrong in 56 (12%) and 22 of these patients suffered neurological complications before the diagnosis was confirmed |
| Yates et al (2004)(33) | Iron deficiency anemia | Of 431 patients with microcytic anemia, 57% had no GI investigations, and of 53 patients who ultimately died of GI cancer, 41 had had no investigation. Female sex, age < 65, and Hgb > 9 gm/dl were associated with non-investigation |
| Bogun et al (2004)(34) | Atrial fibrillation | Review of automated ECG interpretations: 35% of readings interpreted at atrial fibrillation were wrong and the error was detected by the reviewing cardiologist only 76% of the time |
| Buchewitz et al (2005)(35) | Endometriosis | Digital videotapes of laparoscopies were shown to 108 gynecologic surgeons: The interobserver agreement regarding the number of lesions was only 18% |
| Raab et al (2005)(36) | Cancer pathology | Reviewed pathology material from 4 hospitals over 1 year: The error rate was 2-9% for gynecologic cancer and 5-12% for non-gynecologic cancer |
| Perlis (2005)(37) | Bipolar disorder | The initial diagnosis was wrong in 69% of patients and delays in reaching the correct diagnosis were common |
| Edlow (2005)(38) | Subarachnoid hemorrhage | Review of published studies: Approximately 30% are misdiagnosed at presentation |
| Arnon et al (2006)(39) | Infant botulism | Of 129 infants with botulism over a 5 year period, only half the cases were suspected at the time of admission |
| Campos (2012)(40) | Alpha-1 Antitrypsin Deficiency | 200,000 patients in the US have severe deficiency; Less than 10% have been properly diagnosed |
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Adapted in part from Schiff et al, 2005 (41) and Kostopolou et al, 2008 (42). Note: This list is a convenience sample of published articles, not a comprehensive listing.

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