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Beyond Ebola Treatment Units (ETU): Revising the Flow of Patient Care and Using Appropriate PPE to Improve Patient Care after Discharge from the ETU Ward

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1. Summary

The management of confirmed Reverse Transcriptase Polymerase Chain Reactions (RT-PCR) negative patients that continue to present with signs and symptoms of severe infection remains a challenge for care providers in the conventional ETU ward. Healthcare workers providing care in the conventional ETU require appropriate protection against filovirus infection when providing optimal care to the patient. As appropriateness should never be compromised, it should allow the healthcare worker to provide such care with easiness, dexterity, and comfort to minimize heat-associated stress.

The healthcare workers' clinical contact time in the conventional ETU is compromised by the discomfort limiting effective care. In the case of the attached Severe Infection Temporary Treatment Unit (SITTU), reducing the layers to an appropriate precaution-based PPE will increase suppleness and widen the spectrum of care. Other diagnostic-aide apparatuses are handily used in the SITTU care setting, which will improve care.

2. Background and Problem Statement

The flow of patients in a conventional Ebola Treatment Unit is unidirectional beginning with careful triage based on assumed classifications as a suspect, probable, and confirmed cases. The sensitivity of the assumption is guided by using an algorithmic tool (Figure 1) that is mostly based on the case definition for the diagnosis of the Ebola Virus Disease (EVD). During the Ebola outbreak in Liberia, we relied on the use of a World Health Organization (WHO)-adopted algorithm with a high positive predictive value. Depending on the case definition, it could vary significantly due to changes in the Ebola prevalence rates at any given time. In September 2014 when the Ebola prevalence was at its highest peak in Liberia, nine out of ten suspected cases tested positive for the Ebola virus [1].

Towards the end of 2014, this situation changed substantially. Fewer patients admitted to the ETUs eventually tested positive for the Ebola virus disease, reflecting the considerably decreased in the positive predictive value of the Ebola case definition in a low-incidence phase of the outbreak. At that time, about nine out of ten suspected cases in any Liberian conventional ETU turned out to be Ebola virus-negative and were thus unnecessarily exposed to substandard care and possibly also to the Ebola-infected patients in the suspect wards. Adding to the problem was the lack of adequate bed spaces available before the opening of the Island Clinic ETUs on September 21, 2014 [2].

During the peaked transmission time in the 2014-2016 outbreak, on a typical day, only 10-12 beds would be available leading to overcrowding of the available functioning conventional ETUs. Despite the high mortality rate during the peak of the outbreak, the demand for bed space was always on the increase. There were fewer conventional ETUs being constructed and coming online and the community transmissions kept amplifying creating pandemonium [3]. Dead bodies were littering the streets of the communities because of the lack of available bed spaces at the conventional ETUs.

It was at this stage that the policy of cremation of dead bodies was put in place by the Government of Liberia. The decision to discharge patients from conventional ETU care became difficult. The idea of creating a flow of patient care nearby the conventional ETU was adopted. This would allow the use of appropriate PPE that would allow agility of the care provider in providing quality care to the patient prompting the "Beyond the conventional ETU continuum of care concept" [4].

There was a need to pilot the beyond-the-conventional ETU continuum of care concept so we opted to infrastructurally adapt one of the conventional ETUs so that we could manage non-Ebola patients with severe infections that seek non-ETU health care services after proving negative twice for EVD. We coined the word "Severe Infection Temporary Treatment Unit (SITTU). In summary, as the bed spaces for suspect cases in the conventional ETUs were diminishing or not available, creating additional bed spaces was a smart way to address the problem of lack of available beds, especially at the peak of the outbreak. The cases we targeted were: 1) patients discharged from a conventional ETU with two RT-PCR negative test results, 2) patients who were case investigated as non-Ebola patients and who were refused health services at a normal health facility, and 3) patients from the community that might have walked-in or driven-in were targeted.

Ebola virus disease brings about fear and panic in the population including the health providers to the point that non-EVD infectious diseases were not admitted by ordinary healthcare facilities as they were not prepared to manage presumably highly contagious patients. Once discharged from the ETU, a non-EVD patient (confirmed two negative RT-PCR tests) must be properly integrated into the community. Those that were suspects, with confirmed non-EVD by two negative RT-PCR tests in the ETU and discharged with no further illness, were also integrated into the community. The non-EVD patients that met the discharge criteria with severe infectious diseases and may not have received adequate treatments in the ETUs and were at risk of exposure to EVD, were referred to other health facilities.

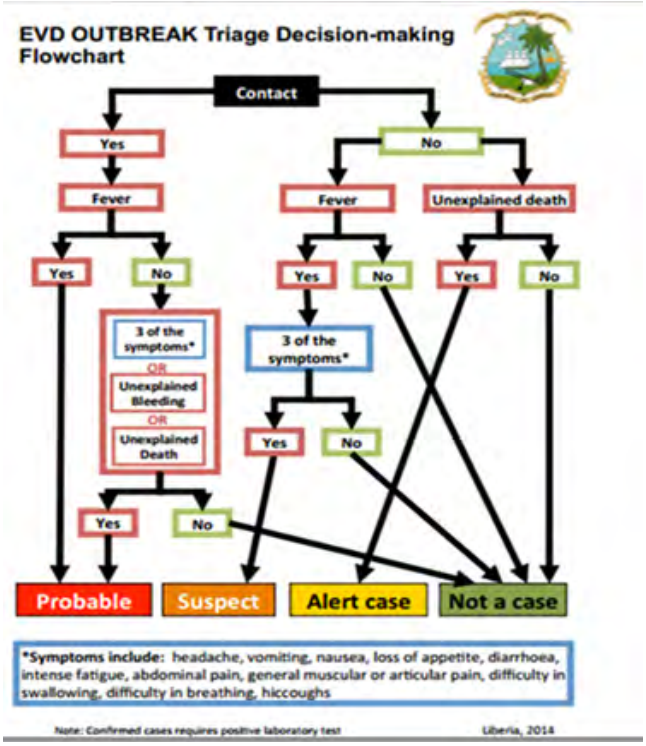

Figure 1: Algorithmic Tool for EVD

3. Revising the Flow of Patient Care

The flow of patient care in the conventional ETU and the SITTU is unidirectional through a suspect case area, an unlikely case area, and a confirmed negative case area (see Annex: Figure 2 and 3). During the EVD outbreak, the conventional ETUs did not have a place nearby until it was piloted by the Ministry of Health (MoH) case management team along with the German Red Cross team. With the SITTU nearby, the two additional areas (Unlikely Case Area and Confirmed Negative Case Area) allow an allocation of patients according to their risk of not being infected by the Ebola virus with the aim of reducing the risk of nosocomial Ebola virus infections and facilitating adapted medical care. The SITTU staff would therefore wear light PPE in most of the confirmed negative sections providing them the ability to perform clinical duties with ease.

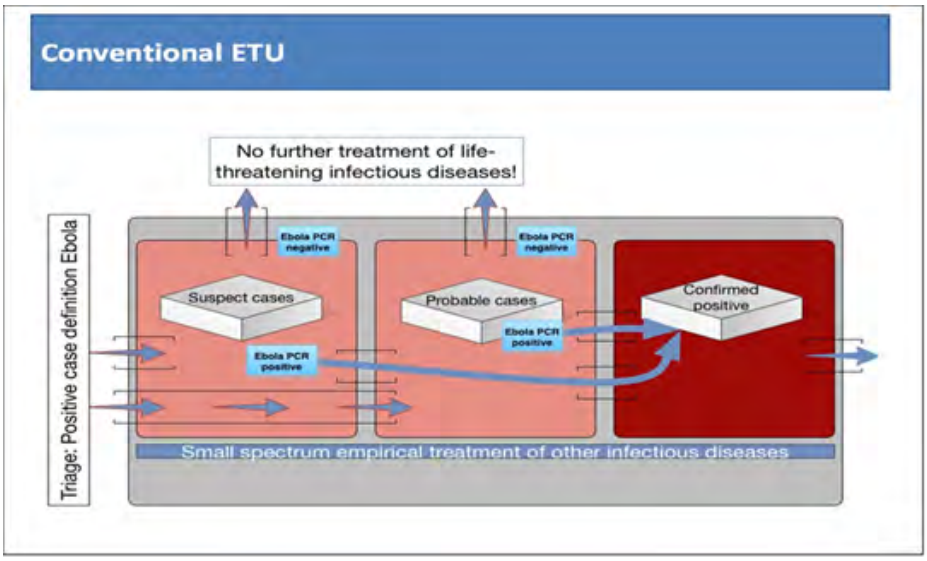

Figure 2: Conventional ETU

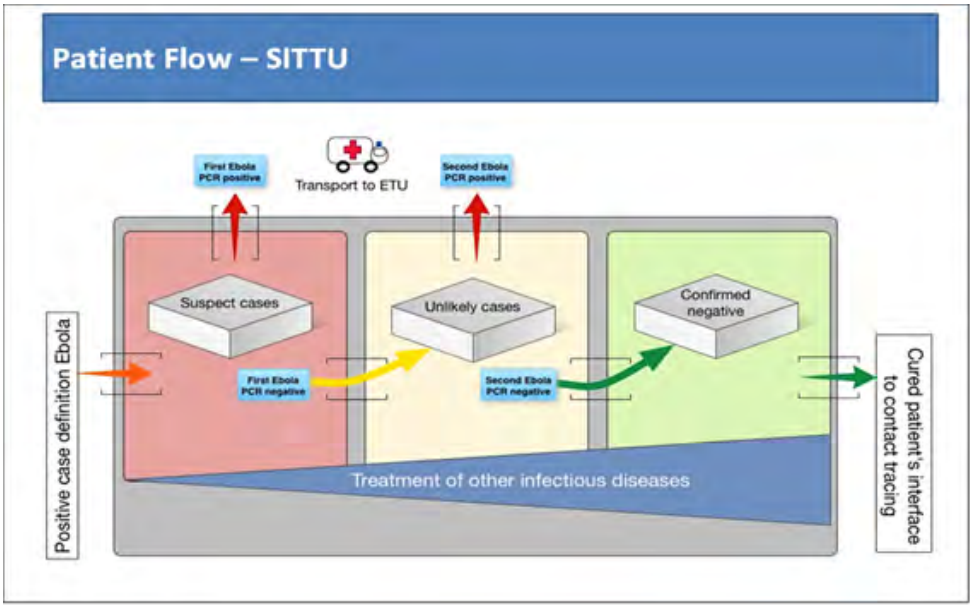

Figure 3: Patient flow adapted from conventional ETU flow

4. Discussion and Conclusion

SITTU is not entirely the solution to the restoration of regular services but rather an adjunct to solving the problem of lack of bed space through a convalescent ward. Because of fear and panic associated with EVD, there is generally a precautionary stance the health workers take which can be interpreted as a refusal to provide care. We observed during the outbreak that most of the health facilities closed their doors. Certain services, like surgeries, could not be provided in a conventional ETU and were also not possible to be provided within the SITTU context. From this experience during the 2014-2016 EVD outbreak, there is a need to re-engineer the infrastructure of new generation ETUs to include SITTU and modified conventional ETUs with a maternity ward, and emergency red zone Laboratory (with electrolyte capacity).

The strongest argument is that having SITTU nearby the conventional ETU could provide convalescent ward services and could at the same time provide an advantage for an EVD-negative patient that may still be having other infections while the use of an appropriate light PPE could support provider agility to improve care for the patient. For suspects or patients who are rejected from other healthcare facilities during outbreak periods, the SITTU can serve as a transition point where RT-PCR is done, and those that are positive are rerouted to the conventional ETUs for proper care using the appropriate PPE. This should be recommended as the new design for future ETUs. It will improve patients' acceptance and will serve as a stimulus for building confidence for healthcare providers who are often afraid of taking care of patients with a history of being cared for at ETUs. In a way, more training for health care providers in the SITTU settings will help the restoration of normal health care.

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