

TPP Examples

2021

INTRODUCTION

The Target Product Profile (TPP), a concept originally aimed at pharmaceutical drug development, is a multidisciplinary strategic development process tool that can be adapted by medical device and diagnostic programs for product development. Implementing a robust and disciplined TPP process can help to drive alignment in cross-functional strategies, leading to more effective and cohesive product development.

The TPP embodies the notion of *beginning with the goal in mind*. That is, it specifies the concepts that are the goals of the product development program, the specific studies intended to support the concepts. TPP guides the design, and maximize the efficiency of the development program.

1. TPP for medical device (simple test). Zaïre ebolavirus rapid test to be used in the control of the Ebola outbreak in West Africa

| KEY FEATURES | DESIRED | ACCEPTABLE |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PRIORITY FEATURES | | |
| Target population | Patients presenting with fever to health care facilities for assessment. | |
| Target use setting | Decentralized health care facilities with no laboratories infrastructure available | Decentralized health care facilities with minimum laboratory infrastructures available. |
| Intended Use | In Ebola outbreak setting, distinguish between symptomatic patients with acute Ebola virus infection and non-Ebola virus infection without the need for confirmatory testing | In Ebola outbreak setting, distinguish between symptomatic patients with acute Ebola virus infection and non-Ebola virus infection with the need for confirmatory testing |
| Clinical sensitivity ^{a, b} | > 98% | >95% |
| Analytical specificity | >99% | >99% |
| Type of analysis | Qualitative or Quantitative | Qualitative |
| Sample type | <ul style="list-style-type: none"> Capillary whole blood from finger stick once/if the use of this type of samples has been validated. Other less invasive sample types (e.g., saliva, buccal) once/if their use has also been validated | Whole blood from phlebotomy, in particular if collection is simple and automated to reduce biosafety requirements |

| TEST PROCEDURE | | |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Number of steps to be performed by operator (use of different reagents/incubation steps) | < 3 0 timed steps | <10 1 timed step |
| Biosafety ^c | No additional biosafety in addition to Personal Protective Equipment ^c | No additional biosafety in addition to Personal Protective Equipment ^c |
| Need for operator to transfer a precise volume of sample | No | Acceptable if adequate disposable blood transfer device is provided |
| Time to result | < 30 minutes | < 3 hours |
| Internal control | included | included |
| Sample preparation Need to process sample prior to performing the test | None or fully integrated | None or fully integrated |

| KEY FEATURES | DESIRED | ACCEPTABLE |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OPERATIONAL CHARACTERISTICS | | |
| Operating conditions | 5- 50°C 90% RH | 5 – 40°C 90% RH |
| Reagent storage (stability) | 24 months at 40°C + 90% RH; no cold chain should be required. Should be able to tolerate stress during transport (3 days at 50°C) | 12 months at 30°C + 70% RH including 3 months at 40°C, no cold chain should be required. Should be able to tolerate stress during transport (3 days at 50°C) |
| In use stability (under tropical conditions) | >1 hour for single use test after opening the pouch | >½ hour for single use test after opening the pouch |
| Reagents reconstitution Need to prepare the reagents prior utilization | All reagents ready to use | Reconstitution acceptable if very simple to do. All liquids, including water, already in kit |
| Training needs Time dedicated to training session for end users | Less than half a day for any level health care worker. Job aid provided. | Less than 2 days for any level of health care worker. Job aid provided |
| Equipment (if needed) | Small and portable, handheld instrument Weight <2 kg | Small, table top device, portable |
| Power Requirements | None required Optional: 110-220 V AC current DC power with rechargeable battery lasting up to 8 hours of testing | 110-220 V AC current DC power with rechargeable battery lasting up to 8 hours of testing |
| Need for maintenance/spare parts | None | 1 annual calibration ideally by operator |

| PRICING (To be discussed) | | |
|----------------------------------------------------------------------|--|--|
| Cost per consumables (e.g. cartridges, strips,...) (for procurement) | | |
| Cost per equipment (if needed) (for procurement) | | |

^a clinical sensitivity in first 10 days of presentation. Allow for repeat testing as per WHO guidelines

^b reference test: Lab validated quantitative PCR assay on blood sample (whole blood or plasma) drawn by phlebotomy

^c biosafety resources for Ebola: <http://www.who.int/csr/disease/ebola/en/>;
http://www.who.int/csr/resources/publications/ebola/filovirus_infection_control/en/

WHO, 3 October 2014
<https://www.finddx.org/wp-content/uploads/2016/02/WHO-TPP-ebola-2014.pdf>

2. TPP for medical device (diagnostics). Point-of-care diagnosis for Chagas disease

Table 1. TPP for point-of-care diagnosis for patients in the acute phase of Chagas disease.

| Needs for Diagnosis | Medical Conduct | Samples and Sampling | Infrastructure | Technical Skills | Testing Site, Turnaround Time | Reading | Taxonomic Diagnosis | Sensitivity | Specificity |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Congenital transmission | Serodiagnosis of pregnant women and women admitted at delivery living or born in endemic countries (knowing that >70% have no signs or symptoms) | Samples processed individually. (i) Maximum. 2 ml of cord or peripheral blood obtained specifically for diagnostic test; (ii) Blood sample collected for routine screening for infectious or metabolic diseases; (iii) Ideal: urine sample | (i) Ideal: processing at point of care; (ii) Less desirable: samples processed in a reference laboratory transported without cold chain | Good laboratory practices (GLP)–trained technical staff with quality certification. Screening conducted by staff who assisted the childbirth | Primary health centre (PHC), hospital or delivery institution. Ideal timing: <1 h, up to a maximum of 12 h from sampling | Qualitative | Single universal test should detect all circulating strains | >95% | 100%. Ideal: integrated into routine health care screening (e.g., metabolic screening) |
| Vector and oral transmission | (i) Differential diagnosis for at risk population with febrile syndrome; (ii) Active search in cases of possible exposure (contacts) | Samples processed individually. (i) 2–5 mL blood or serum; (ii) Ideal: urine, saliva sample | (i) Ideal: processing at point of care; (ii) Less desirable: samples processed in a reference lab and transported without cold chain | GLP-trained technical staff with quality certification | PHC and/or community-based diagnosis facility. Ideal timing: <1 h from sampling | Qualitative/quantitative | Single universal test should detect all circulating strains | >95% | 100%. Ideal: integrated into routine health care screening (e.g., metabolic screening). Should differentiate <i>T. cruzi</i> from <i>T. rangeli</i> |
| Reactivation of infection associated with immune suppression in organ transplants. Blood transfusion transmission | Active surveillance | Samples processed individually. Blood, cerebral spinal fluid, tissue from chagoma | (i) Ideal: processing at point-of-care; (ii) Less desirable: samples processed in a reference laboratory and transported without cold chain | GLP-trained technical staff with quality certification | Reference medical facility, blood banks, and hospital. Ideal timing: <1 h from sampling | Qualitative/quantitative | Single universal test should detect all circulating strains | >95% | 100%. Ideal: integrated into routine screening. Should differentiate between <i>T. cruzi</i> and <i>T. rangeli</i> . In the case of diagnosis in central nervous system manifestations of HIV/AIDS, it should differentiate <i>T. cruzi</i> from other opportunistic infections, such as toxoplasmosis. |

Table 2. TPP for point-of-care diagnosis for patients in chronic phase of Chagas disease.

| Needs for Diagnosis | Medical Conduct | Samples and Sampling | Infrastructure | Technical Skills | Testing Site, Turnaround Time | Reading | Taxonomic Diagnosis | Sensitivity | Specificity |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------|
| Asymptomatic infected patients, referred symptomatic individuals, and positive blood donors | Active search in endemic/nonendemic and remote areas; prenatal screening | Samples processed individually. Ideal: saliva/urine; Alternative: whole blood, plasma or serum | Point of care, including community-based facility external to health center (no transportation required) | Adequately trained technical staff or community works with minimum quality certification standards | PHC and community setting (home, school, or community center); Ideal timing: <1 h from sampling | Qualitative | Single universal test should detect all circulating strains | Equal to or greater than standard serological tests | 100%. No cross-reaction with other parasites (e.g., <i>Leishmania</i> , <i>T. rangeli</i>) |

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<https://www.finddx.org/wp-content/uploads/2016/02/Porras-TPP-PoC-ChD-DX-ToC-2015.pdf>

3. TPP template for a drug

Suggested key sections, complete as necessary

| TARGET | ANNOTATIONS |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <i>outcome of the indicated studies</i> | <i>summary of planned studies to support the target</i> |
| Indication and usage <i>disease or condition</i> | |
| Dosage and administration <i>route of administration, recommended dose</i> | |
| Dosage Forms and Strengths <i>potency, characteristics of dosage forms</i> | |
| Contraindications <i>increased risk of harm because of age, sex, known, not theoretical, hazards</i> | |
| Warnings and Precautions <i>description of clinically significant adverse reactions and potential safety hazards and limitations of use</i> | |
| Adverse Reactions <i>categorized by body system, severity of the reaction, or in order of decreasing frequency</i> | |
| Drug Interactions <i>clinically significant interactions, either observed or predicted</i> | |
| Use in Specific Populations <i>Limitations, need for monitoring, specific hazards, differences in response,</i> | |
| Drug Abuse and Dependence <i>types of abuse, potential for dependence and characteristic effects</i> | |
| Overdosage <i>signs, symptoms, complications</i> | |
| Description <i>proprietary name and established name, dosage form and route of administration, qualitative and quantitative ingredients, pharmacologic or therapeutic class,</i> | |
| Clinical Pharmacology <i>summary of the clinical pharmacology and actions of the drug in humans</i> | |
| Nonclinical Toxicology <i>carcinogenesis, mutagenesis, impairment of fertility, animal toxicology and/or pharmacology</i> | |
| Clinical studies <i>studies that support statements about the efficacy or safety benefits</i> | |
| How Supplied/Storage and Handling <i>information about the available dosage forms to which the labeling will apply and for which the manufacturer or distributor will be responsible</i> | |
| Patient Counseling Information <i>information for prescribers to convey to patients to use the drug safely and effectively</i> | |
| Other important information, as necessary: | |

For more specific information please refer to FDA TPP guide (template in Appendix C, pg. 13):<https://wayback.archive-it.org/7993/20190907022334/https://www.fda.gov/regulatory-information/search-fda-guidance-documents/target-product-profile-strategic-development-process-tool>