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# Diagnosis, treatment, and prevention of community-acquired pneumonia in children: an evidence-based clinical practice guideline adapted for the use in Egypt using 'Adapted ADAPTE'

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## Abstract

**Background** We recently adapted a guideline for Community-Acquired Pneumonia (CAP) in children to the Egyptian health system. Adaptation of evidence-based clinical practice guidelines to the local healthcare context is a valid alternative to de novo development that can upgrade their application without enforcing a major burden on resources. The objective of this manuscript is to elucidate diagnosis, treatment, and prevention of CAP as well as methods used for the adaptation process to produce the 1st National Guideline for Community-Acquired Pneumonia in children in Egypt using Adapted ADAPTE method. The full process was described extensively with all three phases of set up, adaptation, and finalization. An adaptation group and an external review including clinical content experts and methodologists conducted the process.

**Results** The authors adapted 10 principal categories of recommendations from three source Clinical Practice Guidelines. Recommendations incorporate; common clinical manifestations, indications for hospitalization and intensive care unit admission, indications for laboratory investigations and radiology in diagnosis, choice of empiric antibiotic therapy in the outpatient and hospitalized children with non-complicated CAP and the duration of therapy, the role of influenza antiviral therapy, follow-up anticipated response to therapy, management of non-responding pneumonia, criteria of safe discharge, and prevention of CAP. Many tools were gathered and established to improve implement ability containing two clinical algorithms for management of non-complicated CAP and for non-responding pneumonia in children, pathway for assessment of severity of CAP in primary care facilities, medication tables, simplified Arabic patient information, PowerPoint slide presentation lecture for management of CAP, and online resources.

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**Conclusion** The final clinical guideline supports pediatricians and related healthcare workers with evidence-based applicable guidance for managing community-acquired pneumonia in Egypt. This work demonstrated the efficiency of Adapted ADAPTE and highlighted the importance of a cooperative clinical and methodological professional group for adaptation of national guidelines.

**Keywords** Practice guideline, Adaptation, Community-acquired pneumonia, Pediatrics, Pediatrics, Pediatric pulmonology, Egypt, Eastern Mediterranean Region

## Background

In Egypt, academic organizations, professional societies, and research groups develop clinical practice guidelines (CPGs) to improve patient quality care and safety (Abdel Baky et al. 2023a). Since the strategy plan for national pediatric evidence-based CPGs including identifying the national healthcare priorities, community-acquired pneumonia (CAP) was acknowledged as one of the major health concerns in Egypt.

Community-acquired pneumonia (CAP) is defined as an infection of the lung tissues acquired during childhood and produced by a causative organism obtained from outside the hospital "in the community" (Leung et al. 2018). According to the World Health Organization (WHO), pneumonia was the cause for 14% of all deaths among children under 5 years old, killing more than 700 thousands children in 2019. With most of this mortality occurring in developing nations (WHO 2022). In Egypt, CAP is still one of the leading causes of death as it is responsible for about 10% of childhood mortality under the age of five (Seify et al. 2016).

Although the particular etiologic factor in many cases of CAP in children has not been determined, respiratory viruses such as respiratory syncytial virus (RSV) and parainfluenza are detected in more than half of the cases (Angeles Marcos et al. 2006). Recently in 2019, novel coronavirus COVID-19 was discovered causing pandemic worldwide (Ye et al. 2020).

Pyogenic bacteria are identified in just a small percentage of CAP in children, but their early detection is crucial because they can cause severe and/or complicated pneumonia, as well as fatalities (Qin and Shen 2015). *Streptococcus pneumoniae* is considered the most communal bacterial cause of CAP. *Mycoplasma*, *Chlamydia* and *Strep. pneumoniae* are the principal aetiologies of CAP in school-aged children. *Haemophilus influenzae* and group A *Streptococci* are the least predominant causes (Hussein et al. 2019).

Clinical signs of fever, cough, respiratory distress including tachypnea, nasal flaring, intercostal, subcostal, and suprasternal retractions, and grunting, with or without X-ray signs of an acute lung infiltrate or consolidation are commonly used to make the diagnosis (Messinger et al. 2017).

Given that bacterial and viral pneumonia cannot be consistently differentiated clinically, the guidelines of British Thoracic Society indicate that children with positive clinical signs of pneumonia had better be managed with antibiotics (Leung et al. 2018).

The WHO acute respiratory infection case management plan planned to reduce child mortality by treating pneumonia cases with antibiotics while minimizing inappropriate antibiotic administration in children with upper respiratory tract infections (Nguyen et al. 2017).

The introduction of the protein conjugate vaccines against *H. influenzae* and *S. pneumoniae* have resulted in declines in the prevalence of bacterial pneumonia (Kaplan et al. 2015; Morris et al. 2008).

These vaccines are part of routine immunization schedules in many countries. *H. influenzae* vaccine was applied as compulsory vaccine for infants according to the policy of Ministry of Health of Egypt vaccination schedule since 2018 (Said and El-Hawy 2022a).

The definition of Clinical Practice Guidelines (CPGs) is "statements that include recommendations intended to optimize patient care, informed by a systematic review of evidence and an assessment of the benefit and harm of alternative care options" (Amer et al. 2015). CPGs are tools for optimizing healthcare service safety and quality (Glasziou et al. 2011).

Adaptation of CPGs is a useable and effective alternative to de novo development of CPGs, particularly in healthcare settings with limited resource, to avoid effort doubling and to usage the available resources efficiently, and to reassure trans contextual customization of the CPG ready for different economic and healthcare setting relating the local context and system (Wang et al. 2018).

The World Health Organization's Eastern Mediterranean Regional Office recommends a list of measures to help enhance guideline development and / or adaptation and implementation in the region (Alshehri et al. 2023).

Few epidemiological studies in Egypt studied determinants of pneumonia (Fadl et al. 2020; Deraz et al. 2012; Refay et al. 2022) effective strategies and interventions to reduce the incidence of pneumonia should not be ignored.

There have been no published unified CPGs in Egypt for the management of CAP, hence the given evidence-based CPG is proposed as a National CPG using an evidence-based and formal CPG adaptation process. The goal of this work was to tailor international CPG recommendations for diagnosis, treatment and prevention of CAP in children to the Egyptian healthcare system.

The Egyptian Pediatric CPGs Committee (or EPG) was affiliated with the Supreme Council of Egyptian University Hospitals, with the goal of defining subjects, assigning authors, and assisting in the adaptation of pediatric evidence-based CPGs in accordance with a national strategic plan (<http://epg.edu.eg>). The committee is governed by a formal CPG adaptation methodology: the 'Adapted ADAPTE' (Abdel Baky et al. 2023b).

## Methods

### Guideline adaptation methodology

We used the 'Adapted ADAPTE' (Amer et al. 2015; Amer et al. 2019) adaptation methodology, which comprises three stages and 24 steps with modifications in the steps and tools to fit the local general healthcare setting in Egypt (Wang et al. 2018; Fervers et al. 2011).

### Phase one (set up)

In phase one, CAP was identified by the EPG Pulmonology Group as the health topic for this CPG adaptation project as it is a common pediatric infection. The World Health Organization (WHO) estimates that approximately two million children under the age of 5 years die from pneumonia yearly worldwide; the majority of these deaths occur in developing countries (Jain, et al. 2015; Bryce et al. 2005). An initial exploratory search regarding CAP CPGs was conducted to identify published eligible CPGs. The members of the CAP Guidelines Adaptation Group (CAPGAG) were selected from a variety of Egyptian universities and was comprised clinicians (academic faculty staff, consultant paediatricians and pulmonologists) and pediatrician CPG methodologists who were actively involved. The results of the preliminary search for CAP source CPGs encouraged us to proceed with this national CPG adaptation project. Capacity building sessions were conducted by the CPG methodologists for the new members of the CAPGAG on concepts of evidence-based healthcare including the CPG adaptation process methodology (Amer et al. 2015; Wang et al. 2018; Abdel Baky et al. 2023b; Fervers et al. 2011).

The target patient population for the adapted CPG is children with Community-acquired pneumonia (CAP) in immune-competent children (aged 28 days–12 years). The identified target intended users include physicians, pediatricians, primary healthcare physicians (PHC), practitioners, nurses, and clinical pharmacist.

### Phase two (adaptation)

The CAPGAG included 16 Professors of Pediatrics and Pulmonology, a general pediatrician, two professors of child health, one clinical pharmacist and one Professor of Tropical medicine and infectious disease with prior experience in adapting evidence-based CPGs.

The CAPGAG identified specific health questions using the PIPOH model, relevant inclusion and exclusion criteria, and a full search strategy including a list of keywords. Including questions for prevention, diagnosis, and treatment. The PIPOH model includes the target patient population (P), intervention(s) (I), professionals and clinical specialties (P), outcomes (O), and healthcare settings or context (H). We searched bibliographic (e.g., PubMed and Google Scholar) and CPG databases (e.g., Guidelines International Network Library, DynaMed, WHO Guidelines), in addition to online libraries.

The Appraisal of Guidelines for Research and Evaluation II Instrument (AGREE II) (Brouwers et al. 2019) was used to appraise the eligible Source CPGs. Initially, CAPGAG found 5 guidelines meeting the relevant inclusion and exclusion criteria. AGREE II is considered the gold standard for quality assessment of CPGs. It is a reliable tool that consists of 23 items organized in six domains. The members of CAPGAG evaluated CPGs using the criteria of the AGREE II; and chose three guidelines scored 60% or more, hence identified as high-quality and evidence-based CPGs and are retained to be included in the adaptation of related recommendations in the finalized adapted CPG. The 3 eligible CPGs included Infectious Diseases Society of America guidelines 2011, British thoracic society guidelines 2011, and WHO Guidelines 2012–2014 were considered. The first draft of the adapted CPG marks the last step of this phase.

The CAPGAG members agreed, based on the results of the AGREE II appraisal and in-depth content review of the source CPGs, that the recommendations were clear and based on the most relevant scientific evidence, and that they presented options that would be applicable to the local context and acceptable to children with CAP.

We decided not to conduct further assessment of the certainty of the body of evidence and the strength of recommendation and relied on the high standardized domain score of domains 3 (rigour of development) of the AGREE II appraisal and the evidence-base of the appraised source CPGs.

Additionally, the CAPGAG selected, reviewed, and discussed each recommendation statement against the local and federal healthcare systems in Egypt through a series of focus groups. The final stage of this phase was creating the initial draft of the adapted CPG.

### Phase three (finalization)

The first draft of the adapted CPG full document was finalized in phase three, which included reviewing the included recommendations for acceptability and applicability in the local Egyptian healthcare system. This adapted CPG draft was sent to a national panel of external reviewers comprised professional healthcare providers and subject matter experts. The reviewers' comments were discussed within the CAPGAG and reflected in the finalized adapted CPG. The final CPG complete document contained a set of CPG implementation (CPGI) tools.

Furthermore, our CAPGAG opted to report the components of the adapted CAP CPG using the items of the extension of the Reporting Items for Practice Guidelines in Healthcare (RIGHT) Statement for the reporting of adapted CPGs (RIGHT-Ad@pt Tool) (Song et al. 2022).

### Results

The whole duration of this project was one-year (January–December 2020). Twenty live online meetings were conducted for planning, reviewing, and focus group discussions. 80% of meetings were attended by all professors. When one or more professor is missing, the issue of discussing point was sent for his/their opinions to vote within two days after the meeting.

This work marks the third CPG adaptation project for the EPG Pulmonology Group using the 'Adapted ADAPTE' as a part of the EPG third wave of National CPGs (Abdel Baky et al. 2023b).

#### Phase one (set up)

The CAPGAG was developed by a national group with clinical and methodological experience in January 2020. The required resources and abilities were identified and assigned. The CAPGAG members all signed declarations of conflicts of interest.

The feasibility of the CPG adaptation procedure was established through a preliminary search for published CPGs. The CPG adaptation working plan template from the Adapted ADAPTE was used to draft and discuss the working plan from the outset (Fervers et al. 2011; Brouwers et al. 2019; Song et al. 2022).

#### Phase two (adaptation)

PIPOH model was used in identification of health questions. The 22 developed questions include: 11 questions for diagnosis, 7 questions for treatment, and 2 questions for prevention. These questions are presented, shared, and finalized with the larger group of members of the EPG in live online meetings. The prioritization process to develop these questions is based on the real healthcare setting in Egypt and including an informal voting

process. Several sources of original CPGs for diagnosis, treatment, and prevention of community-acquired pneumonia in children were studied. According to the results of the AGREE II appraisal and in-depth content review, there was a consensus among the members of the CAPGAG to adapt Infectious Diseases Society of America (IDSA) guidelines 2011 (Bradley et al. 2011), British thoracic society (BTS) guideline 2011 (World Health Organization 2014) and WHO Guidelines 2012 and 2014 (World Health Organization 2012) to answer the 22 health questions posted. Other most relevant available evidence was searched for questions not answered within the chosen sources, providing its reference.

The details of the health questions used, eligibility criteria, search results, AGREE II ratings of the three source CAP CPGs, and the summary recommendations were reported in the CPG full document (Additional files 1, 2).

Then, the currency of the included CAP Source CPGs was assessed to ensure the validity and currency of their recommendations, and evidence-base using the related assessment of the CPG currency from the Adapted ADAPTE (Additional files 1, 2) to ensure that the source CPG version that we were using was the latest update.

The CAPGAG revised and discussed the AGREE II assessment standardized domain scores and decided to adopt all the recommendations of the three source CPGs.

Following multiple focus group discussions about CPGI facilitators and barriers, particularly with variable healthcare sectors, available medications, or healthcare provider positions, relevant customization of the recommendations was done.

The CAPGAG decided to adopt the pathway of severity assessment and modify the two medication tables from relevant resources. Additional new CPGI tools were involved by the CAPGAG based on and relevant to the adapted CPG recommendations including (i) two clinical algorithms for management of non-complicated CAP and non-responding pneumonia in children (Figs. 1, 2) (ii) patient information in Arabic, and (iii) Educational material for healthcare professionals.

#### Phase three (finalization)

Four members contributed as the external review panel from the target audience of the CPG based on their proficiency managing children with CAP in addition to their representation of multiple relevant healthcare sectors in Egypt.

The external review comments were collated, revised, considered, and incorporated into the completed adapted CPG full document.

The EPG Pulmonology Group contacted all Source CPG developer to request a permission to adapt their CPGs to the Egyptian healthcare system.

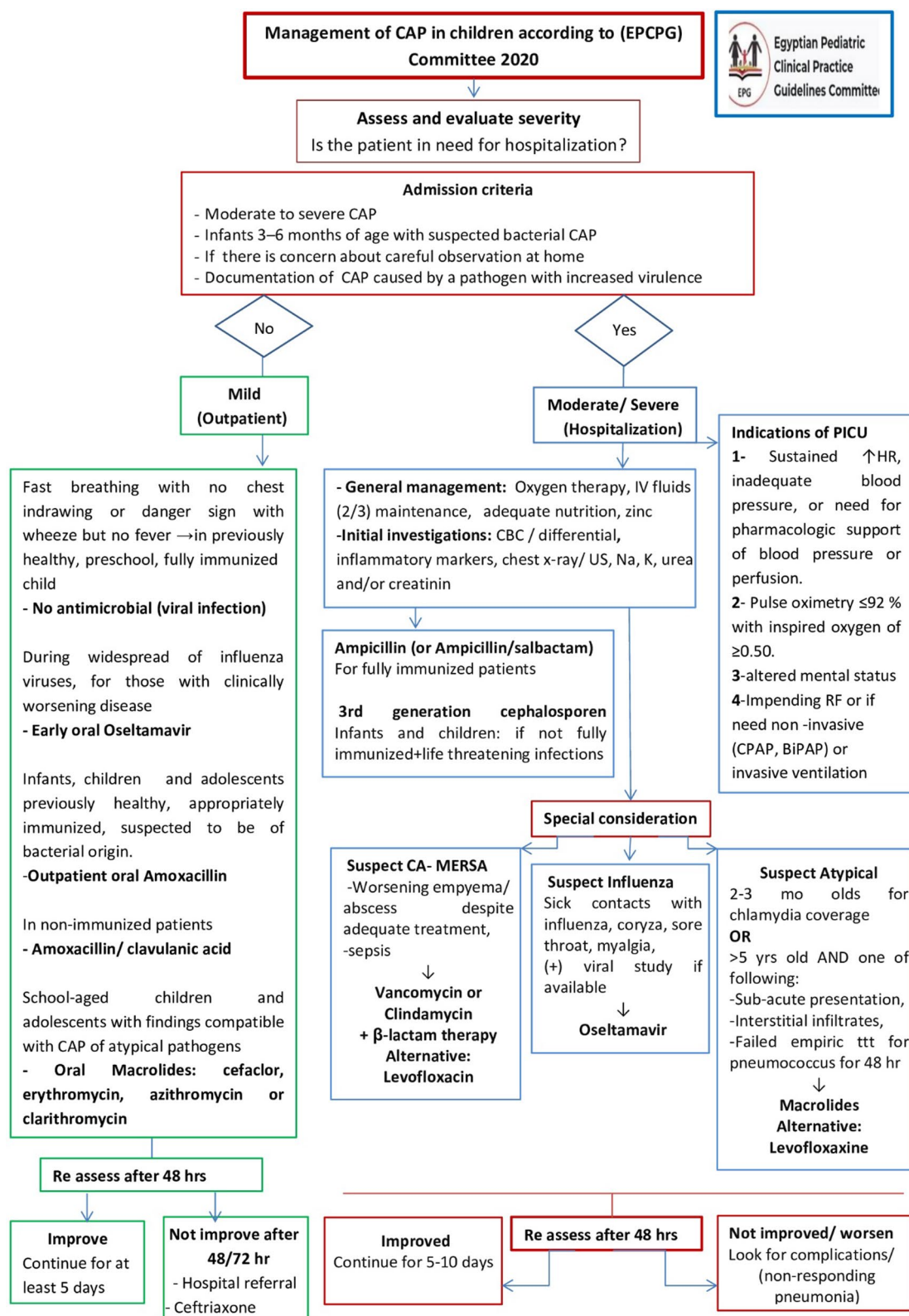
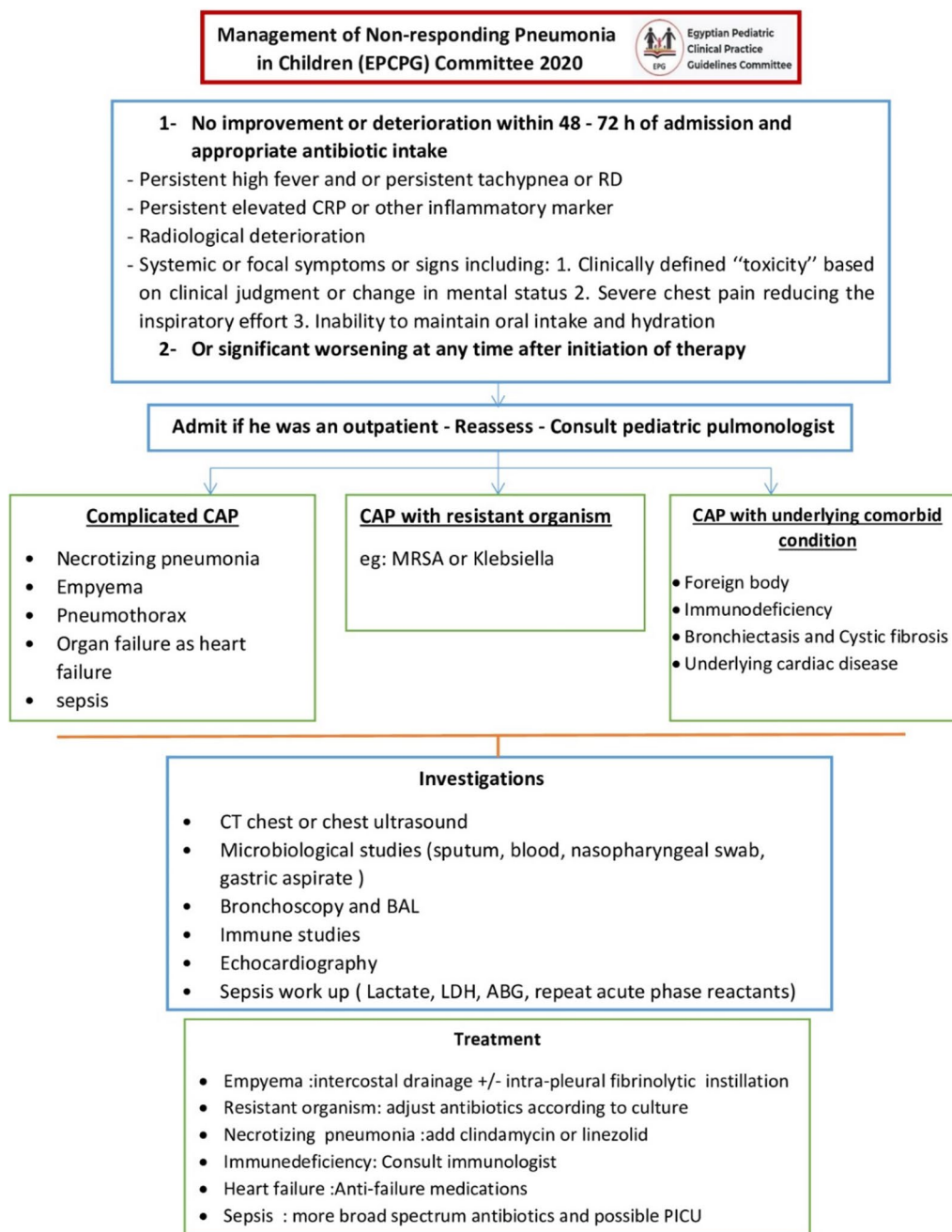


Fig. 1 Management of non-complicated CAP in children



**Fig. 2** Management of non-responding pneumonia

A summary of the key recommendations is provided in full CPG document [Additional files 1, 2].

if a preponderance of published evidence will signal an earlier update of the recommendations.

**Plan for scheduled review and update**

The CAPGAG recommended for the next review of this adapted CPG to be after three years from its publication after checking for updates in the Source CPG or possibly

**Implementation considerations and tools**

A complete set of CPGI tools was a fundamental component of the adapted CPG full document (Figs. 1 and 2, and Additional files 1, 2). Furthermore, several helpful CPGI strategies were suggested containing; (i) leadership

participation and commitment, (ii) dissemination, (iii) clinical and quality champions, (iv) training and education, (v) audit and feedback, (vi) networking with current organizational programs, and (vi) patients as change advocates (Harrison et al. 2010; Dizon et al. 2016).

### Facilitators and barriers to implementation

The EPG has identified several potential facilitators and barriers to the implementation of National Paediatric CPGs. These were reported in a separate article (Abdel Baky et al. 2023b). The CAPGAG recommends widespread implementation of the GAHAR national standards and the WHO international guidelines for antibiotics stewardship programs.

### Discussion

Community-acquired pneumonia (CAP) is considered the most communal cause of death among infectious illnesses, having considerable consequences for healthcare systems in Egypt and worldwide (Seify et al. 2016; Ferreira-Coimbra et al. 2020).

CAP can be caused by many pathogens either singly or in combination, with predominant of viral aetiologies in children (Baroudy et al. 2018). Nevertheless, the most common cause of severe community-acquired pneumonia, according to existing information, is bacterial infection with *Streptococcus pneumoniae* (Nair and Niederman 2021).

In the era of new emerging viruses and while the world is grappling with the significances of a global pandemic related to SARS-CoV-2 causing massive pneumonia, the need for updated guidelines for diagnosis and management of CAP that are suitable and applicable to the Egyptian healthcare system and context, is considered as a healthcare priority.

The significance of this work is the development of an available evidence-based document that provides the need and improve the awareness of Egyptian physicians treating children with CAP and to offer them a standardized practical framework for the diagnosis and management of CAP using this adapted CPG.

We used 'Adapted ADAPTE' (Amer et al. 2015) adaptation methodology, which consists of three phases and 24 steps with modifications in the steps and tools to suit the local general healthcare setting in Egypt (Abdel Baky et al. 2023b). This is a collaborative project by the EPG as a facilitator and a specialized guideline program. Moreover, the inclusion of representative professors from multiple universities all over Egypt. This has enriched the process and bringing in different experiences.

To enhance rapid diagnosis, minimize substantial morbidity, and limit antibiotic abuse, it is critical to recognize

the clinical findings and physical examination signs with pneumonia (Shah et al. 2017).

We highlighted the common clinical manifestations of pneumonia with emphasis on the criteria of hospitalization and the indication of PICU admission. The World Health Organization (WHO) has defined pneumonia and severe pneumonia in children by clinical criteria (WHO 2014). These criteria were established for countries with limited resources, and they are highly sensitive at the cost of specificity (Dean and Florin 2018).

Clinically, it is difficult to distinguish between patients suffering from bacterial pneumonia and those suffering from viral diseases. As a result, making decisions about antibiotic prescriptions for children suspected of having community-acquired pneumonia (CAP) can be difficult. Although viral organisms are often the cause of pneumonia in children, many children who are diagnosed with pneumonia are treated empirically with antibiotics (Popovsky and Florin 2022). We recommended using sensitive and specific tests for the rapid diagnosis of respiratory viruses to evaluate children with CAP. Positive influenza test will help in reduce the need for added diagnostic tests and antibiotics while also guiding proper antiviral drug administration in both outpatient and inpatient settings. The real magnitude of viral pneumonia in children is currently being underrated (Refay et al. 2022). As a result, precise diagnosis of viral infections has been shown to reduce antibiotic misuse and hospitalization time (Shah et al. 2017).

Despite the fact that pediatric pneumonia is a principal source of morbidity and mortality in children globally, a solid gold standard for its diagnosis remains elusive (O'Grady et al. 2014). Diagnostic tools include imaging and microbiological investigation varies according to the capacity of the healthcare setting and depend on the expertise and resources available. These tools help monitor the progress of disease and the occurrence of complications.

We propose that microbiological testing be tried in children with severe pneumonia requiring pediatric intensive care hospitalization or with CAP complications, but not in those with milder illness.

Chest radiographs (CXR) are the most often utilized test; nevertheless, they cannot differentiate between viral and bacterial illnesses and have little value in disease management. A standardized definition of alveolar pneumonia on a CXR exists for epidemiological studies targeting bacterial pneumonias but it should not be generalized to clinical settings. Chest CT scan, ultrasonography, and magnetic resonance imaging play an important role in complicated pneumonias, but there are limitations that preclude their use as routine diagnostic tools (O'Grady et al. 2014). We stress on the fact that lung ultrasound

has significantly high sensitivity and specificity compared to chest x-ray for the diagnosis of pediatric CAP and furthermore we recommended that routine chest radiographs are not necessary for the confirmation of CAP diagnosis in the outpatient setting. Repeated chest radiographs should be obtained only for children who fail to demonstrate clinical improvement and those who are clinically deteriorated within 48–72 h after initiation of therapy, and finally, we highlighted that CT chest is only indicated if the plain chest radiograph is not conclusive to confirm the presence of pleural fluid or other CAP complications.

Treatment choices for children with pneumonia are dictated based on the probable aetiology of the infectious organism and the age and clinical status of the child. Antibiotics are not routinely recommended for children younger than 5 years with non-severe pneumonia and we recommended considering administration of influenza antiviral therapy as early as possible to children with moderate-to-severe CAP consistent with influenza virus infection, during widespread local circulation of influenza viruses.

Childhood vaccination is considered as one of the most cost effective disease preventions interferences. The advantages of vaccines as part of a comprehensive child survival package include the ability to reach a high proportion of all children, especially those who are difficult to reach with curative healthcare, and the potential to rapidly raise up coverage with new vaccines. In Egypt, the compulsory vaccines involve Pertussis (whooping cough) and Measles. Haemophilus influenza type B Vaccine was added to the Egyptian ministry of health and population changed children's obligatory vaccination schedule in 2018 with coverage rates ranged from (94–96%), while pneumococcal vaccine is still outside the obligatory schedule (Said and El-Hawy 2022b). In this adapted CPG recommendations, we considered if infants and children are fully immunized or not in choosing the empirical antibiotic therapy. We also recommended a vaccination program to the infants, care givers, and for the high-risk children.

The availability of national guidelines is necessary to ensure ultimate standardization of patient healthcare. Raising awareness for the healthcare providers will have positive impact on children with CAP, as well as other associated quality improvement and safety initiatives to support the relevant provision of healthcare services.

The goal of this study was to adapt global CPGs and their recommendations to the Egyptian healthcare setting for the inclusive management of patients with CAP across all local healthcare sectors.

The iterative process of the CAP CPG adaptation highlights the type of hard effort and capacity building that

was a vital component of this project, as well as the specific knowledge required for such a process, whether clinical or methodological expertise. The extended timetable observed was not unique to this CPG adaptation effort and was noted in other local CPG adaptation studies as well (Abdel Baky et al. 2023b).

Furthermore, the adaptation of CPG recommendations is a good and valid alternative to de novo developing a CPG for children with CAP, especially given the lack of relevant high quality systematic reviews and randomized controlled trials from the Egyptian context.

A strength of this study is the use of the 'Adapted ADAPTE' method because it is clearly structured and easy to follow with a set of tools to support the process.

According to the CAPGAG's experience, which is consistent with published evidence, determining the expected workload, resources, knowledge, and the need for dedicated leadership and project management is a critical prerequisite of such a national CPG adaptation effort. This requirements assessment is included by default in the adaptation set up phase.

Some points were considered as limitations of this study. We see that the ideal stakeholder mix will include clinical and non-clinical members including others like health policymakers, health economists, and patient representatives, but these were extremely difficult to recruit. Furthermore, our EPG CPG adaptation projects were executed totally based on voluntary contributions from the EPG members and collaborators that do not include any sort of internal or external funding. In addition, we are advisory committee and don't have authorization to implement this CPG in all hospitals. Fortunately, starting from this year, we have become part of the national guideline program hoping for better implementation.

#### **Future research recommendations**

We recommend further research in the Egyptian context to upgrade the evidence base of the good practice points (GPP) included in the guideline recommendations.

#### **Conclusions**

The 'Adapted ADAPTE' approach for CPG adaptation is a rigorous, practical, and intensive tool that has been shown to be particularly practicable for national CPG projects when bundled with the AGREE II instrument as a main component of the adaptation process.

Our experience with this adaptation process provides significant insight into its national application in Egypt, as well as demonstrating its potential appropriateness for the Eastern Mediterranean region. Additional context-specific alterations to the adaptation process and tools are advocated and supported.



## Abbreviations

AGREE	Appraisal of Guidelines for Research and Evaluation
BTS	British thoracic society
CAP	Community-acquired pneumonia
CAPGAG	Community-acquired pneumonia guideline adaptation group
COVID-19	Coronavirus disease 2019
CPG	Clinical practice guideline
CPGI	Clinical practice guideline implementation
CT	Computed tomography
EPG	Egyptian Pediatric Clinical Practice Guideline Committee
GAHAR	The General Authority for Health Care Accreditation and Regulation, Egypt
GPP	Good practice points
IDSA	Infectious Diseases Society of America
PHC	Primary health care physicians
PIPOH	Patient population, intervention(s), professionals, outcome(s), and healthcare context
RSV	Respiratory syncytial virus
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
WHO	The World Health Organization

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s42269-023-01144-4>.

**Additional file 1.** The EPG CAP CPG Book.

**Additional file 2.** The slide set for Educational material for professionals.

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## Author contributions

SMH, MMR, TH, MHM, HGE, HMM, DTS, ASE, BM, and YSA have conceptualized and written the first draft of the manuscript and had the responsibility for the decision to submit it for publishing. YSA, AA, and TIO conceptualized the design. Members of the CAPGAG included clinical experts (ASM, AIH, DHH, DTS, EMF, FGB, HGE, HHS, HMM, MHM, MAS, MMR, MME, NAK, SNB, SMH, TH), and TH was the clinical chair. DTS designed the two algorithms, DHH prepared the PowerPoint presentation. All the clinical members of the CAPGAG selected the topic of the guideline, shared in searching and screening of data, AGREE II appraisal, putting health questions and formulation of adapted recommendation and CPGI tools, and finalization of the adapted full guideline document. AA, TO, and YSA were the CPG methodologists. KA, ZR, TD, ASE, and AA were members of the external review group for the clinical content of the adapted CPG. All authors participated in interpretation of the data and critically reviewed the manuscript and participated in the editing and reviewing of the manuscript. All authors read and approved the final manuscript.

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## Availability of data and materials

Any relevant material in addition to future revisions and updates will be made available from the official website of the Egyptian Pediatric Clinical Practice Guidelines Committee (EPG) (<http://epg.edu.eg>) and by contacting guideline-committee@gmail.com.

## Declarations

### Ethics approval and consent to participate

Not applicable.

### Consent for publications

Non applicable.

### Competing interests

The authors declare that they have no competing interests. Conflict of interest declaration documents can be made available from the EPG upon request.

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