

## Statistics in regulatory affairs in [Wikipedia](#): Initiative of the ISCB Statistics in Regulatory Affairs Subcommittee

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Wikipedia is a free-access, free-content, multi-language Internet encyclopaedia ranked among the ten most popular websites worldwide. The category “Statistics” in the English Wikipedia currently contains about 3,600 articles. Statisticians working in a regulated environment (e.g. the pharmaceutical and healthcare industry) are expected to have a sound knowledge and understanding of the regulatory requirements that affect the design, conduct, analysis and reporting of their studies. Regulatory guidance for the pharmaceutical and medical devices industry exists at the international level (e.g. ICH), as well as at the regional/national level (e.g. EMA in Europe, FDA in USA and PMDA in Japan). Furthermore, statistical regulatory guidance is found under general topics (e.g. Good Clinical Practice) and specific ones either explicitly related to statistics (e.g. Statistical Principles for Clinical Trials) or not explicitly related (e.g. Special Populations: Geriatrics or Clinical Trial Endpoints in Oncology). This large volume and diversity of documents and information sources is subject to regular revisions. Hence, individual statisticians must devote considerable time and effort to keep themselves adequately informed and educated about regulatory requirements. Our objective is to initiate and contribute to the development of a comprehensive source of references for statistics in regulatory affairs guidance documents and related articles in the English Wikipedia. The aim of this paper is to describe the Wikipedia Initiative and encourage corresponding contributions to Wikipedia from the ISCB members and the wider statistical community.

*Key words:* Wikipedia, Regulatory Affairs, Guidance, Guideline, ISCB.

Supporting Information for this article is available at the ISCB homepage:

[http://www.iscb.info/Committees/Statistics-in-Regulatory-Affairs-\(SiRA\).html#wiki](http://www.iscb.info/Committees/Statistics-in-Regulatory-Affairs-(SiRA).html#wiki)

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## 1 Introduction

The pharmaceutical and medical devices industry became highly regulated after the tragedies resulting from the use of Thalidomide, which was marketed in 1957 without having been tested under adequate and well-controlled conditions<sup>[1]</sup>. Biostatistics plays an ever increasing role in bringing safe and efficacious medicinal products to the market. This success is partly due to the foresight of some biostatisticians who insisted on the importance of statistics in drug development and created groups of specialized biostatisticians within regulatory agencies<sup>[2,3]</sup>. It has been recognised that sound academic education, practical training, adequate experience and continued professional development are essential for “qualified statisticians” working in a regulated environment<sup>[4]</sup>.

A large volume and variety of regulatory “guidances” were initially developed by the Food and Drug Administration (FDA) in the USA and “guidelines” by the European Medicines Agency (EMA) in Europe. Furthermore, other regions of the world issued regulatory guidance, for example, the Pharmaceutical and Medical Devices Agency (PMDA) in Japan. A plan for harmonization of guidance across Europe, Japan and the USA was started in 1989 and the first meeting of the International Conference for Harmonization (ICH) was held in 1990 in Brussels (<http://www.ich.org/about/history.html>).

For health technology assessment (HTA) a number of national guidance papers are available from the corresponding national HTA organizations, such as the Institute for Quality and Efficiency in Health Care (IQWiG) in Germany (<https://www.iqwig.de>), the National Institute for Health and Care Excellence (NICE) in UK (<https://www.nice.org.uk>), the Agency for Healthcare Research and Quality (AHRQ) in USA (<http://www.ahrq.gov>) and the Canadian Agency for Drugs and Technologies in Health (CADTH) (<https://www.cadth.ca>). In Europe, EUnetHTA (<http://www.eunethta.eu>) was established in 2005 to create an effective and sustainable network for HTA to support collaboration between European HTA organizations. EUnetHTA Guidelines have been developed to help the assessors of evidence to process, analyse and interpret the data (<http://www.eunethta.eu/eunethta-guidelines>).

Regulatory affairs, also called government affairs, covers a variety of professions within regulated industries (e.g. pharmaceutical and medical devices) where biostatisticians are expected to implement regulatory guidance into their work practices. Statistical guidance covers the design, conduct, analysis and reporting of clinical studies at different levels of detail depending on the nature of the regulatory guidance. The general guidances, such as Good Clinical Practice (ICH E6-R2)<sup>[5]</sup>, tend to have a short section on “Statistics”, whereas the specific statistical guidances, such as Statistical Principles for Clinical Trials (ICH E9)<sup>[6,7]</sup>, are explicitly devoted to statistical topics. Biostatisticians can also expect to find statistical guidance sections where it is not explicit from the title (e.g. Special Populations: Geriatrics (ICH E7)<sup>[8]</sup> or Clinical Trial Endpoints for the Approval of Cancer Drugs and Biologics (FDA)<sup>[9]</sup>).

## 1.1 Motivation

The statistical community in the regulated environment encounters an ever increasing volume of regulatory guidances and faces the challenge of keeping up with new methodological advances in the multi-disciplinary collaboration that is required to develop and market a medicinal product or device. Hence, there is a need for a shared depository of regulatory guidance in a free and open-access medium. Our objective is to initiate and contribute to the development of a comprehensive source of references for statistics in regulatory affairs guidance documents and related articles in the English Wikipedia. The aim of this paper is to describe the Wikipedia Initiative and encourage corresponding contributions to Wikipedia.

## 1.2 Project plan and implementation

The Statistics in Regulatory Affairs Sub-Committee (SiRA SC) of the International Society for Clinical Biostatistics (ISCB) started the Wikipedia Initiative at their Annual Conference in Utrecht (2015) with a discussion session and developed an initial plan with timelines for the project. The project was envisaged to be implemented in two stages: 1) initiation of a structure for making entries into Wikipedia under the term “List of Guidances for Statistics in Regulatory Affairs”; and 2) initiation of a process for creating articles. The project was approved by the ISCB Executive Committee. A “List of Guidances for Statistics in Regulatory Affairs” was drafted and posted in Wikipedia in 2016

([https://en.wikipedia.org/wiki/List\\_of\\_Guidances\\_for\\_Statistics\\_in\\_Regulatory\\_Affairs](https://en.wikipedia.org/wiki/List_of_Guidances_for_Statistics_in_Regulatory_Affairs)). The project was subsequently presented in a poster at the ISCB Annual Conference in 2016 within a framework of a brief user guide<sup>[10]</sup>. Furthermore, an Outline for the (English) Wikipedia Page was developed in Word format by the SiRA SC in the last quarter of 2016 and it was posted in Wikipedia ) in the first quarter of 2017

([https://en.wikipedia.org/wiki/Guidances\\_for\\_statistics\\_in\\_regulatory\\_affairs](https://en.wikipedia.org/wiki/Guidances_for_statistics_in_regulatory_affairs)). It includes a link to the aforementioned Wikipedia List, which was updated in parallel with posting of the Wikipedia Page. Both the Page and the List underwent Wikipedia’s internal review process and were “accepted”. Subsequently, the List has been developed further by the SiRA SC members.

A Wikipedia User Guide<sup>[11]</sup> was developed by the ISCB SiRA SC specifically for this Initiative in 2017. The User Guide and the above-mentioned Outline were the subject of a Poster<sup>[12]</sup> that was presented by the SiRA SC at the Annual ISCB conference in 2017 ([http://www.iscb.info/Committees/Statistics-in-Regulatory-Affairs-\(SiRA\).html#wiki](http://www.iscb.info/Committees/Statistics-in-Regulatory-Affairs-(SiRA).html#wiki)).

## 2 Working in Wikipedia

This section provides a general overview for readers who are not very familiar with contributing to Wikipedia. Working within Wikipedia requires some understanding of how information is structured therein and how to collaborate in a group on a subject of common interest, such as the “Guidances for statistics in regulatory affairs”. In

order to contribute to Wikipedia, it is advisable to open an account. A detailed description on contributing within Wikipedia is provided on the website ([https://en.wikipedia.org/wiki/Wikipedia:Contributing\\_to\\_Wikipedia#Help\\_resources\\_and\\_interactive\\_assistance](https://en.wikipedia.org/wiki/Wikipedia:Contributing_to_Wikipedia#Help_resources_and_interactive_assistance)) and some key topics are dealt with briefly below.

## 2.1 Organising information

A **Portal** in Wikipedia is a gathering point for a certain topic or related topics that helps readers and editors to navigate their way to relevant information. One Portal of interest here is “Statistics”, which presents a good selection of statistical articles, images, and biographies amongst others: (<https://en.wikipedia.org/wiki/Portal:Statistics>).

**Categories** and **subcategories** are intended to group pages on similar subjects, helping readers to find and navigate around a subject area. We have chosen to use the pre-existing category “Biostatistics” and eventually generate the subcategory “Statistics in Regulatory Affairs” to tag all articles created within this initiative.

Among a range of possibilities of entering material on a particular topic, some are described below:

- (i) **Wikipedia Articles** are **Pages** with encyclopaedic content (e.g. [https://en.wikipedia.org/wiki/Minimal\\_clinically\\_important\\_difference](https://en.wikipedia.org/wiki/Minimal_clinically_important_difference)).
- (ii) **Lists** are used to list articles related to specific topics (e.g. [https://en.wikipedia.org/wiki/Wikipedia:WikiProject\\_Statistics/List\\_of\\_statistics\\_categories](https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Statistics/List_of_statistics_categories) and [https://en.wikipedia.org/wiki/List\\_of\\_statistics\\_articles](https://en.wikipedia.org/wiki/List_of_statistics_articles)).
- (iii) **Glossaries** are alphabetical lists of terms related to a specific topic with the definitions for those terms (e.g. [https://en.wikipedia.org/wiki/Glossary\\_of\\_probability\\_and\\_statistics](https://en.wikipedia.org/wiki/Glossary_of_probability_and_statistics)).

## 2.2 Collaborating on a project

**WikiProject** is a group of contributors who work together as a team to improve Wikipedia. These groups often focus on a specific topic area (e.g. Statistics), a specific location or a specific kind of task (e.g. checking newly created pages). The English Wikipedia currently has over 2,000 WikiProjects, each with varying levels of activity. For example, in 2014 the Cochrane Collaboration announced that it had entered into a partnership with Wikipedia's WikiProject Medicine, "to improve the reliability and accessibility of Wikipedia medical information online". WikiProject pages are not used for writing encyclopaedia articles directly, but as resources to help coordinate and organise the group's efforts at creating and improving articles. A WikiProject often writes advice for editors, uses so-called “**bots**” to track what is happening to articles of interest to the group, and creates lists of tools and templates their members commonly use. The discussion pages attached to a project page are a convenient forum for those involved in that project to talk about what they are doing,

to ask questions, and to receive advice from other people interested in the group's work (e.g. [https://en.wikipedia.org/wiki/Wikipedia:WikiProject\\_Statistics](https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Statistics)).

**User pages** are useful for organising and aiding the work users do on Wikipedia, and facilitating interaction and sharing between users. User pages are mainly for interpersonal discussion, notices, testing and drafts (via “**Sandboxes**”) and, if desired, limited autobiographical and personal content.

### 2.3 Writing and review process

The writing process is aided by the use of editing tools:

- (i) **Templates** help to maintain consistent formatting and aid navigation between articles.
- (ii) **Infobox** on Wikipedia is a consistently-formatted table which is present in articles with a common subject. A complete list of **Infoboxes** is available at: [https://en.wikipedia.org/wiki/Wikipedia:List\\_of\\_infoboxes](https://en.wikipedia.org/wiki/Wikipedia:List_of_infoboxes).

Several aids are available for the review process and some are described below:

- (i) **Talk page** (also known as a discussion page) can be used by editors to discuss improvements of an associated article or project page. When viewing an article (or any other non-talk page), a link to the corresponding Talk page appears on the “**Talk**” tab at the top of the page. Clicking on this tab switches to the Talk page. The Talk Pages related to our Guidances for Statistics in Regulatory Affairs initiative may provide information about the format the Articles must follow, a “**To-Do List**” for anyone interested to collaborate, and a space for open discussion. Indications about the format that is used for adding new references to a **List** are found on its Talk page.
- (ii) **Watchlist** is used to follow Articles that one is interested in, by including them therein. One is notified anytime there is a change on the Articles in the User’s Watchlist. This might be useful in this project to remain updated about any new documents included in the “List of Guidances for Statistics in Regulatory Affairs”. The Watchlist may contain those guidances that are currently in preparation or in revision.

## 3 Dissemination plans for the Wikipedia Initiative

This paper, the User Guide<sup>[10]</sup> and the Poster<sup>[11]</sup> are planned to be disseminated to the ISCB members for encouraging contributions to the Wikipedia Page and List. It is to be noted that the Outline that is detailed in the Poster lays down a common basis for contributing to the Wikipedia Page.

Similarly, a wider dissemination to other relevant professional societies and organisations will be carried out to encourage world-wide use and contribution to the Wikipedia Page and List.

The ISCB SiRA SC members plan to oversee further development and implementation of the aforementioned Outline in the English Wikipedia, with future plans for regular monitoring and moderating of the Wikipedia contributions.

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### **Conflict of Interest**

The authors have declared no conflict of interest.

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