

concurrently with pneumothorax or pneumomediastinum, may obscure the ultrasonographic chest examination.

The novel “Bellows Sign” provides for the first time a bed-side tool for the diagnosis of primary segmental lung atelectasis. The sign incorporates demonstration of aberrant ultrasonographic lung sliding and typical movement patterns of the B lines and ribs that result from collapsed lung tissue that remain immobile while the surrounding lung and chest wall are expanding. However, since this is only the first description of the sign, it cannot yet be recommended to replace other diagnostic modalities. The sensitivity and specificity of this sign for primary segmental atelectasis of the lung still require validation in comparative clinical studies. Nonetheless, the potential advantages of this novel point-of-care diagnostic technique for a fairly common clinical condition in the intensive care setting are uncontestable.

#### Authors' contribution to the manuscript

Conception and design: DJ, AY, AB; Analysis and interpretation: DJ, AY, YY, AB; Drafting the manuscript for important intellectual content: DJ, AY, YY, AB.

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#### Epidemiology of and risk factors for iliopsoas abscess in a large community-based study



The psoas muscle is closely adjacent to organs such as kidneys, sigmoid colon, jejunum, appendix, pancreas, abdominal aorta, and ureter [1]. Iliopsoas abscess (IPA) is an uncommon infective clinical condition, often with nonspecific signs and symptoms. IPA is classified based on its origin, with primary IPA thought to be triggered by an unrecognized staphylococcal bacteremia, and secondary IPA caused by an underlying condition or disease, or spread of infection subsequent to surgery [2]. Symptoms of IPA vary due to the location of the psoas muscle, but the classical clinical presentation includes fever, back pain and difficulty ambulating [2]. Delays in diagnosis may lead to increased morbidity and mortality. Modern imaging techniques such as ultrasonography, computed tomography (CT) and magnetic resonance imaging (MRI) are often used to confirm IPA diagnosis. There is no uniform treatment strategy for IPA, however therapy usually consists of broad-spectrum antibiotics, often combined with percutaneous or surgical drainage [3]. Our study objectives were to assess the epidemiology, risk factors, clinical features, and prognosis of patients presenting to emergency department (ED) with IPA.

This was retrospective cohort analysis to determine the prevalence, imaging features and clinical conditions associated with IPA in patients presenting to the EDs of seven affiliated hospitals in West Michigan. All eligible cases were seen between January 2006 and December 2017 (12 years). IPA was classified as primary or secondary, depending on the presence or absence of underlying disease. The diagnosis was made based on diagnostic imaging (CT or MRI) performed in the hospital. ED records were used to collect data on prevalence and risk factors for IPA, demographics, associated signs and symptoms, imaging results, and treatment provided (particularly surgical procedures). Hospital records were used to determine treatment provided (particularly surgical procedures), hospital course, complications and morbidity. Descriptive statistics (mean, SD) and frequency tables were used to describe the key quantitative and qualitative variables.

During the study period, 128 patients met inclusion criteria. The mean age was  $62.1 \pm 17.9$  years; age range 11 to 93 years. The typical patient was elderly (48%), Caucasian (85%), and male (61%) with multiple co-morbid conditions. Risk factors included diabetes (25%), renal failure (12%), immunosuppression (9%), previous IPA (8%), inflammatory bowel disease (7%), alcoholism (7%), IV drug use (4%), malnutrition (4%) and HIV (2%). Presenting symptoms were often nonspecific, with an average duration of  $17.1 \pm 11.2$  days. Pain was present in 92% of patients with localization to the back, flank, abdomen, pelvis or hip. Other clinical features included malaise (21%), fever (11%), leg swelling (9%), and altered mental status (9%). The classic triad of back pain, fever and limitation of hip movement was seen in only 14% of patients; a mass lesion was documented in only 3%.

Overall, 19 IPA cases (15%) were primary; 85% secondary. Among the 109 secondary IPA cases, the most common etiologies were skeletal (46%), followed by gastrointestinal (28%) and cardiovascular (14%) (Table 1). Primary abscesses were often monomicrobial, with *Staphylococcus* spp. as the predominant pathogen (93%). Secondary IPA were often polymicrobial (27%), with *Staphylococcus* still accounting for 69% of cases, followed by *E. coli* (16%), *Bacteriodes* (12%), *Prevotella* (10%), *Fusobacterium* (8%), *Enterococcus* (7%), *Streptococcus* (7%), *Klebsiella* (5%), and *Salmonella* (2%). CT confirmed the diagnosis in most patients (71%), followed by MRI (26%), white blood cell nuclear scan (2%), and ultrasound (1%). MRI was useful in patients with a poor treatment response or high suspicion for infection of adjacent structures. The diagnosis of IPA was made in the ED in only 32 patients (25%). Common admitting diagnoses were septic arthritis, pneumonia, sepsis, osteomyelitis, acute febrile illness, diverticulitis, pyelonephritis, altered mental status, and musculoskeletal back pain. Patients were initially treated

**Table 1**  
Cases of secondary IPA according to origin (N = 109).

Skeletal		
	Vertebral osteomyelitis	29 (26.6%)
	Epidural abscess	6 (5.5%)
	Septic arthritis	5 (4.6%)
	Post arthroscopy infection	2 (1.8%)
	Femoral osteomyelitis	2 (1.8%)
	Infected lumbar fusion	2 (1.8%)
	Infectious sacroiliitis	1 (0.9%)
Gastrointestinal		
	Diverticulitis	6 (5.5%)
	Pancreatic abscess	4 (3.7%)
	Crohn disease	5 (4.6%)
	Abdominal abscess	4 (3.7%)
	<i>C. difficile</i> colitis	3 (2.8%)
	Appendicitis	2 (1.8%)
	Colorectal cancer	2 (1.8%)
	Ulcerative colitis	1 (0.9%)
	Rectal abscess	1 (0.9%)
Cardiovascular		
	Infected vascular graft	6 (5.5%)
	Infected catheter	5 (4.6%)
	Endocarditis	3 (2.8%)
	Infected Fistula	1 (0.9%)
Bacteremia/sepsis		
	Urinary	10 (9.2%)
	Urinary tract infection	1 (0.9%)
	Pyelonephritis	3 (2.8%)
Other		
		5 (4.6%)

with broad-spectrum antibiotics, followed by percutaneous drainage (68%) and/or surgical decompression (13%). Patients spent an average of  $13.5 \pm 11.3$  days in the hospital; the mortality rate was 2.3% (3 patients).

Iliopsoas abscess is a relatively uncommon condition that often presents with ambiguous clinical features. Patients may initially present with nonspecific symptoms such as malaise, fatigue, and low-grade fever, or they may exhibit a more severe presentation such as high fever, weight loss, pain in the abdomen, groin, low back, or hip, or difficulty walking [1]. We found, as has been shown previously, the classic triad of pain, fever and limp is rarely seen in IPA patients [3]. CT has been documented as having a diagnostic sensitivity rate for IPA approaching 100% and this method was used to confirm diagnosis in 71% of our patients [3]. Mortality rates of approximately 2.4% for primary, and up to 18.9% in secondary IPA have been documented [4]. Our study had an overall mortality rate of 2.3%. Difficulty of making the correct diagnosis can be attributed to its non-specific presentation as well as its rarity. However, a thorough medical history and subsequent imaging studies can be helpful in establishing the diagnosis and making effective therapy possible.

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## Barriers to bystander CPR: Evaluating socio-economic and cultural factors influencing students attending community CPR training



Out-of-hospital cardiac arrest (OHCA) remains a leading cause of death in the United States, affecting over 350,000 people annually [1]. Research repeatedly demonstrates that prompt bystander initiated cardiopulmonary resuscitation (CPR) improves both the overall survival rate and nearly every objective measures of surviving an OHCA [2–9]. Yet the rate at which bystander initiated CPR is administered varies considerably and is dependent on the location of the arrest [6,10–14]. With the overwhelming evidence in support of bystander CPR, public health organizations have implemented widespread educational initiatives to train laypeople in compression-only CPR over the past decade. Correspondingly, an increase in the proportion of patients receiving bystander CPR in large national registries has been reported [5,15,16]. Despite overall increases in bystander rates, specific populations such as the socio-economically disadvantaged and the under-educated, still lag behind in this critical link in the chain of survival [17,18]. Several barriers to bystander intervention have been identified in recent years including panic, general anxiety, fear of not performing CPR properly, fear of hurting the victim, fear of litigation, and fear of transmittable diseases [2,19,20]. The purpose of this study is to identify how social and educational factors impact reported barriers to bystander CPR.

Prospective surveys were conducted both before and after free community compression-only CPR classes in Howard County, Maryland during a three-month study period. Requested information included demographics, previous CPR training, motivation for learning CPR, followed by four questions that asked the respondent to rank his/her confidence and likelihood in performing CPR, as well as barriers to performing CPR (using a visual analog score). A validated pilot-tested survey was administered to all members in attendance at all CPR training classes excluding classes at mass gatherings and classes targeting children under 14.

**Table 1**  
CPR training participant demographics (continuous).

	Mean (SD)	Range
Age	47.5 (16.1)	14–81
Median zip code annual household income (IQR)	\$100,252 (\$91,276–\$108,169)	\$33,772–\$161,447
Number of children	1.5 (1.4)	0–6
Number of people in household	3.2 (1.6)	1–8