How to Use This Statistical Analysis Plan Template

This Statistical Analysis Plan (SAP) template has been created by the Ottawa Methods Centre (OMC), drawing on the recommendations presented in the *Guidelines for the Content of Statistical Analysis Plans in Clinical Trials* (Gamble C, Krishan A, Stocken D, et al.). Users of this SAP are encouraged to cite the above-mentioned article as: Gamble C, Krishan A, Stocken D, et al. Guidelines for the Content of Statistical Analysis Plans in Clinical Trials. JAMA. 2017;318(23):2337–2343. doi:10.1001/jama.2017.18556

Details for each section should be completed as reported in the study's protocol and case report form. SAP authors should consult with members of the trial team (as needed) to populate the final report. Depending on the study, some sections may not be applicable, in which case they may be deleted.

This template includes sample text (presented in *italics*) for the consideration of those completing the SAP. Examples are intended to provide guidance and are not meant to be prescriptive. The exact content will depend on what is appropriate for a particular study and can vary accordingly. Individuals needing direction on how to complete this SAP are encouraged to consult with the OMC.

This section on how to use the template should be deleted prior to sharing any draft or final version of your SAP.

Statistical Analysis Plan

Section 1: Administrative Information

Date	
Study Title	
Study Registration Number	
SAP Version Number	*Version 1.0*
Protocol Version and Date	*Version 8.0 (31/07/2019)*
Trial Statistician	*Jane Doe*
Trial Principal Investigator	*John Deer*
SAP Author(s)	*Jay Smith*

Revision Control

Protocol Version	Updated SAP version number	Section number changed	Description of change	Date changed

SAP Signatures

SAP Version Number being approved: _____
I approve the attached SAP entitled <STUDY TITLE> dated <SAP VERSION DATE>"

Trial Statistician
Name: _____
Signature: _____
Date: _____

Senior Statistician
Name: _____
Signature: _____
Date: _____

Trial Principal Investigator
Name: _____
Signature: _____
Date: _____

Roles and responsibilities

Name	Role	Institution
Jane Doe	*Trial Statistician*	*OHRI - Ottawa Methods Centre*
John Deer	*Trial Principal Investigator*	*University of Manitoba*
Jay Smith	*Senior Statistician*	*OHRI - Ottawa Methods Centre*

Contributions

Jay Smith developed the statistical analysis plan (SAP) based on the analyses set out in the trial protocol. Jane Doe is the trial statistician and helped answer questions related to trial data and management relevant to the development of the SAP. Jay Smith, Jane Doe, and John Deer reviewed, and approved the SAP.

Abbreviations and Definitions

All abbreviations and acronyms used in the SAP, along with their definitions, should be provided and listed in alphabetical order. The list of abbreviations and acronyms should be updated throughout preparation of the SAP and reviewed after its finalization to ensure that all the abbreviations have been noted. It is standard practice, however, to spell out abbreviated terms and to specify their abbreviation in parentheses at their first mention in the text.

Section 2: Introduction

Background and Rationale

This should be a brief summary (approximately one paragraph) of the important background information from the protocol. This information should come directly from the protocol and should not be re-written. Readers can be directed to additional protocol sections if needed.

Objectives

This section describes the overall purpose or hypotheses of the study; content can often be taken directly from the protocol.

Section 3: Study Methods

3.1 Trial Design

Identify the trial design, including the study category (ex. parallel group, crossover, multi-armed, factorial) and allocation ratio. Brief descriptions of interventions can be listed. Information to include:

- Type of control(s) used
- The sequence and duration of all study periods such as screening, baseline, active treatment, and follow-up
- The procedure used for assigning treatment
- The method and level of blinding

- At what instance subjects are randomised relative to treatments, events and study periods.

3.2 Randomization

The randomisation and blinding methodology need to be described sufficiently enough to ensure reproducibility. This information can come from the protocol but depending on the study it may need to be supplemented. Confirm whether the study you're conducting allows for certain information to be included in the SAP (ex. double-blind study) rather than the final study report.

3.3 Sample Size

This section should provide a full sample size calculation or point to the sample size calculation in the protocol.

3.4 Statistical Interim analyses and stopping guidance (if applicable)

Provide a rationale for the necessity of interim analyses. Any learning outcomes from the interim analyses can be used to adjust the design of the rest of the study through the Data Monitoring Committee. All data that will be analysed needs to be identified explicitly (e.g. baseline data, treatment received, etc.) and all timepoints need to be listed. Identify any formal stopping rules and, if appropriate, document the probability of stopping for futility, efficacy, or moving on to the next stage. Specify whether the sample size requires adjustment at the interim analysis stage. Documentation of the available data at each interim analysis should be retained, including any corresponding analysis plans, programming code, and reporting created.

3.5 Timing of final analysis

Document details surrounding the timing and conditions for the final analyses to be performed. This includes how data will be cleaned as well as what locking procedures will be followed.
Ex.: *The trial is due to finish with the last 12-month follow-up appointment (scheduled around the end of March 2022). The data will be cleaned, verified, and locked. Final analysis will commence once the final lock has been confirmed by the Principal Investigator*.

3.6 Timing of outcome assessment

Outline the measurement of outcomes relative to the time points they will be recorded on, including visit windows when time of assessment may be variable.

Section 4: Statistical Principles

4.1 Confidence Intervals and P-values

Describe what confidence intervals and p-values will be reported, as well as what level of significance will be used for hypothesis tests. If applicable, describe any adjustments for multiplicity.

4.2 Adherence and protocol deviations

Describe how adherence to the intervention is defined and how it will be assessed. Outline the specific protocol deviations that could impact the analysis (e.g. major deviations and a definition of such) and specify the methods used to identify and investigate them. Define which deviations could cause a subject to be excluded from the analysis population.

4.3 Analysis populations

This section should clarify all necessary characteristics for each population that is included in the study's analysis. All populations should be identified with a formal title and defined (ex. full analysis, intention to treat, per protocol, safety); corresponding criteria is defined for appropriate subject assignment to each respective population.

A Note on "Intention to Treat":
"Intention to treat" describes how subjects are assigned to a treatment group for the purposes of analysis, however, it can be used within **any** analysis population and **is not** an adequate description for a population.

Ex. ***Full Analysis Population***

- *All subjects who received any study treatment*
- *All subjects who received any study treatment and who participated in at least one post-baseline assessment*
- *All subjects who were randomised*

Each subject's inclusion or exclusion status relative to each analysis population needs to be assigned (before the blind is broken) and listed in this section.

Section 5 – Trial Population

5.1 Eligibility

Provide a list of criteria for eligibility. Note whether changes to eligibility criteria occurred at any point in the study (ex. after 1st patient randomization).

5.2 Withdrawal/Follow-up

Describe the circumstances and specifics related to how withdrawal/lost to follow-up data will be handled and exhibited.

5.3 Baseline Patient Characteristics

Identify all data for each participant that will be considered as a baseline variable before any intervention is applied. Keep in mind that randomised controlled trials aim to compare groups of participants that differ only with respect to the intervention (treatment); while proper random assignment prevents selection bias, it does not guarantee that the groups are equivalent at baseline—e.g., any differences in baseline characteristics are the result of chance rather than bias.

Section 6 – Analysis

6.1 Outcome Definition

Outline and explain all primary and secondary outcomes. Include the specification of outcomes as they relate to timing and list the order in which primary or key secondary end points will be tested.

6.2 Analysis Methods

Describe what method of analysis will be used and how the effects of treatment will be presented. Provide commentary on covariates, whether continuous or categorical if they are likely to have an influence on specific endpoints. Include information on sensitivity analysis for each outcome (if applicable) and the analysis of sub-groups (if applicable)

6.3 Missing Data

This section is intended to be a general explanation of the approach to missing data. Use it to explain how cases of discontinuing the study or treatment prematurely and missing data will be handled. Include consideration of possible biases the techniques used to handle missing data could introduce. Identify all underlying assumptions in both statistical and non-statistical terms.

6.4 Harms

Provide details regarding the methods of describing the safety data that will be used in the final report. Include general descriptions of the methods. Note if any of the items require a unique approach. This includes how adverse events will be coded and how adverse event data will be analysed.