

Implementation of blood cultures in the Ebola Virus Disease care response in North Kivu, Democratic Republic of the Congo: results of a pilot study



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INTRODUCTION

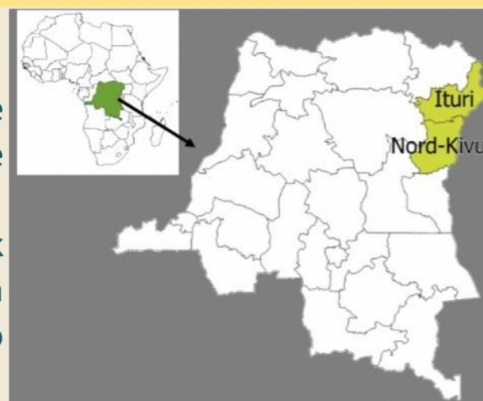


Figure 1. Republic Democratic of the Congo

- Ebola virus disease (EVD) outbreaks are recurrent in DR Congo.
- The 10th outbreak occurred in eastern DRC (August 2018 to June 2020).

- High case-fatality in EVD patients despite access to experimental EVD specific treatments.
- Bacterial bloodstream infections (translocation, healthcare-associated infections) are suspected to be one of the causes of this adverse outcome.

AIM

We piloted a blood culture system applicable in Ebola treatment centers (ETCs) in low resource settings to study the potential role of bloodstream co-infections.

METHODS

- EVD patients enrolled in ETCs of Beni and Mangina from 11/11/2019 to 13/05/2020, but interrupted due to insecurity from 27/11/2019 to 09/01/2020.
- Blood culture bottles (BCB) were sampled at admission, and at clinical indication
 - Adults: set of aerobic + anaerobic BCB
 - Children (< 14years): aerobic BCB
- Bacteriology lab installed in Beni, next to the ETC
 - BCB processed in BacT/ALERT 3D 60 automate
 - Upon detection of growth, subcultures, antigen testing for *Streptococcus pneumoniae* (BinaxNOW™), identification and antibiotic susceptibility testing

RESULTS

- 43 EVD patients** enrolled (male/female ratio: 0.33; 8 below 14 years)
- 30% with EBOV nucleoprotein cycle threshold <22 at ETC
- Most initiated malaria (65%) and/or antibiotic treatment (92%) before admission
- 46 blood culture sets sampled**
- 4 blood culture sets with bacterial growth**

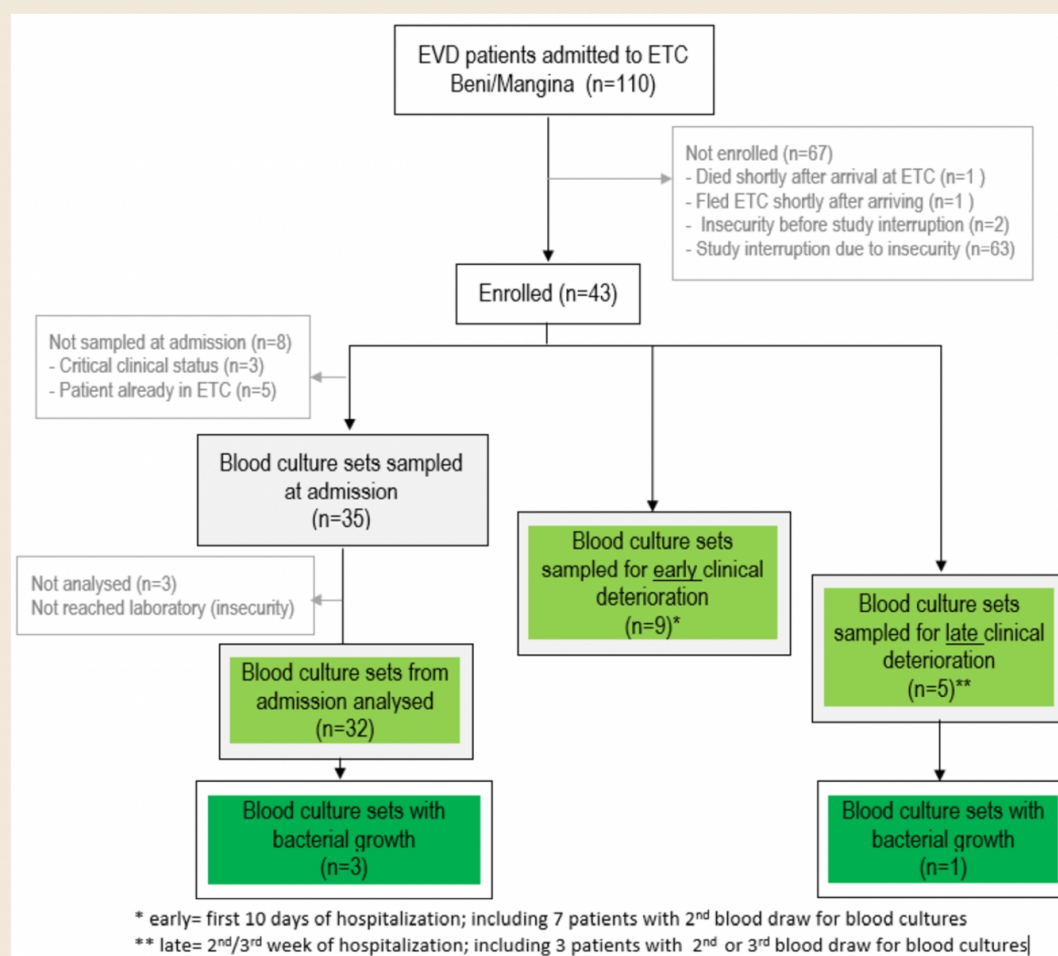


Figure 2. Patient diagram flow

BACTERIAL ISOLATES

- Streptococcus pneumoniae*** (2 patients, at admission, died)
- Klebsiella pneumoniae***, multidrug resistant (1 patient, at clinical indication, 11 days after admission, survived)

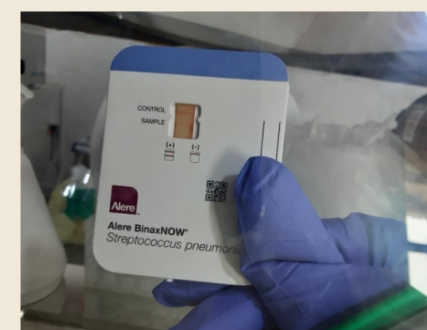


Figure 3. Positive Antigen testing for *Streptococcus pneumoniae*

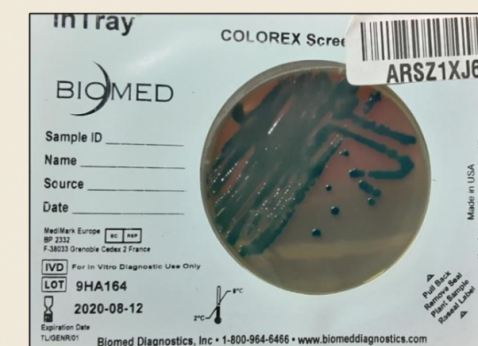


Figure 4. Colony of *Klebsiella pneumoniae* on Colorex screen media

QUALITY INDICATORS	Target	Result
Contamination rate	<3%	0%
Correct volume sampled (adult 8-12ml, enfant 1-5ml)	≥ 80%	87%
Needle-to-incubator time (median)	<4h	Beni: 32 min Mangina: 320 min
Time-to-detection of growth		0-4 days

Table 1. Blood culture quality indicators

CHALLENGES

- Insecurity
- Sample transport from Mangina (30 km) to Beni
- BacT/ALERT cells failure due to dust
- Continuous power supply

CONCLUSION

Our experience shows that a biosafe blood culture system can be integrated in the EVD care response in the field. Our pilot results (BC positivity rate of 8.7% despite the suboptimal process time and high proportion of antibiotic use prior to sampling) indicate the need for further research.

ACKNOWLEDGEMENTS

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