Interactive Data Visualization of Adverse Events
Clinical Trial Data with the D3.js script
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Objectives
Interactive data visualization of data can provide a clear and straightforward way of quickly communicating information.

The purpose of this poster is to demonstrate the potential to display adverse events information using a force directed graph motif. This approach makes it possible to interact with the display, for example, to drag pie charts around and zoom in and out with standard browser functionality. Graphic lines represent the hierarchy between MedDRA System Organ Class (SOC) and Adverse Reaction Terms. Size of each pie slice is proportional to the frequency of adverse events. Outer radius of pie charts is double when the adverse event is serious. Inner radius is reduced by half when it is SOC category element. Color represents the medicinal product group.

Methods
The data structure is the key element. Raw data have been transformed to structured json format which contains node information and children details. Several functions from D3.js library were used to perform this data visualization. Firstly, the d3.layout.tree() function parses our preformatted data structure and builds links between elements, then this d3.layout.force() function allows us to draw force directed graph. And finally, the d3.layout.pie() and the d3.svg.arc() functions are used to display nodes. The web page needs to be served from a web server to enable the JavaScript library to run and to be accessed from a JavaScript enabled web browser.

Figure 1. Interactive data visualization force directed graph of Adverse Events

Results
Figure 1 below shows the typical representation of the selected data. As can be seen a considerable amount of data can be displayed in one view.

Figure 1 Interactive data visualization force directed graph of Adverse Events with the D3.js script library showing the distribution of adverse events broken down by SOC and then treatment regimen.

Figure 2. Drill down to more specific data on hovering over a particular pie slice.

Conclusions
This interactive data visualization provides a powerful overview of adverse events. One way of displaying a complex arrangement of hierarchical data is shown. However, clearly there are many different approaches that can be considered. Many alternatives are possible. Equally important is that such analysis can be performed quickly and easily.

Use of the D3 library makes it easy and straightforward to produce these kinds of visualization. This approach can be extended to facilitate search of a specific adverse event or drill down to the actual data when a pie chart is hovered over. It clearly offers huge potential to display all sorts of data inside and outside clinical research.

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References
Information extracted from the Canada Vigilance Adverse Reaction Online Database on the 17th of April 2014:
http://webprod3.hc-sc.gc.ca/arquery-recherche/index-eng.jsp
Further details about interpretation of suspected adverse reaction data on Health Canada website:

Nota bene, numerical comparisons should not be made between reactions associated with different health products on the basis of the data in these line-listings. D3 Data-Driven Document JavaScript library version 3.4.6 downloaded on the 17th of April 2014: http://d3js.org/