Technical guide : Blood culture

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I. Introduction

This campaign is designed to evaluate the quality of the pre-analytical phase of blood culture in adult patients. Evaluated criteria include: properly filled bottles, the total volume of blood cultured over a 24h period, and the contamination rate. This study allows to evaluate each laboratory in reference to good laboratory practices and to establish pre analytical phase of blood culture state of the art in Europe. Secondary objective includes identification of determining factors for poor quality blood culture samples.

II. General procedure

Prerequisites: We strongly recommend that you use an updated version of Microsoft Excel (at least the 2010 version).

The results are to be returned in the **Excel file** received with this technical guide, between 07/01/2019 and 28/02/2019, by uploading it on the website to the following address: https://www.ctcb.com/4DACTION/Navigation?page=CQI_Upload&code=HEMOCULT.

Important note :

- An email address will be requested when uploading your file. This address must be unique. Groups who would like to have several their labs participating to the survey are allowed to. In this case, please use **one Excell file per participating lab** and **a distinct email address per lab**.

Results of this study will be displayed in 2 steps:

i) your own results compared to guidelines (delayed e-mail notification after receiving your results file by the CTCB);
ii) your results compared to your group of pairs. This will be completed when all participants will have submitted their data.

This excel file contains 3 spreadsheets:

- Spreadsheet 1 is dedicated to information about your lab(s) and how the sampling is performed,
- Spreadsheet 2 is dedicated to information on the characteristics of the bottles,
- Spreadsheet 3 is designed to collect information on sample and series results including the weight of bottle after sampling.

The following information will help you to organize your participation to this quality control and to fill in these forms. Additional information is provided in the Excel sheets.
If you want individual reports for each participating department, you must use a different e-mail address which correspond to specific Excel spreadsheet.

III. Semantics

An **adult patient** is a patient of ≥18 year old.

The term "**blood culture**" is used only in its original meaning of bacteriological culture of blood, without prejudging the number of bottles cultured. The term blood culture will not be used in the sense of "pair of bottles" (an aerobic bottle and an anaerobic bottle).
A period of blood culture sampling (episode) is defined as a period of 24 hours, from the time of collection of the first blood culture (see example below). For convenience, the term "sampling period" or "episode" will be used interchangeably.
The term **sampling**, used alone, is reserved to characterizing the gestures necessary to perform the collection of the blood sample. Accompanied by the terms "single" or "multiple", it will refer to the strategy for obtaining vials over a period of 24 hours (see definitions chapter IV.A).

The term **solitary blood culture** is used to characterize blood culture series limited to one single pair of bottles over a 24h period.

Concerning the diagnostic, the term of **contamination** should be used only for micro-organisms that is not responsible of a bloodstream infection. Usually, low-level pathogenic bacteria part of the cutaneous flora and isolated from one bottle only are considered as contaminants: *Corynebacterium sp, Micrococcus luteus, Coagulase negative Staphylococci (CNS), Cutibacterium (Propionibacterium).* When one of these bacteria is recovered from several bottles, the isolate will be considered as pathogenic when i) there is some clinical signs with no other infectious source, ii) antimicrobial treatment targeting this microorganism was administered, iii) there is a catheter or any other device consistent with bacteria isolated and the medical history.

IV. How to fill in the Excel form

A. "General information" sheet:

- **Sampling**
  - **Definition of the (various) recommended method(s) of sampling in use in your institution:**
    - **Multiple sampling**: all bottles cultured over a period of 24 hours ("a series") are obtained by several punctures. Classically, 2 to 3 phlebotomy act are performed, and collection of one pair of bottles (set) at each phlebotomy act (3 x 1 pair or 2 x 1 pair).
    - **Single sampling:** all vials collected over a period of 24 hours are obtained by a single sampling (phlebotomy act). Usually, 2 to 3 pairs of vials are obtained in a single sample (1 x 3 pairs (=6 bottles) or 1 x 2 pairs (=4 bottles)).

- **Instrument** if you choose "other "in the drop-down menu please specify in the box G46 the name of the equipment and the name of the manufacturer.

B. "weight of empty bottles" sheet:

In case of bottle shortage at a manufacturer, if you need to use a second type of bottle during this survey, you must fill out an Excel file for each type of bottle. If an episode contains two types of aerobic bottles or 2 types of anaerobic bottles during the transition period, please do not include it in the study.

- **Method for determining the weight of empty bottles:**
  - o Weigh, one by one, 10 empty aerobic bottles, after having removed the lid protecting the cap of the bottle and record data on the sheet.
  - o Weigh, one by one, 10 empty anaerobic bottles, after having removed the lid protecting the cap of the bottle and record data on the sheet.

The unit used is the gram.
Note: pediatric bottles are excluded.

C. "patients results" sheet:

The survey is open from 01/12/2018 to 28/02/2018: you are free to choose the period of collection over the duration of the survey.

1. The table:

The table to be completed on this Excel file includes 50 lines (1 line = 1 episode): you have to collect data from 50 consecutive sampling periods (episodes) taken from adults only (children excluded), from any ward. The volume taken in pediatrics is generally very low so that the methodology proposed here is not appropriate (variability of the weight of empty bottles may be greater than the volume of blood collected). Should you be unable, for reasons of recruitment, to collect 50 episodes, you are kindly asked to collect at least 30 consecutive episodes and not to exceed 15 days of collection.

Note: It is possible to include a patient several times in this survey if he/she has been sampled over different 24-hour periods. As far as possible, patients who are deceased or transferred to another institution during the episode should not be included in this study so as not to bias the results. Given the definitions (see section IV.A), this point is addressed only for BC obtained by the multi-sampling strategy.
CAUTION: to view the table in its entirety you have to move the cursor to the bottom of the tab!

- **Patients information**
  - The episode is identified by an **increment number**.
  - For each episode, inform the **medical specialty** from which the patient is managed
  - **The sampling method** (see definition at the beginning of the manual). Cases of solitary blood culture should be filled in as follows:
    - For labs using single-sampling only, the case of a single pair of bottles over a 24-hour period should be scored as " **non-compliant single-sampling strategy** "
    - For labs using multiple sampling only, the case of a single pair of bottles over a 24-hour period should be scored as "**non-compliant multiple-sampling strategy** "
    - For labs that use both single and multiple sampling (depending on the medical department, for instance), taking of one single pair over the 24-hour period corresponds to a non-compliant sampling (or prescription) situation, without being able to identify whether it is a "non-compliant multiple sampling strategy" or a "non-compliant single sampling strategy". This case should be recorded as an "**Undetermined sampling strategy** »**.**

      - Example 1: patient A is sampled at 5 a.m. (1 pair), 8 a.m. (1 pair), 6 p.m. (1 pair). This case is to be entered in as a multiple sampling (3 samples, with a 6 bottles).
      - Example 2: patient B is sampled at 5 a.m. (1 pair), 8 a.m. (1 pair), 8 a.m. the next day (1 pair), this case should be indicated as a multiple sampling (2 samplings, 4 vials in total) followed by a non-compliant multiple sampling (a single sampling of 2 vials) as the last one is out of the 24h period.
    - Note: some centers may have 'the time of BC sampling' infrequently specified. When the sampling time is not specified, it is acceptable to substitute date time of the BC sampling by the one of BC reception at the lab. The 24 hour period (sample reception) approximately matches with the 24h period of BC sampling. **This substitution is permitted in this case only** (no specified date time of BC sampling).

    - Note for centers practising both single sampling strategy and multiple sampling strategy: when several BC pairs (same patient) are received in the lab from the same transportation batch, and neither the sampling method nor the time of BC sampling is specified, the sampling method should be scored as "**undetermined sampling strategy**".

    - A series (episode) that both comprises pairs sampled through a catheter and pairs obtained by venipuncture should be scored as '**mixed sampling strategy**" for centres that practise either the single sampling strategy or the multi-sampling strategy.

  - **Sampling site**

- **Traceability of bottles batches**

Enter aerobic and anaerobic bottles batch number and indicate expiration dates.
Note: the number of batches are usually limited to 1 or 2 per types of bottles per institution._Use Excel file rapid input system to facilitate and speed the record.

- **Weight of the bottle after blood collection**

  - The participant is free to choose his/her organization, i.e. weighing bottles before incubation or after unloading from incubator. However, from our experience, we advise weighing the bottles after they are unloading because it is easier and faster (hereafter retrospective method). For a patient, all the bottles sampled during 24h period starting from the collection of the first pair are to be included in the series

(these weights are to be indicated on a single line of the table). We advise to proceed with data collection after having extracted from your lab system and print the patient list of blood cultures over the study period. This list includes the BC incubated 5 days before the bottles you plan to weigh are unloaded (if incubation in your laboratory is of 5 days. It will help you to check that you did not miss any bottle over the 24h period.

Note: the retrospective method requests to **store bottles flagged positive from approximately one week**[1] before BC unload and during the duration of the survey in order to not have any missing bottle within a series (episode).

You can enter weights of up to eight bottle pairs per episode.

- The Excel file contains an alarm that informs of a possible input error. When the weight of the bottle is between 0 and m (m = average weight of empty bottles), the weight of the patient bottle is displayed in red. Please check the figures in such a case.
- The unit used is the gram.

Note: some BC instruments are able to estimate the volume of blood per bottle. The method used by these instruments is not accepted in this protocol, and a volume **measurement by weighing** is requested from every participant.

- **Diagnostic**

This part is dedicated to results of culture and clinical interpretation.
You have the option to enter two bacteria per episode. If more than two bacteria have been recovered, prioritize those considered as pathogenic. For a possible third bacterium, you can use the free comment area.
For a polymicrobial episode, interpretation can be achieved for every bacteria recovered (e.g., allowing categorization of the 1st micro-organism as pathogen and the second as contaminant).

Note: the term of contaminant is defined in the section III.

- **Specific bottles of fungal strains**

Because of the low rate of use of specific fungal vials, the filling volume of such bottles is not taken into account in this survey. However, you are asked to inform for each episode if this type of bottle was used. In such a case and when a fungal strain have been isolated, it should be specified whether or not this fungi strain was also recovered from aerobic / anaerobic bottles.

2. The free comment area

This zone allows you to enter any information you consider important to report (please specify the episode number when it concerns only one particular line) or to enter the name of the bacteria when you do not find it in the drop-down menu (please specify the corresponding line).

[1] Exact duration: duration of bottle incubation in your lab