Medline ® Abstracts for References 44-52 of 'Community-acquired pneumonia in children: Clinical features and diagnosis'

TI

Ultrasound detection of pneumonia in febrile children with respiratory distress: a prospective study.

AU

Guerra M, Crichiutti G, Pecile P, Romanello C, Busolini E, Valent F, Rosolen A

SO

To analyse the usefulness of bedside lung ultrasound (LUS) in detecting lung consolidation in a paediatric emergency room (ER) setting, febrile children seen at our ER from 2008 to 2012 with a moderate to severe respiratory distress underwent LUS, chest X-ray (CXR) and laboratory investigations. At first ER assessment, LUS identified a lung consolidation in 207 patients of 222 children enrolled, with a liver-like appearance in 75 (36.2 %) and an associated pleural effusion in 36.7 % of cases. CXR proved positive in 197 cases, showing a parenchymal consolidation (68.5 %) or a focal ground-glass opacity (31.4 %). LUS liver-like consolidation was significantly associated with longer duration of fever (p = 0.002), higher neutrophil counts and C-reactive protein (CRP) values (p = 0.015 and p < 0.0001, respectively), and with the discovery of a homogeneous and dense parenchymal consolidation on CXR (p < 0.0001). CONCLUSIONLUS can be adopted by the clinician as a non-invasive bedside tool to expand the physical evaluation of febrile children with respiratory distress. In our study, LUS results appeared not only as reliable as CXR in detecting lung consolidations but also consistent with clinical and laboratory data. What is known:•The diagnosis of pneumonia is mainly based on physical examination plus radiologic and laboratory evaluation when needed.•Although lung ultrasound (LUS) has shown high sensitivity in detecting several pleuropulmonary diseases in adults, its role in the work-up of pneumonia in children is not yet widely recognized. What is new:•LUS is confirmed to be a reliable imaging technique for the diagnostic work-up of febrile children with respiratory distress, consistent not only with CXR results as previously reported by others but also with clinical and laboratory data.•In the hands of trained clinicians, it may represent a valuable supplemental bedside tool for a rapid evaluation in such circumstances.

AD

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Prospective evaluation of point-of-care ultrasonography for the diagnosis of pneumonia in children and young adults.

AU

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OBJECTIVETo determine the accuracy of point-of-care ultrasonography for the diagnosis of pneumonia in children and young adults by a group of clinicians.

DESIGNProspective observational cohort study.

SETTINGTwo urban emergency departments.

PARTICIPANTSPatients from birth to age 21 years undergoing chest radiography for suspected community-acquired pneumonia.

INTERVENTIONAfter documenting clinical examination findings, clinicians with 1 hour of focused training used ultrasonography to diagnose pneumonia in children and young adults.

MAIN OUTCOMES MEASURESTest performance characteristics for the ability of ultrasonography to diagnose pneumonia were determined using chest radiography as a reference standard. Subgroup analysis was performed in patients having lung consolidation exceeding 1 cm with sonographic air bronchograms detected on ultrasonography; specificity and positive likelihood ratio (LR) were calculated to account for lung consolidation of 1 cm or less with sonographic air bronchograms undetectable by chest radiography.

RESULTSTwo hundred patients were studied (median age, 3 years; interquartile range, 1-8 years); 56.0% were male, and the prevalence of pneumonia by chest radiography was 18.0%. Ultrasonography had an overall sensitivity of 86% (95% CI, 71%-94%), specificity of 89% (95% CI, 83%-93%), positive LR of 7.8 (95% CI, 5.0-12.4), and negative LR of 0.2 (95% CI, 0.1-0.4) for diagnosing pneumonia by visualizing lung consolidation with sonographic air bronchograms. In subgroup analysis of 187 patients having lung consolidation exceeding 1 cm, ultrasonography had a sensitivity of 86% (95% CI, 71%-94%), specificity of 97% (95% CI, 93%-99%), positive LR of 28.2 (95% CI, 11.8-67.6) and negative LR of 0.1 (95% CI, 0.1-0.3) for diagnosing pneumonia.

CONCLUSIONClinicians are able to diagnose pneumonia in children and young adults using point-of-care ultrasonography, with high specificity.

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TI

Lung ultrasound characteristics of community-acquired pneumonia in hospitalized children.

AU

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BACKGROUNDThe diagnosis of community-acquired pneumonia (CAP) is based mainly on the patient's medical history and physical examination. However, in severe cases a further evaluation including chest X-ray (CXR) may be necessary.

At present, lung ultrasound (LUS) is not included in the diagnostic work-up of pneumonia.

AIMTo describe the ultrasonographic appearance of CAP at presentation and during the follow-up.

METHODSA total of 102 patients with clinical signs and symptoms suggesting pneumonia, who underwent a clinically driven CXR, were evaluated by LUS on the same day. LUS signs of pneumonia included subpleural lung consolidation, B-lines, pleural line abnormalities, and pleural effusion. The diagnostic gold standard was the ex-post diagnosis of pneumonia made by two independent experienced pediatricians on the basis of clinical presentation, CXR and clinical course following British Thoracic Guidelines recommendations.

RESULTSA final diagnosis of pneumonia was confirmed in 89/102 patients. LUS was positive for the diagnosis of pneumonia in 88/89 patients, whereas CXR was positive in 81/89. Only one patient with normal LUS examination had an abnormal CXR, whereas 8 patients with normal CXR had an abnormal LUS. LUS was able to detect pleural effusion resulting from complicated pneumonia in 16 cases, whereas CXR detected pleural effusion in 3 cases.

CONCLUSIONSLUS is a simple and reliable imaging tool, not inferior to CXR in identifying pleuro-pulmonary alterations in children with suspected pneumonia. During the course of the disease, LUS allows a radiation-free follow-up of these abnormalities.

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Lung ultrasound for the diagnosis of pneumonia in children: a meta-analysis.

AU

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BACKGROUND AND OBJECTIVEPneumonia is the leading cause of death of children. Diagnostic tools include chest radiography, but guidelines do not currently recommend the use of lung ultrasound (LUS) as a diagnostic method. We conducted a meta-analysis to summarize evidence on the diagnostic accuracy of LUS for childhood pneumonia.

METHODSWe performed a systematic search in PubMed, Embase, the Cochrane Library, Scopus, Global Health, World Health Organization-Libraries, and Latin American and Caribbean Health Sciences Literature of studies comparing LUS diagnostic accuracy against a reference standard. We used a combination of controlled key words for age<18 years, pneumonia, and ultrasound. We identified 1475 studies and selected 15 (1%) for further review. Eight studies (765 children) were retrieved for analysis, of which 6 (75%) were conducted in the general pediatric population and 2 (25%) in neonates. Eligible studies provided information to calculate sensitivity, specificity, and positive and negative likelihood ratios. Heterogeneity was assessed by using Q and I(2) statistics.

RESULTSFive studies (63%) reported using highly skilled sonographers. Overall methodologic quality was high, but heterogeneity was observed across studies. LUS had a sensitivity of 96% (95% confidence interval [CI]: 94%-97%) and specificity of 93% (95% CI: 90%-96%), and positive and negative likelihood ratios were 15.3 (95% CI: 6.6-35.3) and 0.06 (95% CI: 0.03-0.11), respectively. The area under the receiver operating characteristic curve was 0.98. Limitations included the following: most studies included in our analysis had a low number of patients, and the number of eligible studies was also small.
CONCLUSIONSCurrent evidence supports LUS as an imaging alternative for the diagnosis of childhood pneumonia. Recommendations to train pediatricians on LUS for diagnosis of pneumonia may have important implications in different clinical settings.

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Lung Ultrasonography: A Viable Alternative to Chest Radiography in Children with Suspected Pneumonia?

AU

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SO

OBJECTIVETo determine the interrater reliability (IRR) of lung ultrasonography (LUS) and chest radiography (CXR) and evaluate the accuracy of LUS compared with CXR for detecting pediatric pneumonia compared with chest computed tomography (CT) scan.
STUDY DESIGNThis was a prospective cohort study of children aged 3 months to 18 years with a CXR and LUS performed between May 1, 2012, and January 31, 2014 with or without a clinical diagnosis of pneumonia. Four pediatric radiologists blinded to clinical information reported findings for the CXR and LUS images. IRR was estimated for 50 LUS and CXR images. The main outcome was the finding from CT ordered clinically or the probability of the CT finding for patients clinically requiring CT. Two radiologists reviewed CT scans to determine an overall finding. Latent class analysis was used to evaluate the sensitivity and specificity for findings (eg, consolidation) for LUS and CXR compared with CT.
RESULTSOf the 132 patients in the cohort, 36 (27%) had CT performed for a clinical reason. Pneumonia was clinically documented in 47 patients (36%). The IRR for lung consolidation was 0.55 (95% CI, 0.40-0.70) for LUS and 0.36 (95% CI, 0.21-0.51) for CXR. The sensitivity for detecting consolidation, interstitial disease, and pleural effusion was statistically similar for LUS and CXR compared with CT; however, specificity was higher for CXR. The negative predictive value was similar for CXR and LUS.
CONCLUSIONSLUS has a sufficiently high IRR for detection of consolidation. Compared with CT, LUS and CXR have similar sensitivity, but CXR is more specific for findings indicating pneumonia.

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TI

Lung ultrasound compared to chest X-ray for diagnosis of pediatric pneumonia: A meta-analysis.

AU

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SO

OBJECTIVEAlthough a clinical diagnosis, the standard initial imaging modality for patients with concern for pediatric community acquired pneumonia (pCAP) is a chest x-ray (CXR), which has a relatively high false negative rate, exposes patients to ionizing radiation, and may not be available in resource limited settings. The primary objective of this meta-analysis is to evaluate the accuracy of lung ultrasound (LUS) compared to CXR for the diagnosis of pCAP.
METHODSData were collected via a systematic review of PubMed, EMBASE, and Web of Science with dates up to August 2017. Keywords and search terms were generated for pneumonia, lung ultrasound, and pediatric population. Two independent investigators screened abstracts for inclusion. PRISMA was used for selecting appropriate studies. QUADAS was applied to these studies to assess quality for inclusion into the meta-analysis. We collected data from included studies and calculated sensitivity, specificity, positive predictive value, and negative predictive values of CXR and LUS for the diagnosis of pCAP.
RESULTSTwelve studies including 1510 patients were selected for data extraction. LUS had a sensitivity of 95.5% (93.6-97.1) and specificity of 95.3% (91.1-98.3). CXR had a sensitivity of 86.8% (83.3-90.0) and specificity of 98.2% (95.7-99.6). Variations between the studies included ultrasound findings diagnostic of pneumonia, study setting (inpatient vs emergency department) and inclusion of CXR in the reference standard for pneumonia.
CONCLUSIONSIn our meta-analysis, lung ultrasound had significantly better sensitivity with similar specificity when compared to chest x-ray for the diagnosis of pediatric community acquired pneumonia.

AD

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Prospective observational study of point-of-care ultrasound for diagnosing pneumonia.

AU

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SO

OBJECTIVESThe clinical diagnosis of pneumonia lacks specificity and may lead to antibiotic overuse, whereas radiological diagnoses can lack sensitivity. Point-of-care lung ultrasound is an emerging diagnostic tool. There are limited prospective data, however, on the accuracy of sonologists in the paediatric emergency department setting. We aimed to test the diagnostic accuracy of lung ultrasound for pneumonia using chest radiograph (CR) as the reference standard. METHODSThis prospective observational cohort study in a paediatric emergency department enrolled children aged 1 month to<18 years, who had a CR ordered for possible pneumonia. Lung ultrasounds were performed by two blinded sonologists with focused training. Sonographic pneumonia was defined as lung consolidation with air bronchograms. Radiograph and ultrasound results both required agreement between two readers, with final results determined by an arbiter in cases of disagreement. Patient management was decided by treating clinicians who were blinded to lung ultrasound results. Follow-up was performed by phone and medical record review to obtain final diagnosis and antibiotic use. RESULTSOf 97 included patients, CR was positive for pneumonia in 44/97 (45%) and lung ultrasound was positive in 57/97 (59%). Ultrasound sensitivity was 91% (95% CI 78% to 98%) and specificity was 68% (95% CI 54% to 80%). Ultrasound results displayed greater consistency with CR and patient outcomes when sonographic consolidation exceeded 1 cm. Thirteen of 57 patients with sonographic consolidation improved without antibiotics.
CONCLUSIONLung ultrasound may have a role as first-line imaging in patients with possible pneumonia, with higher specificity for consolidations exceeding 1 cm.
TRIAL REGISTRATION NUMBERACTRN12616000361404, http://www.ANZCTR.org.au/ACTRN12616000361404.aspx.

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Lung ultrasound features of children with complicated and noncomplicated community acquired pneumonia: A prospective study.

AU

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SO

OBJECTIVEThe purpose of this study was to describe lung ultrasound (LUS) findings at baseline and 48 hours after the beginning of treatment and evaluate how they correlate with outcome DESIGN: We prospectively analyzed patients from 1 month to 17 years of age with community acquired pneumonia (CAP) evaluated at a tertiary level pediatric hospital. At baseline and 48 hours after the beginning of treatment, history, clinical examination, laboratory testing, chest X-ray, and LUS were performed.
RESULTSOne hundred one children were enrolled in the study (13 with complicated CAP). At baseline those who developed complications presented a

larger size of the subpleural pulmonary parenchymal lesions (P = .001) often associated with a complex pleural effusion (63.6%, P = .013). Those with an uncomplicated CAP presented an air, arboriform, superficial and dynamic bronchogram, as opposed to complicated CAP which had an air and liquid bronchogram, deep, fixed (P = .001). At the 48-hour control in the noncomplicated CAP group, bronchogram was more frequently superficial and dynamic (P = .050). Pleural effusion disappeared in half cases (P = .050). In all patients, neutrophilic leucocytosis with increased C-reactive protein was detected and decreased at control (P = .001). The linear regression analyses showed the switch from a deep to a superficial bronchogram as the only explanatory variable (r = 0.97, R2 = 0.94, P = .001, t = 10.73).

CONCLUSIONSOur study describe early LUS features of CAP that might be able to predict the development of complicated CAP.

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Can lung ultrasound differentiate between bacterial and viral pneumonia in children?

AU

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SO

PURPOSEThis study evaluates whether LUS can differentiate between bacterial and viral pneumonia in children and thus affect their management.

METHODSThe prospective, cross-sectional, analytical study included 200 children under 12 years of age (excluding neonates) with clinical suspicion of pneumonia who had undergone a chest radiograph (CR). The CR and LUS findings were classified as bacterial or viral pneumonia. The final diagnosis was made on the basis of a combination of clinical profile, available routine laboratory investigations and CR diagnosis which was taken as the gold standard for the study and LUS was compared with the gold standard.

RESULTSLUS has a high sensitivity (91%; 95% CI [84-96]) and specificity (91.3%; 95% CI [84-96]) in diagnosing bacterial pneumonia with a high positive predictive value (91.9%; 95% CI [85-96]) and negative predictive value (90.3%; 95% CI [82-95]). For diagnosing viral pneumonia, the sensitivity of LUS was 78.4%; (95% CI [68-86]), specificity was high (90.4%; 95% CI [83-95]) and so was the positive predictive value (87.3%; 95% CI [78-94]) and negative predictive value (91.3%; 95% CI [84-96]).

CONCLUSIONLUS has a high accuracy in differentiating between bacterial and viral pneumonia in children and can help in their management by avoiding an ill-advised use of antibiotic therapy.

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