Clinical Policy: Critical Issues for the Initial Evaluation and Management of Patients Presenting With a Chief Complaint of Nontraumatic Acute Abdominal Pain

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INTRODUCTION

This clinical policy expands on the previous *Clinical Policy for the Initial Approach to Patients Presenting With a Chief Complaint of Nontraumatic Acute Abdominal Pain* that was published in 1994.[1] This topic was initially selected because of the high frequency with which such patients present to emergency departments and the potential for serious adverse outcomes. The format of the original abdominal pain clinical policy focused on the evaluation of a patient presenting with a chief complaint of abdominal pain as opposed to specific disease processes. It was a broad-based attempt to focus on key history, physical, and diagnostic findings to drive the diagnosis of potentially serious medical conditions. Because of the all-inclusive nature of the original format, specific emphasis on critical issues in the evaluation of selected subsets of abdominal pain patients was not possible.

The Clinical Policies Committee believes that the format of the previous complaint-based clinical policies has gone as far as possible in directing the appropriate evaluation and treatment of patients presenting with abdominal pain. The committee is satisfied that the previous policy met the original goals of the American College of Emergency Physicians (ACEP). A decision was made to develop a revised policy that focuses on critical issues in the evaluation of patients with abdominal pain. It is hoped that this new format will not only improve patient care but also direct future research.

Unlike the initial policy, the revised policy does not make exhaustive recommendations regarding the evaluation and treatment of the patient with abdominal pain. Instead it presents important research on critical issues

regarding this topic. The revised policy makes recommendations, as much as possible, based on scientific research rather than on the consensus of an expert panel. Evidence-based medicine creates few standards in directing patient care in the ED setting. In addition, this revision presents data concerning laboratory and imaging modalities used to determine the etiology of abdominal pain.

Annually, nearly 5 million patients present to EDs in the United States with the complaint of abdominal pain.[2] This complaint accounts for 5% to 10% of all ED visits in some areas.[3] Etiologies of acute abdominal pain range from minor, self-limiting conditions to life-threatening disorders. Although a majority of patients have conditions that are not life-threatening, failure to identify and treat those patients with serious illness may result in devastating health consequences. Elderly patients are at particular risk for critical conditions. It is not always possible to determine the cause of acute abdominal pain. Studies show that specific diagnoses are not made in approximately 30% of these patients.[3,4]

There is no single best method for determining the correct diagnosis and treatment derived from the patients' symptoms and signs during their ED visit, and therefore this cannot be written in a clinical policy. However, a useful policy should assist in the identification of the most serious and life-threatening conditions based on their common signs and symptoms. A review of the medical literature on abdominal pain found many studies on specific disease entities but very few regarding the overall approach to patients with abdominal pain. Published research on abdominal pain is predominantly retrospective and diagnosis specific. There are few data regarding the emergency evaluation of an undifferentiated complaint. It is clear that future studies are required that analyze the relationship among the signs, symptoms, laboratory analyses, and imaging studies in patients with acute abdominal pain.

The usefulness of ancillary testing depends on many factors: pretest probability, the specificity and sensitivity of the test, and disease prevalence. Many commonly used laboratory analyses and imaging studies are neither sensitive nor specific for a particular diagnosis. The emergency physician should understand the limits of these ancillary studies and should order only those tests likely to affect diagnosis or management. These tests are listed in the Appendix.

Inclusion criteria This clinical policy is intended for patients with a chief complaint of acute abdominal pain who present to a hospital ED.

Exclusion criteria

Excluded from this policy are:

1. Children
2. Patients with known antecedent trauma
3. Patients in the last trimester of pregnancy or the first month post partum

Methodology

A MEDLINE search for articles published between January 1990 and January 1999 was performed for abdominal pain management in the ED. Key words consisted of physical examination techniques (eg, auscultation) and specific abdominal conditions (eg, pancreatitis). Radiology and laboratory qualifiers were then applied to each of the abdominal diagnoses. The bibliographies of the individual articles were also searched for additional references, some of which were published before 1990. The subcommittee reviewed these articles to determine those that applied to the selected topics in this revision. These were analyzed by at least 2 subcommittee members and scored for strength of evidence according to the following criteria:

Strength of evidence A—Interventional studies including clinical trials, observational studies including prospective cohort studies, aggregate studies including meta-analyses of randomized clinical trials only.

Strength of evidence B—Observational studies including retrospective cohort studies, case-controlled studies, aggregate studies including other meta-analyses.

Strength of evidence C—Descriptive cross-sectional studies, observational reports including case series, case reports; consensual studies including published panel consensus by acknowledged groups of experts.

Articles with significant flaws or design bias were downgraded in their strength of evidence.

Strength of recommendations were then made according to the following criteria:

Evidence-based standards. Generally accepted principles for patient management that reflect a high degree of clinical certainty (ie, based on "strength of evidence A" or overwhelming evidence from "strength of evidence B" studies that directly address all the issues).

Guidelines. Recommendations for patient management that may identify a particular strategy or range of management strategies that reflect moderate clinical certainty (ie, based on "strength of evidence B" that directly addresses the issue, decision analysis that directly addresses the issue, or strong consensus of "strength of evidence C").

Options. Other strategies for patient management based on preliminary, inconclusive, or conflicting evidence, or, in the absence of any published literature, based on panel consensus.

The reasons for developing clinical policies in emergency medicine and the approaches used in their development have been enumerated.[5] This policy is a product of the ACEP clinical policy development process, including expert review, and is based on the existing literature; where literature was not available, consensus of emergency physicians was used. Expert review comments were received from emergency physicians, physicians from other specialties, such as surgeons, and specialty societies including members of the American Academy of Family Physicians, American College of Obstetricians and Gynecologists, and Emergency Nurses Association. Their responses were used to further refine and enhance this policy. Clinical policies are scheduled for revision every 3 years; however, interim reviews are conducted when technology or the practice environment changes significantly.

Scope of application

This guideline is intended for physicians working in hospital-based EDs.

DIAGNOSING UNDIFFERENTIATED ABDOMINAL PAIN

The most frequent diagnosis assigned to patients evaluated for abdominal pain in the ED is undifferentiated abdominal pain (UDAP), also called nonspecific abdominal pain (NSAP) or abdominal pain of unknown etiology.[3,6] That a clear etiology is often not found, even after extensive testing and evaluation, illustrates the difficulty that physicians often face in assigning a specific diagnosis to their patients presenting with abdominal pain. UDAP is a diagnosis of exclusion assigned after attempting to rule out more serious etiologies. Most of these patients have a benign course in follow-up.[7,8] However, exceptions occur, especially when the patient is examined in the early stages of a developing disease process. Elderly patients with abdominal pain have a higher prevalence of serious disease. Therefore, the diagnosis of UDAP should be used with caution in elderly patients.[9,10]

Patients with diagnosis of UDAP who are discharged from the ED need specific discharge instructions and timely reevaluation. The fact that the cause of their abdominal pain is unknown needs to be discussed directly with the patient. Patient education and close follow-up may minimize the chance of subsequent morbidity or mortality.

Patient Management Recommendations: Diagnosing Undifferentiated Abdominal Pain

Evidence-based standards. None specified.

Guidelines.

1. Patients with abdominal pain of undetermined etiology should have a diagnosis of UDAP rather than given a more specific diagnosis unsupported by history, physical, or laboratory findings.
2. Discharged patients with UDAP should receive discharge instructions and follow-up.

Options. None specified.

EVALUATING ABDOMINAL PAIN

Location of pain. Pain arising from various abdominal pathologic processes may localize to different areas of the abdomen. However, limiting the differential diagnosis because the location of the pain is or is not in a specific quadrant can lead to errors in diagnosis.[11,12]

Standardized data collection. A complaint-specific history and physical examination should be performed before a differential diagnosis is formulated or ancillary testing is performed. The use of a standardized history and physical examination form increases accuracy for diagnosing appendicitis in the ED.[13,14]

Serial evaluations. In patients with an unclear etiology for their abdominal pain, serial evaluation can improve diagnostic accuracy. Observation and repeated examinations of patients with suspected appendicitis improves diagnostic accuracy.[15,16] Scheduled outpatient follow-up of reliable patients for serial evaluations remains unstudied, but appears to be a reasonable strategy.

Temperature measurement. Although an elevated temperature is often associated with intra-abdominal infections, the sensitivity and specificity of this test vary greatly. There is insufficient evidence to correlate temperature with the cause of abdominal pain; therefore, the significance of a fever in a patient with abdominal pain is not always clear. Fever cannot distinguish surgical from nonsurgical disease in the elderly.[17] The majority of elderly patients with acute cholecystitis and appendicitis are afebrile despite higher rates of perforation and sepsis.[18-21]

Note: Tympanic temperature measurements[22,23] and oral temperature measurements[24] may not be reliable in evaluating for the presence of a fever.

Abdominal auscultation. Auscultation of bowel sounds may be used to assist in the evaluation of abdominal pain. However, the correlation of bowel sounds and specific

diagnoses has not been extensively studied. In one report, approximately half of the patients with peritonitis had normal or increased bowel sounds.[25] Patients with acute small-bowel obstruction are likely to have abnormal or absent bowel sounds.[26] Elderly patients with abdominal pain and abnormal bowel sounds frequently have serious disease.[27]

Peritoneal signs for peritonitis. Emergency physicians traditionally have been trained that as the peritoneum becomes inflamed, certain peritoneal signs become apparent. These signs include rebound tenderness, pain with cough, pain with abrupt movement, and pain with heel tap. However, many studies have shown that peritoneal signs are not particularly sensitive or specific for peritonitis, a specific disease, or the need for surgery. The rebound tenderness test had a sensitivity of 81% and a specificity of 50% for peritonitis.[28] Rebound tenderness had a sensitivity of 63% to 76% and specificity of 56% to 69% for appendicitis.[29,30] Pain with cough had a sensitivity of 77% and specificity of 80% for peritonitis in one small study.[31]

Digital rectal examination (DRE). Many abdominal processes have no specific findings referable to the rectum. Pain elicited by DRE is common but is not pathognomonic for any abdominal condition. Localized rectal tenderness is found in fewer than half of patients with appendicitis.[25,32] Sensitivity of DRE for diagnosing appendicitis is low.[29,33] One study of patients presenting with right lower quadrant pain found that a rectal examination did not add any useful diagnostic information.[34] Obtaining a sample for stool guaiac testing to evaluate for gastrointestinal bleeding represents the primary reason to complete a DRE in most patients with abdominal pain in the ED.

Pelvic examination. There is insufficient evidence published to determine which patients require a pelvic examination in the ED during evaluation of their abdominal pain.

Patient Management Recommendations: Evaluating Abdominal Pain

Evidence-based standards. None specified.

Guidelines.

1. Do not restrict the differential diagnosis solely by the location of the pain.
2. Do not use the presence or absence of a fever to distinguish surgical from medical etiologies of abdominal pain.

Options.

1. Use serial evaluations over several hours to improve the diagnostic accuracy in patients with unclear causes of abdominal pain.
2. Collect a complete data set before reaching a differential diagnosis; consider a systemic data collection tool, such as a formatted chart.
3. Perform a stool for occult blood test in patients with abdominal pain.
4. Perform a pelvic examination in female patients with abdominal pain.

HIGH-RISK PATIENTS

Elderly patients and patients with HIV are likely to have atypical presentations of abdominal pathologic conditions, as well as increased morbidity and mortality.

Geriatric patients. Older patients are more likely than younger patients to have serious causes of abdominal pain.[9,35] Both mortality and misdiagnosis rise exponentially with each decade beyond age 50.[9,36] In one series, approximately 14% of the patients older than 50 years with appendicitis had generalized pain and tenderness compared with only 2% of younger patients.[10] Rebound tenderness is less likely in geriatric patients with appendicitis.[21] In addition, elderly patients with abdominal pain more likely have catastrophic illnesses rarely seen in younger patients, including mesenteric ischemia, leaking or ruptured abdominal aortic aneurysm (AAA), and myocardial infarction.[37]

Patients with HIV. In addition to the common causes of abdominal pain, the patient with HIV may also have (1) enterocolitis with profuse diarrhea and dehydration, (2) perforation of the large bowel often caused by cytomegalovirus (CMV), (3) obstruction caused by Kaposi's sarcoma, lymphoma, or atypical mycobacteria, and (4) biliary tract disease caused by CMV or *Cryptosporidium*.[38,39] Some retroviral drugs have been associated with life-threatening pancreatitis.

Patient Management Recommendations: High-Risk Patients

Evidence-based standards. None specified.

Guidelines. None specified.

Options. Identify patients at high risk for atypical presentations to avoid misdiagnosis.

COMMONLY MISSED DIAGNOSES

Misdiagnoses of abdominal pain frequently leads to malpractice litigation.[40] For patients with serious abdominal pathology frequent misdiagnoses include gastroenteritis, gastritis, urinary tract infection, pelvic inflammatory infection, and constipation. Life-threatening conditions

that are sometimes missed in the ED in patients with abdominal pain include ruptured AAA, appendicitis, ectopic pregnancy, diverticulitis, perforated viscus, mesenteric ischemia, and bowel obstruction.

Ruptured abdominal aortic aneurysm. AAA ranks as the 13th leading cause of death in the United States and is responsible for 0.8% of all deaths.[41] Most patients with rupture have no previous diagnosis of AAA.[42,43] The traditional description of acute pain in the back, flank, or abdomen, hypotension, and a palpable abdominal mass is unusual, with perhaps fewer than 25% presenting with this triad.[44] Missed diagnosis can occur in 30% to 60% of cases, primarily because the physical examination is frequently unreliable.[44-46] In almost 25% of patients with a known AAA, a palpable abdominal mass could not be detected, and neither the presence of bruits nor absence of pulses predicts AAA.[47,48] Many patients with ruptured AAA are misdiagnosed with nephrolithiasis, because these patients may have hematuria, have no palpable pulsatile mass, and have flank pain.[44,49] Other common misdiagnoses of ruptured AAA include diverticulitis, gastrointestinal hemorrhage, acute myocardial infarction, and musculoskeletal back pain.[44]

Appendicitis. Appendicitis is frequently misdiagnosed as gastroenteritis during the initial ED visit. Although this is probably the most well-studied specific disease entity that causes abdominal pain, appendicitis continues to be a difficult ED diagnosis because of its varied presentations.[29,30] Up to one third of women of childbearing age with appendicitis are misdiagnosed. Common misdiagnoses include pelvic inflammatory disease or urinary tract infection.[50]

Ectopic pregnancy. Ectopic pregnancy may be missed if the physician fails to diagnose pregnancy. History and physical examination are unreliable to determine pregnancy.[51,52] The rapid and readily available assays that detect the presence of β-human chorionic gonadotropin (hCG) are very sensitive. If the β-hCG assay result is negative, then ectopic pregnancy is extremely unlikely.

Myocardial infarction. Myocardial infarction may present with upper abdominal pain and may be overlooked if the physician does not consider this diagnosis in the differential.[53] Elderly patients and those with cardiac risk factors and with unexplained upper abdominal pain should be considered for an ECG.

Patient Management Recommendations: Commonly Missed Diagnoses

Evidence-based standards. None specified.

Guidelines. None specified.

Options.

1. Obtain an ECG in elderly patients and those with cardiac risk factors with upper abdominal pain of unclear etiology.
2. Obtain a pregnancy test in all women of childbearing potential who present with abdominal pain.
3. Use of abdominal ultrasound or computed tomography may be of help in evaluating for AAA in patients in stable condition older than 50 years with unexplained abdominal pain.
4. Consider the diagnosis of appendicitis in women with diagnoses of pelvic inflammatory disease or urinary tract infections.

NARCOTIC ANALGESIA IN ABDOMINAL PAIN

Administration of narcotics to patients with abdominal pain to facilitate the diagnostic evaluation is safe, humane, and in some cases, improves diagnostic accuracy.[54] Incremental doses of an intravenous narcotic agent can eliminate pain but not palpation tenderness. Analgesics decrease patient anxiety and cause relaxation of their abdominal muscles, thus potentially improving the information obtained from the physical examination. There is evidence that pain treatment does not obscure abdominal findings, or cause increased morbidity or mortality.[55-57]

Patient Management Recommendations: Narcotic Analgesia in Abdominal Pain

Evidence-based standards. None specified.

Guidelines. None specified.

Options. Provide narcotic analgesia to patients being evaluated for abdominal pain in the ED.

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APPENDIX.

The following table is a compilation of imaging modalities and laboratory tests often used in the evaluation of ED patients with suspected major abdominal conditions. The literature cited in the appendix provide maximum sensitivity and specificity. Individual institutions may achieve lower sensitivities and specificities using these modalities. Institutional variation of imaging and laboratory capabilities and surgical consultation patterns will determine the actual usefulness of these tests in any given circumstance. The tests are listed in approximate order of utility for each condition.

Presumptive Diagnosis	Testing	Comments
Appendicitis	CT*	CT scanning has emerged as the imaging modality of choice in most patients with suspected appendicitis in whom an imaging study is indicated. Sensitivity approaching 100% and specificity of 95% to 98% are reported from one university group.[58,59] Similar results have been reported in a community hospital setting.[60] Liberal use of CT scanning has decreased negative appendectomy rates[61,62] and may decrease the cost of hospital resources in patients with suspected appendicitis.[63,64]
	Unenhanced CT	Sensitivity/specificity of 90% and 97%, respectively, have been obtained with helical CT technique without contrast.[65,66]
	Ultrasound	Best reported sensitivity of 93% and specificity of 91%.[67,68] This modality is generally preferred in children and pregnant patients but is also the test most subject to operator variation.
	Tc-99m WBC scan	Radiolabeled WBC scans are very effective in some hands with a sensitivity of 98% and specificity of 95%.[69]
	Tc-99m immune globulin scan	Sensitivity of 91% reported.[70] Inherent delays with this type of imaging, technical preparation, and large number of nonspecific findings make radiolabeled studies less useful in most institutions.
	Abdominal plain films	Abdominal plain films are not beneficial.[71]
	WBC count CRP	An elevated WBC count or CRP level is not sensitive for appendicitis; both tests demonstrate rather poor specificity.[72-75]
Abdominal aortic aneurysm	CT Ultrasound	CT and ultrasound approach 100% sensitivity in detecting the presence of an aneurysm.[76-78] In stable patients, a leaking aneurysm is best visualized by CT, and obtaining this study did not adversely affect outcome.[79] Unstable patients with AAA have an increased mortality and morbidity if surgical evaluation is delayed for formal imaging studies.[76] A bedside ultrasound scan during resuscitation in unstable patients may help to confirm or refute the diagnosis.[80]
	MRI	Very accurate in delineating AAA anatomy but logistical concerns preclude its use in the emergency patient.[78,81]
	Angiography	Less sensitive than CT or ultrasound scan in detecting AAA and neither practical nor appropriate in the emergent patient. [82,83]
Biliary tract disease	Ultrasound	Ultrasound scanning remains the preferred test for delineating biliary tract anatomy. Sensitivity for detecting cholelithiasis is approximately 91% and specificity 98%.[84] Ultrasound scanning has practical advantages in imaging in that it is quick, inexpensive, and generally easier to obtain and should be considered the test of first choice.
	Radionuclide scanning	Radionuclide scan depicts function best—sensitivity 97% and specificity 90% for acute cholecystitis.[84]
	CT/MRI	CT and MRI are superior to ultrasound scans for detecting common duct pathology and choledocholithiasis.[85-87]
	LFT	Elevated LFTs are only approximately 50% specific for cholecystitis and relatively insensitive.[88]
	WBC count	Up to 40% of patients with acute cholecystitis will not have an elevated WBC count.[89,90]
Bowel obstruction	Abdominal plain films	Plain film sensitivity for diagnosing SBO is as high as 70% with a specificity of approximately 80%.[91,92] Test of first choice.
	CT	CT is 94% to 100% sensitive and 83% to 96% specific in diagnosing SBO and can delineate the etiology of obstruction in up to 90% of patients.[93,94] CT is also accurate in differentiating SBO from ileus.[95]
	Ultrasound	The sensitivity and specificity of ultrasound scanning approximates 88% and 96%, respectively, in diagnosing bowel obstruction.[92,96]
Diverticulitis	CT	CT demonstrates diverticulitis with sensitivities and specificities approaching 100%.[97,98]
	Ultrasound	Graded compression ultrasound scanning has a sensitivity of 84% to 98% and a specificity of 93% to 97%.[99,100]
	Barium contrast enema	Sensitivity of 80%, specificity of 100% has been reported.[98,101]
Ectopic pregnancy	Ultrasound—endovaginal	The accuracy of ultrasound scanning is dependent on the operator and the gestational period as evidenced by the quantitative β-hCG value. The primary utility of ultrasound is detecting an IUP thereby essentially excluding an ectopic pregnancy. A gestational sac can be seen at a β-hCG level of 1,000 to 2,000 mIU/mL (1 to 2 IRP).[102,103] With a β-hCG <1,000 mIU/mL, there is only a 17% sensitivity in making the diagnosis of IUP or ectopic pregnancy.[104]
	Ultrasound—transabdominal	Transabdominal ultrasound scanning may occasionally locate an ectopic pregnancy missed by an endovaginal examination.[105]

Cont'd.

APPENDIX. *Cont'd*

Presumptive Diagnosis	Testing	Comments
Mesenteric infarction/ischemia	Angiography	Angiography has 88% sensitivity for mesenteric infarction (92% arterial, 50% venous).[106]
	CT	Sensitivity ~82%, specificity to 93%.[106,107] CT more accurate for venous obstruction than angiography.
	Ultrasound	28% sensitive for infarction,[106] although color Doppler can be helpful in differentiating ischemic bowel wall from inflammatory bowel wall.[108]
	Abdominal plain films	Plain radiographs are typically normal in early disease, but can show pneumatosis intestinalis, portal vein gas, or thumbprinting in more advanced disease.[106]
	Serum phosphate	Sensitivities quite variable: 26% to 85%, specificity as high as 85%.[109,110]
Ovarian torsion	Color flow Doppler ultrasound	Color flow Doppler ultrasound was 100% sensitive in a small series for depicting ovarian torsion.[111]
Pancreatitis	Amylase	Sensitivity approximately 80%, 90% specific.[112,113] Using a cutoff of 3 times the traditional top normal value of amylase increases specificity to 100%, although a corresponding drop in sensitivity to 72%.[114]
	Lipase	Sensitivity 97% to 100%, specificity 83% to 98%.[112,113]
	CT/MRI/ultrasound	All depict pancreatic and peripancreatic fluid collections well.[115,116] CT demonstrates pancreatic necrosis reasonably well and can aid in establishing prognosis.[117]
Urinary stone disease	Unenhanced CT	Unenhanced helical CT depicts urinary stone disease with sensitivity of 97% to 98%, specificity of 96% to 100%.[118-120]
	IVP	Sensitivity of 85% to 90%, specificity of 95% to 100%.[121,122]
	Ultrasound plus KUB	Best reported sensitivity of 93%, with 100% specificity.[123,124]
	KUB alone	Sensitivities approximate 60%, specificity 77%.[124,125]
Testicular torsion	Color flow Doppler ultrasound	Sensitivities and specificities approach 100% in some reported series.[126,127]
	Radionuclide scanning	Reported sensitivities of 85% to 98%, specificity to 100%.[127,128] If acute torsion is suspected, urologic consultation should not be delayed for imaging studies.
Urinary tract infection	Urine WBC	>10 WBC/hpf sensitivity 82% and specificity 80% for positive culture (>50,000 CFU/mL).[129]
	Leukocyte esterase	Sensitivity 72% to 89%; specificity 68% to 92%.[130-132]
	Nitrite	Sensitivity 40% to 75%, specificity 93% to 98%.[129-131]
Salpingitis/PID	WBC	An elevated WBC count is generally not a sensitive indicator of PID (66% sensitive).[133]
	ESR	60% to 81% sensitive, 53% to 57% specific.[133-135]
	CRP	50% to 74% sensitive, 59% to 80% specific.[133-135]
	Ultrasound	85% sensitive, 100% specific in a small series,[136] but 63% sensitivity reported in a study primarily of adolescents.[137]

CT, Computed tomography; **Tc-99m,** technetium 99m; **CRP,** C-reactive protein; **AAA,** abdominal aortic aneurysm; **MRI,** magnetic resonance imaging; **LFT,** liver function test; **SBO,** small-bowel obstruction; β-hCG, β-human chorionic gonadotropin; **IUP,** intrauterine pregnancy; **IRP,** International Reference Preparation; **IVP,** intravenous pyelogram; **KUB,** kidneys, ureter, and bladder; **hpf,** high-power field; **CFU,** colony-forming unit; **PID,** pelvic inflammatory disease; **ESR,** erythrocyte sedimentation rate.

*There are differences in contrast administration protocols among the studies, making direct comparison of reports problematic.