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*Published in:*  
Respiratory Medicine Case Reports

*DOI:*  
[10.1016/j.rmcr.2018.08.024](https://doi.org/10.1016/j.rmcr.2018.08.024)

*Publication date:*  
2018

*Licence:*  
CC BY-NC-ND

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication in Discovery Research Portal](#)

*Citation for published version (APA):*  
Jahan, Y., & Rahman, A. (2018). A case report on management of severe childhood pneumonia in low resource settings. *Respiratory Medicine Case Reports*, 25, 192-195. <https://doi.org/10.1016/j.rmcr.2018.08.024>

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## Case report

## A case report on management of severe childhood pneumonia in low resource settings

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## ARTICLE INFO

## Keywords:

Community clinic  
Day care management  
Severe childhood pneumonia

## ABSTRACT

Pneumonia is a major cause of child mortality among children under five years, worldwide. Pneumonia infection may be caused by bacteria, viruses, or fungi in single or in both lungs. According to recent criteria developed by World Health Organization (WHO) in September (2013), pneumonia can be classified into severe pneumonia, pneumonia and no pneumonia. Most of the deaths occur from severe pneumonia and management of severe childhood pneumonia requires early identification, prompt referral and the availability of intensive quality of care. This case study aimed to represent the actual scenario of severe childhood pneumonia case management at community clinic. Considering that circumstances, International Centre for Diarrheal Disease Research, Bangladesh (icddr,b) developed an innovative day care management approach as safe, effective and less expensive alternative to hospital management of severe childhood pneumonia. A twenty-seven months old boy came to the Health & Family Welfare Centre (HFWC) with severe breathing difficulty, cough, history of fever. The management described below was continued daily until there was clinical improvement; no fever, no fast breathing, no lower chest wall indrawing, no danger signs, no rales on auscultation and no hypoxemia. Considering the WHO case management protocol for severe pneumonia, day care management approach on community clinic recommends that diagnosis of severe pneumonia should be based primarily on visible clinical parameters. On that basis, severe childhood pneumonia can be successfully managed at community clinics including for children with hypoxemia who is required prolong (4–6 hours) oxygen therapy.

## 1. Introduction

Globally, Pneumonia sustains as the leading cause of death among under five years old children [1]. The recent World Health Organization (WHO) global report (2013) deemed that pneumonia accounts for approximately 120 million cases every year [2], among which 14 million (12%) progress to severe pneumonia [3]; and developing countries belong into the most vulnerable vicinity (95%) [1]. Reported deaths in a year of this age group was 0.9 million which represents about 17% of all deaths among children under five [4]. More than 99% of all pneumonia deaths occur in low- and middle-income countries (LMIC). For instance, South Asia and sub-Saharan Africa, specifically, suffer more than two-third of worldwide pneumonia burden; 13% of which covers children from Bangladesh [5].

According to WHO guideline, successful management of severe childhood pneumonia requires hospitalization for supportive treatment, such as suctioning, oxygen therapy, fluid and nutritional management, and close monitoring [6–9]. In Bangladesh, inadequacy of pediatric

hospital beds for severe pneumonia patients is a major challenge. A prospective observational study has resulted that, day care facility based modified primary care management for severe pneumonia is more successful and cost-effective as an alternative in respect to hospitalization [10]. Previous research indicated positive outcomes (both efficacy and safety) of a day care-based management at community clinic. The International Centre for Diarrheal Disease Research, Bangladesh (icddr, b) by following the outcomes, developed an innovative model of day care-based management approach as a safer and less expensive alternative to hospital management of severe childhood pneumonia. The fundamental theme of this model urges initiating patient management in the community clinics for those severe patients who can not be hospitalized. This will be applicable for both in the urban outpatient clinics, such as Comprehensive Reproductive Health Centres (CRHCs) and in the rural clinics such as Health & Family Welfare Centres (HFWCs). As a consequence, day care management at community clinics has become a validated approach to free up hospital beds in LMIC [11].

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Received 7 March 2018; Received in revised form 27 August 2018; Accepted 27 August 2018

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**Table 1**  
Clinical evaluation during day care-based management at community clinic.

Day	Clinical Features				
	Respiratory Rate/min	Temperature (Axillary)	Pulse Rate/min	O2	Lungs findings
Day-0	74	37.4	176	84% without O2 (O2 continues 5 hours) With provision of O2, SpO2 was 95%, 89%, 93% and 94%	Crepitation & Rhonchi present in both lung (B/L) field
Day-1	44	36.8	157	97% without O2	Crepitation present and rhonchi resolved by nebulization (B/L)
Day-2	36	36.2	136	96% without O2	Crepitation present (B/L)
Day-3	38	36.0	132	100% without O2	Crepitation present right lung field
Day-4	36	36.5	134	99% without O2	Crepitation present at right lung field
Day-5	34	36.4	116	100% without O2	No crepitation and Rhonchi

## 2. Case report

A twenty-seven months old boy came from the rural site of Bangladesh and presented with a history breathing difficulty, cough and fever for two days. His physical examination revealed the past case history of grunting, very severe chest wall indrawing and hypoxemia (SpO2 (peripheral capillary oxygen saturation) 82% without O2) and head nodding. He was clinically diagnosed with severe pneumonia. On admission, his temperature was 37.4° C, RR 74 breaths/min, PR 176 beats/min, and SpO2 was 82% without O2. Patient was dyspneic and irritated. On Auscultation, crepitation was present in both lung fields (right upper zone and left lower zone) and rhonchi was present on upper and middle side of left lung field. He was admitted in a HFWC in day care management basis and treated as a severe pneumonia patient immediately. In HFWC, there is an out-patient facility providing space, trained staff members (doctors, nurses), beds, and the necessary equipment's like antibiotics, oxygen therapy, nebulization, nasopharyngeal suction etc. as needed.

Treatment and diet that the patient received (According to the body weight):

1. Diet- Breast feeding + Milk Suji 12ml/kg/feed
2. Oxygen inhalation: 2L/min - Stat and SOS
3. Inj. Ceftriaxone: 1gm I/M once daily for 5 days
4. Syp. Levosalbutamol: 1 ½ TSF P/O 12 hourly for 7 days
5. Syp. Paracetamol: 1 TSF P/O 8 hourly (for fever more than or equal to 38° C)

No investigations were done due to inadequate facilities.

### 2.1. Expected outcome of the treatment plan

Clinical improvement of the patient; no fever, no hypoxemia, no fast breathing and no tachycardia after the 5th day of treatment.

### 2.2. Actual outcome

#### 2.2.1. On day 0 (admission day)

The patient was diagnosed with following physical conditions: age specific fast breathing, severe lower chest wall indrawing, grunting and hypoxemia, temperature (37.4° C, not fever), respiratory rate (74 breaths/min), SpO2 (82%; without O2) and Pulse rate (176 beats/min). SpO2 improved after providing 5 hours of continuous oxygen supply. With provision of O2, SpO2 was 95%, 89%, 93% and 94% respectively at the beginning and after 2 mins, 15 mins and 1 hour of removing O2. Respiratory rate was 50 breaths/min, temp was 37° C.

#### 2.2.2. On day 1

There was age specific fast breathing, tachycardia and chest wall indrawing. Temp was 36.8° C, Respiratory rate was 44 breaths/min, SpO2 was 97% without O<sub>2</sub> though the child was kept without O2 for

overnight and Pulse rate was 157 beats/min.

#### 2.2.3. On day 2

There was mild chest indrawing but no age specific fast breathing, no fever and no hypoxemia. Temp was 36.2° C, respiratory rate was 36 breaths/min, SpO2 was 95% without O2 and Pulse rate was 136 beats/min.

#### 2.2.4. On day 3

Patient started improving clinically but there was age specific fast breathing but no chest indrawing, no fever, no tachycardia and no hypoxemia. Temp was 36.3° C, respiratory rate was 41 breaths/min, SpO2 was 98% without O2 and pulse rate was 132 beats/min.

#### 2.2.5. On day 4

Patient was clinically improved and there was no hypoxemia, no fever, no age specific fast breathing and no tachycardia. Temp was 36.5° C. Respiratory rate was 36 breaths/min, Pulse rate was 134 beats/min, SpO2 was 99% without O2.

#### 2.2.6. On day 5

Patient was clinically stable, and his Temperature was 36.4° C. Respiratory rate was 34 breaths/min, SpO2 was 100% without O2 and Pulse rate was 118 beats/min.

As the child was clinically improved and there was no fever, no hypoxemia, no fast breathing and no tachycardia, he was discharged from the HFWC (See Table 1).

## 3. Discussion

Management of severe childhood pneumonia in low resource settings health facilities is pertinent where referral is difficult or impossible. In most developing countries, more health resources are available in cities and towns than in rural areas. Children with severe pneumonia need to be referred due to difficult breathing, hypoxemia, stridor, convulsion like danger signs. In countries with a high burden of pneumonia, implementation of the WHO revised guidelines will increase the proportion of children receiving care at the outpatient or community levels reduce the need for referrals and improve treatment outcomes [12].

According to the WHO revised treatment guideline, child age 2–59 months with cough and/or difficult breathing with fast breathing and/or chest indrawing, pneumonia should be treated with oral amoxicillin and home advice and child age 2–59 months with cough and/or difficult breathing with general danger signs (not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in a calm child or severe malnutrition), severe pneumonia or very severe disease should be treated with first dose antibiotic and referral to facility for injectable antibiotic/supportive therapy [13]. According to the WHO/United Nations Children's Fund (UNICEF) joint statement, management of pneumonia in community settings recommends the training and

deployment of Community Health Workers (CHWs) as an important strategy to increase access to quality care for pneumonia [13]. Research showed that educated community members could be trained to detect and manage fast breathing pneumonia in their communities. Large-scale studies showed that the sensitivity, specificity, and overall agreement rates in pneumonia diagnosis and treatment were high among CHWs who had intensive basic training and routine supervision [13]. Thus, the need for referrals to higher-level facilities is decreased and the probability of hospitalization and thus the risk of nosocomial and injection-borne diseases is reduced.

Case management in a low resource setting, we will be able to assess the effectiveness of severe childhood pneumonia treatment at community health clinics. This case management proved that, children with severe pneumonia can be treated at community clinic, as effectively as in the hospital. Generally, chain of management of a severe childhood pneumonia is increasing management of patients at first-level facilities [14–17], improving emergency triage assessment and treatment [18,19], and appropriately managing severely ill children in hospitals [20–22]. Along this chain of management of sick children, the referral of a sick child from a rural first-level health facility to a hospital at the district level often is a bottleneck. So, this case report is to explore the possibility of managing children locally. The additional things will be cost effectiveness compare to hospital as parents do not need to pay hospital related fees. Furthermore, they do not need to stay overnight at the hospital, thus they can save their time.

The findings can be easily replicated also in most urban and rural outpatient clinics in developing countries through provided proper training and motivation of staff members and provision of logistic support are guaranteed. Moreover, the case report findings may have a significant impact on the treatment of severe childhood pneumonia, particularly in countries with poor resources and limited hospital beds.

#### 4. Conclusions

Day care management at community clinics might be a feasible method of applying scarce hospital beds in developing countries more proficiently by selecting day care treatment for children with severe pneumonia. The solution could be executed followed by WHO guideline in those hospitals which have been identified as requiring hospitalization. This practical approach would be effective for both developing and other developed and/or underdeveloped countries where similar health resources and infrastructures are available. In such manner, the health care providers would be familiar with clinical manifestations to comprehend the presence of danger signs of pneumonia like hypoxemia. This case study suggests for upgrading the existing day care facilities by promoting training to service providers, procurement of modern equipment and create friendly and secure atmosphere for the clients. Moreover, integrating day care management at community clinics in health promotion strategy will benefit to develop new healthcare policy and particularly the cost-effectiveness will assist to increase client's interest.

#### Ethical approval

Our institutions do not require ethical approval for reporting individual cases or case series.

#### Conflicts of interest

The authors declare that they have no competing interests.

#### Informed consent

Written informed consent was obtained from the legally authorized representative(s) for anonymized patient information to be published in this article.

#### Authors' contribution

YJ wrote the initial text and AR reviewed and complemented it. All authors critically reviewed the manuscript and approved the final version submitted for publication.

#### Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

#### Acknowledgements

I would like to express my appreciation to my co-authors for their full-time cooperation.

#### Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.rmcr.2018.08.024>.

#### References

- [1] I. Rudan, C. Boschi-Pinto, Z. Biloglav, K. Mulholland, H. Campbelle, Epidemiology and etiology of childhood pneumonia, *Bull. World Health Organ.* 86 (2008) 321–416, <https://doi.org/10.2471/BLT.07.048769>.
- [2] The United Nations International Children's Emergency Fund (UNICEF), Pneumonia Acute Respiratory Infection Diagnostic Aid - Target Product Profile Introduction, (2014) [https://www.unicef.org/supply/files/Pneumonia\\_Diagnostics\\_Aid\\_Device\\_TPP\\_Introduction.pdf](https://www.unicef.org/supply/files/Pneumonia_Diagnostics_Aid_Device_TPP_Introduction.pdf), Accessed date: 7 January 2018.
- [3] H.J. Zar, S.J. Aston, S.B. Gordon, Pneumonia in low and middle-income countries: progress and challenges, *Thorax* 68 (2013) 1052–1056, <https://doi.org/10.1136/thoraxjnl-2013-204247>.
- [4] World Health Organization (WHO), Children: Reducing Mortality, (2017) <http://www.who.int/mediacentre/factsheets/fs178/en/>, Accessed date: 7 January 2018.
- [5] N. Tong, Priority Medicines for Europe and the World “A Public Health Approach to Innovation”, (2013) <http://apps.who.int/medicinedocs/documents/s20245en/s20245en.pdf>, Accessed date: 9 January 2018.
- [6] B.D. Gessner, Acute lower respiratory infection in the developing world, *Expert Rev. Respir. Med.* 5 (2011) 459–463 <https://doi.org/10.1586/ers.11.47>.
- [7] S.M. Graham, T. Hazir, P. Enarson, T. Duke, Challenges to improving case management of childhood pneumonia at health facilities in resource-limited settings, *Bull. World Health Organ.* 86 (2008) 349–355, <https://doi.org/10.2471/BLT.07.048512>.
- [8] M.J. Chisti, S.L. Vincente, S.M. Graham, T. Duke, Pneumonia in severely malnourished children in developing countries – mortality risk, aetiology and validity of WHO clinical signs: a systematic review, *Trop. Med. Int. Health* 14 (2009) 1173–1189, <https://doi.org/10.1111/j.1365-3156.2009.02364.x>.
- [9] P. Ayieko, Case management of childhood pneumonia in developing countries, *Pediatr. Infect. Dis. J.* 26 (2007) 432–440, <https://doi.org/10.1097/01.inf.0000260107.79355.7d>.
- [10] H. Ashraf, S.A. Jahan, N.H. Alam, R. Mahmud, S.M. Kamal, M.A. Salam, et al., Day-care management of severe and very severe pneumonia, without associated comorbidities such as severe malnutrition, in an urban health clinic in Dhaka, Bangladesh, *Arch. Dis. Child.* 93 (2008) 490–494, <https://doi.org/10.1136/adc.2007.118877>.
- [11] H. Ashraf, R. Mahmud, N.H. Alam, S.A. Jahan, S.M. Kamal, F. Haque, et al., Randomized controlled trial of day care versus hospital care of severe pneumonia in Bangladesh, *Pediatrics* 126 (2012), <https://doi.org/10.1542/peds.2009-3631.e807-15>.
- [12] Integrated Management of Childhood Illness (IMCI), WHO Recommendations on the Management of Diarrhoea and Pneumonia in HIV-infected Infants and Children, World Health Organization, Geneva, 2010 [http://www.who.int/maternal\\_child\\_adolescent/documents/9789241548083/en](http://www.who.int/maternal_child_adolescent/documents/9789241548083/en).
- [13] Revised WHO Classification and Treatment of Childhood Pneumonia at Health Facilities. Evidence Summaries, World Health Organization, Geneva, 2014.
- [14] T. Lambrechts, J. Bryce, V. Orinda, Integrated management of childhood illness: a summary of first experiences, *Bull. World Health Organ.* 77 (1999) 582–594.
- [15] E.A. Simoes, T. Desta, T. Tessema, T. Gerbresellassie, M. Dagnew, S. Gove, Performance of health workers after training in integrated management of childhood illness in Gondar, Ethiopia, *Bull. World Health Organ.* 75 (Suppl 1) (1997) 43–53.
- [16] M.W. Weber, E.K. Mulholland, S. Jaffar, H. Troedsson, S. Gove, B.M. Greenwood, Evaluation of an algorithm for the integrated management of childhood illness in an area with seasonal malaria in the Gambia, *Bull. World Health Organ.* 75 (Suppl 1) (1997) 25–32.
- [17] H.D. Kalter, J.A. Schillinger, M. Hossain, G. Burnham, S. Saha, V. de Wit, et al., Identifying sick children requiring referral to hospital in Bangladesh, *Bull. World Health Organ.* 75 (Suppl 1) (1997) 65–75.

- [18] S. Gove, G. Tamburlini, E. Molyneux, P. Whitesell, H. Campbell, Development and technical basis of simplified guidelines for emergency assessment and treatment in developing countries, *Arch. Dis. Child.* 81 (1999) 473–477.
- [19] G. Tamburlini, S. Di Mario, R.S. Maggi, J.N. Vilarim, S. Gove, Evaluation of guidelines for emergency triage assessment and treatment in developing countries, *Arch. Dis. Child.* 81 (1999) 478–482.
- [20] World Health Organization, *Acute Respiratory Infection in Children: Case Management in Small Hospitals in Developing Countries —a Manual for Physicians and Other Senior Health Workers*, World Health Organization, Geneva, 1995.
- [21] World Health Organization, *The Treatment of Diarrhoea – a Manual for Physicians and Other Senior Health Workers*, World Health Organization, Geneva, 1995.
- [22] World Health Organization, *Management of the Child with a Serious Infection or Malnutrition. Guideline for Care at the First Referral Level in Developing Countries*, World Health Organization, Geneva, 2000.