A Covid-19 screening strategy based on the use of rapid antigen tests in health care facilities in Niger

E-Poster No. 1424

F. Lamontagne (1), S. Bissala (1), S. Mir (1), O. Diakité (1), M. Goli (1), A. Lagare (2), L. Sagaon-Teyssier (3,4), G. Laborde (4), R. Abdoulaye-Mamadou (1), S. Ouvrard (1), S. Bieler (5), R. Jambou (2), M. Adamou (6), E. Adehossi (7)

1. SOLTHIS NGO, 2. CERMES, 3. Aix-Marseille University, 4. IRD, 5. FIND, 6. Ministry of Public Health of Niger, 7. Niamey University

Background

In Niger, as in other African countries, the diagnosis of Covid-19 has remained very low up to now, despite several seroprevalence studies suggesting a large spread of SARS-CoV2 (1). As of November 1st 2021, only 6,366 cases have been confirmed and 213 deaths reported in the country (2). Highly centralized testing capacities, based on PCR, hindered the access to Covid-19 diagnosis. New screening techniques based on antigen rapid detection appeared as an opportunity to screen and manage Covid-19 patients in all health facilities, including the most peripheral.

Our intervention aimed to assess the feasibility, acceptability, impact and cost-effectiveness of a Covid-19 screening strategy based on the use of rapid antigen tests (Ag-RDT) to diagnose symptomatic patients, in order to prepare national scale-up in clinical settings.

Design Method

We conducted an operational research from November 2021 to April 2022 in a representative sample of health care facilities: 5 primary health centers and 3 hospitals in Niamey and Dosso regions. Most had never diagnosed a case of Covid-19. All adults attending medical or emergency outpatient consultations were screened for Covid-19 by trained dedicated nurses. WHO Covid-19 cases definition was used (3), facilitated by a digital decision-support tool. Suspected cases were tested with Covid-19 Ag-RDT (STANDARD Q COVID-19 Ag Test, SD-Biosensor). Severity was assessed clinically and using pulse oximeters, and defined by hospitalization decision. Face-to-face interviews with health care workers and patients were conducted to evaluate intervention acceptability. Cost-effectiveness was assessed in a health sector perspective, accounting for expenses in human resources, equipment and tests. Patients who had left a phone number were called at least 2 weeks after their diagnosis in order to know their outcome.

Results

Feasibility and impact of the intervention:
Based on consultations data of the participating facilities, an estimated 78% of the targeted patients were triaged. Among the 12,014 patients screened, 2,244 were classified as Covid-19 suspected cases (19%), of whom 2,177 were tested with Ag-RDT (97%). Patients who tested positive were 135 (6%), with a median age of 42 years. Severe symptoms requiring admission were present for 15*/135 positive patients (11%) and death occurred for 6*/135 Covid-19 positive patients (4%): 5 among hospitalized patients and 1 among outpatients.
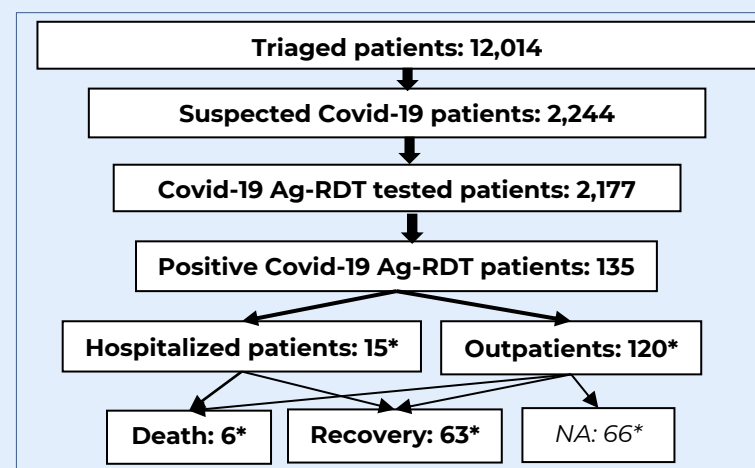

Triaged patients: 12,014
↓
Suspected Covid-19 patients: 2,244
↓
Covid-19 Ag-RDT tested patients: 2,177
↓
Positive Covid-19 Ag-RDT patients: 135
↓
Hospitalized patients: 15*   **Outpatients: 120***
↓
Death: 6*   **Recovery: 63***   *NA: 66**

Figure 1: Covid-19 screening cascade based on the use of rapid antigen tests (Ag-RDT) in symptomatic patients in 8 health care facilities in Niger

Covid-19 was present at all levels of the health pyramid, with the same frequency in the capital and in Dosso region. Most severe patients consulted directly in the hospitals (14/15*). Among hospitalized patients, 14 were admitted after their first consultation and 1 secondarily worsened and was hospitalized after a second consultation.

The usual risk factors for severe form of the disease and death were found (age, comorbidities, male sex), as well as the protector effect of vaccination. Nevertheless, one third of severe cases had no known risk factor.

Abstract's errata: *Updated numbers

	Severe Covid-19 aOR; 95%CI	Death by Covid-19 aOR; 95%CI
Age ≥ 65 years	1.7 [0.4 - 7]	**10.7 [1.3 - 86]**
Comorbidities	**4.6 [1.4 - 15]**	1.7 [0.2 - 14]
Male sex	**3.5 [1.1 - 11]**	**13.4 [1.3 - 144]**
Vaccination	**0.1 [0 – 0.9]**	0 [0 - ∞]

Acceptability:
Test acceptance in suspected cases was 98%. The intervention was well accepted by heath care workers (HCWs) and patients, despite a quite high level of stigma and denial. For HCWs, Ag-RDT were reliable and easy to use. The rapidity of diagnosis allowed for immediate patient care and limited contamination risk. For patients it avoided a long wait and an additional trip to the facility to get the results. Positive results aroused fear, but most people were reassured by the explanations of caregivers.

Cost-effectiveness:

Estimated cost of Ag-RDT screening strategy in routine§	
Average cost per test	14* USD
Average cost per positive test	231* USD
Average cost per positive test, severe case	2 082* USD

§Direct costs for the health system when Covid-19 screening is integrated into the regular consultation without dedicated staff.
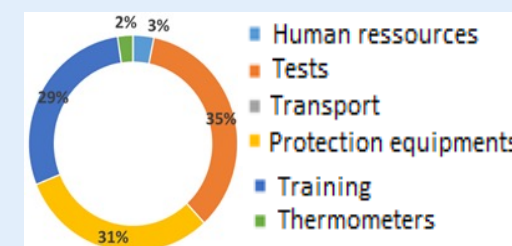

- Human ressources
- Tests
- Transport
- Protection equipments
- Training
- Thermometers

Figure 2: Components of the average full direct cost per test in routine Ag-RDT screening strategy

Abstract's errata: *Updated numbers

Discussion / Conclusions

Screening based on Ag-RDT was feasible, well accepted and improved access to Covid-19 diagnosis at all levels of the health care system in Niger. It contributed to reveal that Covid-19 frequency was underestimated. However, the cost-effectiveness of this screening strategy could be debated in very resource-limited context, where other health issues could be prioritized.

The use of dedicated staff and of a digital decision-support tool in the study had certainly improved the effectiveness of the screening intervention, but would be challenging to implement routinely.

Despite the study was conducted during an epidemic wave, and the screening protocol well applied, the number of Covid-19 diagnoses was low compared to the catchment population of the participating health facilities (>1 million people), suggesting that few of the Covid-19 infected people sought medical care. Therefore, this screening strategy could probably not be useful to control the epidemic spread. Its main benefit would be to diagnose more correctly the severe forms of Covid-19 requiring specific care.

A relatively high proportion of severe cases was identified in this study, especially among patients who consulted in hospitals. This could be related to a selection bias : the most severe patients have probably consulted more.

In order to improve the cost-effectiveness of the strategy, testing could be focused on patients at risk of severe form, patients presenting severity signs, or consulting in hospital settings.

National scaling up of this strategy will require appropriate supply of Ag-RDT and staff training, in order to implement a more systematic approach of Covid-19 screening and a proper identification of severe cases. Beyond diagnosis, improving the management of severe cases could reduce mortality.

References
(1) Lewis HC, Ware H, Whelan M, et al. SARS-CoV-2 infection in Africa: a systematic review and meta-analysis of standardized seroprevalence studies, from January 2020 to December 2021. BMJ Global Health 2022;7:e008793. doi:10.1136/bmjgh-2022-008793
(2) Our World in Data. Niger: Coronavirus Pandemic Country Profile. 2022. https://ourworldindata.org/coronavirus/country/niger
(3) WHO Covid-19: Case Definitions. December 16th 2020. Reference number: WHO/2019-nCoV/Surveillance_Case_Definition/2020.2