

Integrating pulse oximetry into IMCI consultations to improve health care of under-5 children in Primary Health Centres in West Africa

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Background

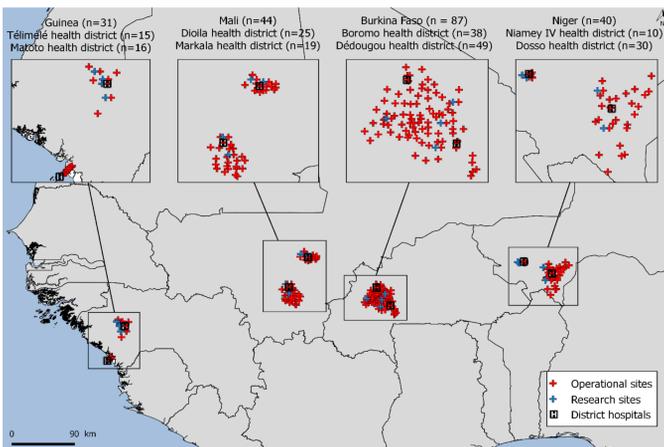
In 2020, 5 million of children under-5 died and 53% of them lived in Sub-Saharan Africa (United Nations Inter-agency Group for Child Mortality Estimation 2020).

The Integrated Management of Childhood Illness (IMCI) guidelines for children under-5 is a symptom-based algorithm that helps health care workers to manage children at primary health centres (PHCs). In these settings, many comorbidities in severely ill children are underdiagnosed, such as hypoxaemia, a strong predictor of death.

Pulse Oximeter (PO) is a simple tool, cheap, reliable and easy to use to diagnose hypoxaemia.

The AIRE operational research project, UNITAID-funded, has implemented the routine integration of PO into IMCI consultations at the PHC level, covering two health districts in Burkina Faso, Guinea, Mali and Niger (Figure1). This decentralized strategy is aimed to strengthen the diagnosis of hypoxemia among IMCI cases (respiratory and non-respiratory) to prompt their effective referral to hospital to receive appropriate case management (with oxygen, antibiotic therapy and other required treatments).

This study aims to describe the use of PO integrated into IMCI consultations and its added value in diagnosing of severe cases in the AIRE countries.



Source: Flore-Appoline Roy

Figure 1: Map of AIRE intervention sites per country

Methods

We conducted a cross-sectional study collecting monthly aggregated health data on the PO use integrated into IMCI consultations in the 202 West African PHCs. Severe hypoxaemia requiring oxygen therapy was defined as oxygen saturation of blood (SpO₂ by using PO) less than 90%. All children aged 0-59 months attending IMCI consultations, except those aged 2-59 months classified as green non-respiratory (without cough or breathing difficulties) cases were eligible for PO use after the IMCI classification. According to these criteria, children initially classified as Green or Yellow cases with SpO₂ <90% after PO use were considered as severe cases and joined the Red group of severe cases to prompt their case management (Figure2).

Ethical Approval number: Burkina Faso n°2020-4-070; Guinea n°169/CNERS/21; Mali n°127/MSDS-CNESS; Niger n°67/2020/CNERS; EEC Inserm n°20-720; WHOERC n° ERC.0003364



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Results

From June 2021 to August 2022, 401,802 children under-5 years old attended IMCI consultations in the 202 AIRE PHCs.

- A total of 291,924 children were eligible for PO use of whom 92% (N=268,548) had an SpO₂ measurement.
- Among those children eligible for PO use :
 - 14,953 (5.1%) were classified as severe cases using IMCI alone
 - 15953 (5.4%) were classified as severe cases using IMCI+PO
 - The added value of PO use into IMCI classification to identify severe cases at PHC level was estimated at +5.6% (885/15,838; 95% CI: 5.2-6.0). (Figure 3)
- The prevalence of severe hypoxaemia among children attending IMCI and eligible for SpO₂ measurement was estimated at 0.9% (2,615/291,924 – 95% Confidence Interval [CI]: 0.86 – 0.93) (Table 1)
- The prevalence of severe hypoxaemia among all severe cases was estimated at 16.5% (2,615/15,838; 95% CI: 15.9-17.1) (Figure 3)

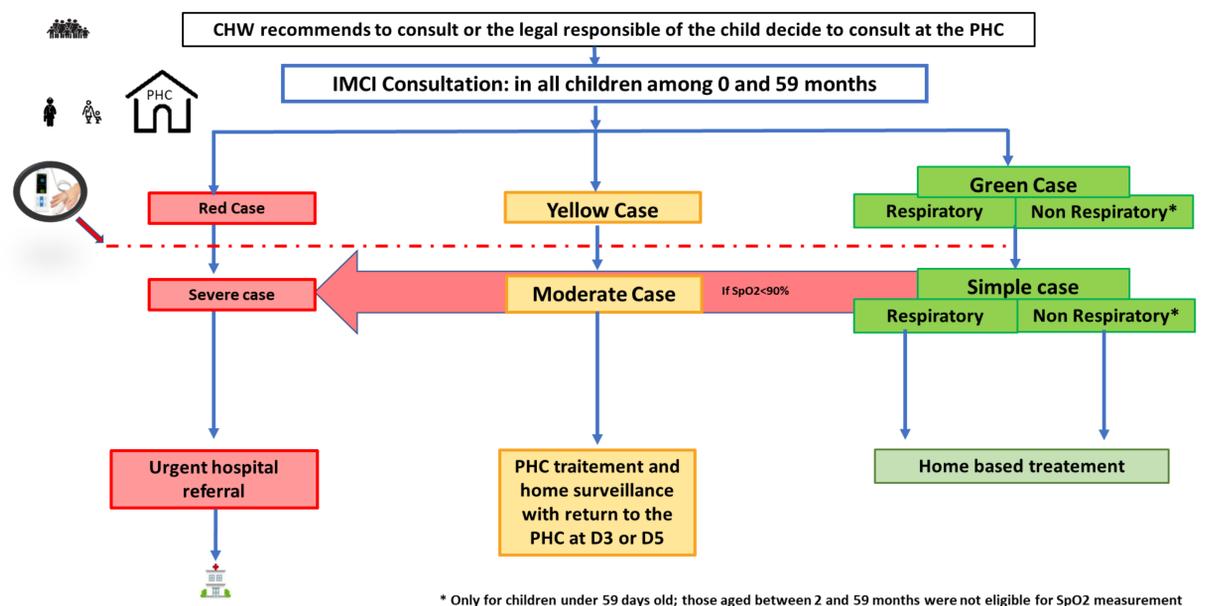
- Severe hypoxaemic children for whom hospital referral were decided by health care workers represented 64.5% of the 2,615 severe hypoxemic cases (n=1,688; 95% CI: 62.7-66.3).

Conclusion

The integration of PO use into IMCI consultations could substantially help to better identify hypoxaemia in West-African children at PHC level, with an added value estimated to be +5.6%. However, 34.5% missed opportunities of hospital transfer decision in these field conditions. The appropriate care management of these hypoxemic cases requiring urgent oxygen therapy in resource-limited settings is challenging. Further qualitative-quantitative analysis are ongoing in a sub-sample of PHC to assess the effects on health care decisions and on health outcomes of severe cases with hypoxemia.

Table 1: Proportion of severe cases identified, using IMCI alone and IMCI+PO among eligible children under-5 attending IMCI consultations in the 202 AIRE PHCs; June 2021-August 2022

Country (number of IMCI consultations)	Burkina Faso (N=192,514)	Guinea (N=64,971)	Mali (N=30,205)	Niger (N=114,112)	Total (N=401,802)
Number of IMCI consultations eligible for PO use	136,154	49,188	23,916	82,666	291,924
% of severe cases using IMCI alone	3.8	7.0	18.8	2.2	5.1
% of severe cases identified using IMCI+PO	4.1	7.1	20.0	2.3	5.4
Prevalence of severe hypoxaemia (%)	0.6	0.9	2.8	0.9	0.9



* Only for children under 59 days old; those aged between 2 and 59 months were not eligible for SpO₂ measurement

Figure 2: Integration of systematic PO use after IMCI classification among children under-5 in the 202 AIRE PHCs

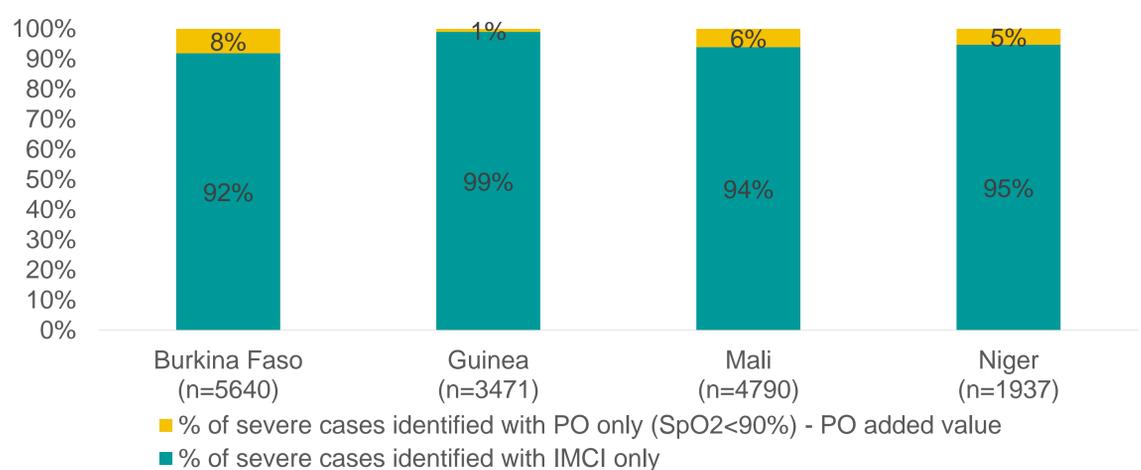


Figure 3: Pulse Oximeter added value per AIRE country; June 2021 to August 2022.