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# Time variation of some selected topics in bioethical publications

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## ABSTRACT

**Objective:** To analyse the time variation of topics in bioethical publications as a proxy of the relative importance.

**Methods:** We searched the Medline database for bioethics publications using the words "ethics or bioethics", and for 360 specific topics publications, associating Medical Subject Heading topic descriptors to those words. We calculated the ratio of bioethics publications to the total publications of Medline, and the ratio of each topic publications to the total bioethics publications, for five-year intervals, from 1970 to 2004. We calculated the time variation of ratios, dividing the difference between the highest and lowest ratio of each topic by its highest ratio. Four topics were described, selected to illustrate different patterns of variation: "Induced Abortion", "Conflict of Interest", "Acquired Immunodeficiency Syndrome", "Medical Education."

**Results:** The ratio of bioethics publications to total Medline publications increased from 0.003 to 0.012. The variation of the topic's ratios was higher than 0.7 for 68% of the topics. The Induced Abortion ratios decreased from 0.12 to 0.02. Conflict of Interest ratios increased from zero to 0.07. The Acquired Immunodeficiency Syndrome ratios were nearly zero in the first three intervals, had a peak of 0.06 during 1985–9, followed by a decrease to 0.01. Medical Education ratios varied few, from 0.04 to 0.03.

**Conclusions:** There was an increase of bioethical publications in the Medline database. The topics in bioethics literature have an important time variation. Some factors were suggested to explain this variation: current legal cases, resolution of the issue, saturation of a discussion and epidemiologic importance.

It can be perceived that the literature on bioethics has some favorite topics, and that these topics change with time.<sup>1</sup> Turner affirmed that nowadays topics such as embryonic stem cell research or cloning attract a lot of attention from editors and readers, and that in the 1980s and 1990s palliative care topics were in that place.<sup>1</sup> However, few studies have been carried out to analyse this fact.

One study<sup>2</sup> verified the topics addressed by empirical research publications in nine international bioethics journals from 1990 to 2003, showing that great importance is given to euthanasia, theoretical perspectives on ethics and informed consent. However, this study was limited to bioethical journals and did not present the variation of the topics with the years, only a total number of each article.

Sugarman<sup>3</sup> reviewed publications of empirical research in bioethics present in the Medline database from 1980 to 1999, showing an increase

in the percentage of empirical studies. In the analysis of the topics of those studies, he has shown that the number of studies about each topic "fluctuates", and that there is a rise in the number of empirical studies on genetics and genetic screening. However, the analysis of the topics was not a central point of this study and was not properly described. In addition, this study was limited to empirical research, not covering most bioethics publications. Others studies focused on analysing time variation of topics in a field publications,<sup>4</sup> but not on the bioethics field.

This study presents an analysis using counts of publications of different topics on bioethics from 1970 to 2004. We aimed to verify and describe the presence of bioethical publications in the Medline database and the time variation of some topics in these publications.

The number of publications on a topic can indicate the importance the bioethics community assigns to it. Therefore, a better understanding of what is published can help to grasp what and why bioethicists study. In this work we analyse the variation of topics and try to understand the trends and influences of other fields of research in bioethics.

## METHODS

Bibliometrics is the analysis of a body of literature to reveal the historical development of subject fields and patterns of authorship, publication, and use.<sup>5</sup> Bibliometric methods are widely used to measure the impact of articles and journals through citation analyses, as well as to evaluate scientific production of researchers, institutions or countries.<sup>6</sup> An activity measurement, using counts of articles, can provide indicators of the scientific production in a subject.<sup>7</sup> This study uses a bibliometric approach, with counts of articles, to analyse the given importance of some topics in bioethics and its variation with time.

We used the National Library of Medicines Medical Subject Headings (MeSH) as topic descriptors. MeSH is a controlled vocabulary, hierarchically organised, used to describe the content of articles indexed in the Medline, as well as retrieve results in Medline searches.<sup>8</sup> We searched the MeSH database for the words present in the table of contents of the Encyclopedia of Bioethics,<sup>9</sup> and in the National Reference Center for Bioethics Literature Library Classification Scheme.<sup>10</sup> With the results, we created a list of 360 MeSH terms that represented bioethics topics.

In order to find the number of publications included in the Medline database, we searched it with an empty search query. We limited the results

by the publication date, in five-year intervals, from 1970 to 2004. We limited our search to the Medline database to guarantee that all publications studied were indexed with MeSH terms. We did not use the complete Pubmed database because it includes non-life sciences topics and publications that are not completely indexed.<sup>11</sup> Our search initiated in the year 1970 because Medline starts indexing in 1966<sup>11</sup> and the interest in bioethics increased around this decade as well. Our search ends in the year 2004 to fit into the five-year intervals and to avoid changes in the number of results caused by recently indexed publications.

In order to find the number of bioethics publications included in the Medline database, we searched it for the words “ethics or bioethics”. We used the same publication date limits already used. This search for the words “ethics or bioethics” occurred in all fields, including title, abstract, MeSH terms and subheadings, and was intended to find all publications with some bioethics content. When using the word “ethics”, the search engine automatically includes all the MeSH terms hierarchically placed below it—for example, “conflict of interest”, “morals”, “personal autonomy”—what is called “explode the term”. In addition, the search for the word “ethics” in the MeSH subheadings allows retrieval of publications not indexed with ethical MeSH terms, but with some ethical focus—for example, “Organ Transplantation/ethics.” Therefore, this search can be considered quite comprehensive.

In order to find the number of bioethics publications included in the Medline database about each topic previously listed, we searched it for the “topic” in the MeSH field and the words “ethics or bioethics” in all fields. We used the same publication date limits already used. The field “MeSH Terms” represents the MeSH subject descriptors given to the publication on its indexing. We limited the search of the topic to this field to find publications where that was an important topic, not only a word present in the abstract.

In this article, we presented results from searches made in the first semester of 2006. The number of results may vary slightly in posterior searches, due to variations of the Medline database such as indexing new publications or journals. The search results are presented in table 1.

The ratio of a topic’s number of publications to the total number of publications of a field was used as an indicator of the topic’s relative importance in this field. After the searches, we divided the number of results found to determine two ratios: the ratio of bioethics publications to the total publications of Medline, and the ratio of each topic publications to the total bioethics publications. These ratios were determined for every five-year interval, allowing the analysis of their variation with time. The bioethics/total Medline publications ratios are presented in fig 1.

We determined the variation of each topic’s ratios as the difference between the highest and the lowest ratio found for that topic. Those variations were divided by the highest ratio of that topic, to indicate the impact of this time variation in the topic’s ratios. These results are presented in fig 2.

We selected four topics with different patterns of time variation to include in this article. We selected three topics with a high variation of its publications ratio in the total bioethics publications, and one with a low variation. The three selected topics were: “Induced Abortion”, because it had a clear decreasing pattern; “Conflict of Interest”, because it had a clear increasing pattern; “Acquired Immunodeficiency Syndrome”, because it had an interesting pattern of a fast increase followed by a fast decrease. The other selected topic was “Medical Education”, because it had a slow decreasing pattern. These results are presented in fig 3.

We created ratio per year interval graphics and carried out an analysis of the trend curves. The software used was Microsoft Excel 2002.

## RESULTS

The number of publications indexed in the Medline database has increased in every interval, and in the years 2000–4 it has been almost twice the number of 1970–4. In these same intervals the number of bioethics publications has increased sevenfold (table 1). This resulted in an increase from 0.004 to 0.012 in the ratio of bioethics publications to the total Medline publications (fig 1). In the analysis of the trend curve, those ratio values presented an exponential increase with determination coefficient,  $R^2 = 0.9708$ .

The relative variation of the ratios of each topic publications to the total bioethics publications was very high for most of the studied topics. Over 90 topics had a relative variation of 1. This occurred when, in any time interval, the topic had no publication record in the bioethics total. Of the 360 topics studied, 246 (68%) had a relative variation of more than 0.7. One topic had a relative variation of 0, because it had no publication record in the bioethics total (fig 2).

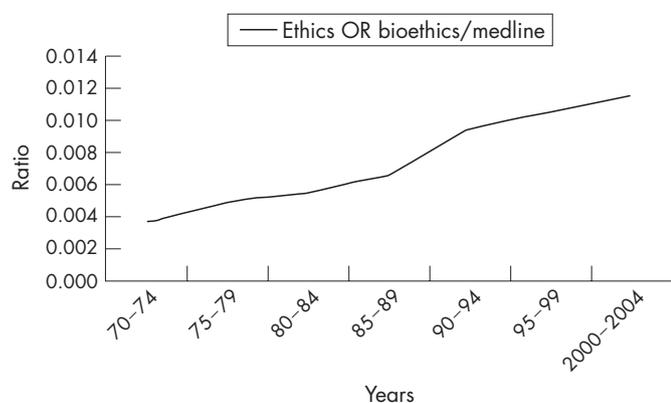
The number of bioethics publications about “Induced Abortion” was 519 in the 1970–4 interval, representing more than 12% of the total bioethics publications in this period. This number varied inconstantly and in the 2000–4 interval it was almost the same as the first interval (table 1). The ratio of “Induced Abortion” records to the total bioethics publications has decreased constantly, achieving less than 0.02 in the last interval (figure 3). Those ratio values presented a logarithmic decrease with  $R^2 = 0.9679$ .

The number of bioethics publications about “Acquired Immunodeficiency Syndrome” was almost zero before 1984, increased to nearly 700 in the 1985–9 and 1990–4 intervals, but

**Table 1** number of results by search

	70–74	75–79	80–84	85–89	90–94	95–99	00–04
Medline	1109860	1288981	1438919	1743324	1973460	2172675	2628648
ethics OR bioethics	4006	6323	7796	11393	18834	22721	30339
Induced Abortion [mh]*AND (ethics OR bioethics)	519	612	443	561	944	680	541
Acquired Immunodeficiency Syndrome [mh]* AND (ethics OR bioethics)	0	0	16	687	793	349	197
Conflict of Interest [mh]* AND (ethics OR bioethics)	1	20	70	81	617	1184	2089
Medical Education [mh]* AND (ethics OR bioethics)	158	209	257	350	555	626	959

\* Restricted to MeSH terms.



**Figure 1** Bioethics articles in Medline.

reduced by half in the 1995–9 interval and reduced even more in the last interval (table 1). This topic ratio has varied with the same pattern as its absolute publications number, with a peak of 0.06 in the 1985–9 interval (fig 3). Those ratio values presented a polynomial trend curve of 3<sup>rd</sup> order, with  $R^2 = 0.6084$ .

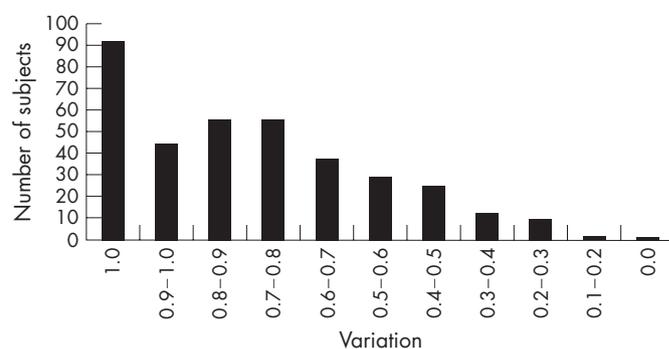
The number of bioethics publications about “Conflict of Interest” had an impressive increase, from 1 and 20 in the first intervals, to 1184 and 2089 in the last ones. This increase was most important from the 1990–4 interval (table 1). The same increase was observed in this topic’s ratio values: from zero in the first interval to more than 0.06 in the last one (fig 3). In the analysis of the trend curve, those ratio values have presented a potential increase with  $R^2 = 0.9618$ .

The number of bioethics publications about “Medical Education” increased in every interval, resulting in a sixfold overall increase (table 1). However, the ratio of “Medical Education” publications to the total bioethics publications had a small decrease in the first six intervals, with a small increase in the last interval (fig 3). Those ratio values presented a polynomial trend curve of 2<sup>nd</sup> order, with  $R^2 = 0.8879$ .

## DISCUSSION

This study used the Medline database due to its great coverage of biomedical literature and easy access and search. Medline is a United States National Library of Medicine bibliographic database containing citations of 4800 worldwide journals, from 1966 to the present, covering biomedicine and health sciences.<sup>12</sup> Other authors have pointed out that Medline may be an excellent source for objective biomedical science, but limited for information about culture and religion, having a biased view for its predominance of United States journals and authors.<sup>13</sup> Other studies also pointed out that most publications in major bioethics journals are from high-income, English speaking countries, especially the United States (responsible for around 60% of the articles).<sup>14 15</sup> Therefore, the findings of this study probably reflect the importance of bioethics topics as viewed by authors and journals of those countries, with under-representation of other countries opinions.

The method used for article retrieving allowed the authors to analyse all bioethical publications indexed in the Medline database, aiming to include publications in journals not restricted to the field of ethics. However, due to the great number of publications retrieved, they were not individually reviewed to ensure their content. This limitation might overestimate the number of relevant publications.<sup>3</sup> The use of MeSH terms as topic descriptors was reported and discussed in a

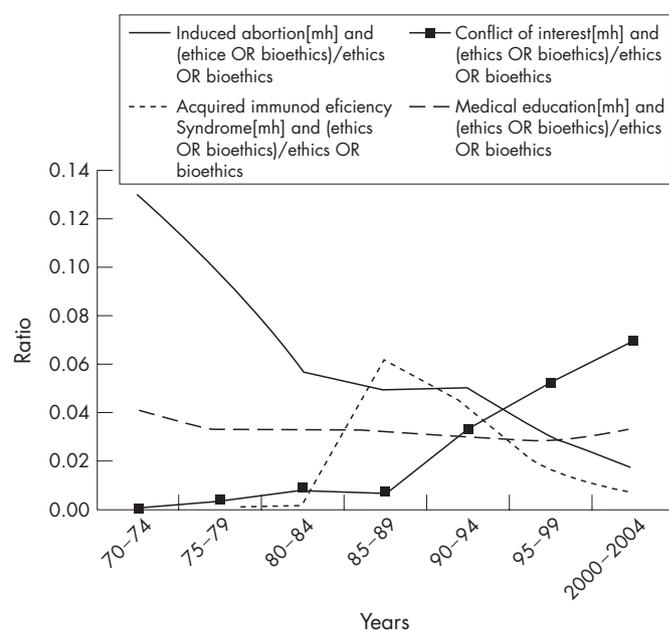


**Figure 2** Time variation of bioethics subjects ratios.

similar study,<sup>2</sup> achieving the conclusion that “Medline, with its excellent controlled vocabulary, exemplary quality control, and highly trained indexers, probably represents the state-of-the-art in manually indexed databases.”<sup>12</sup>

In this study the number of publications on a topic and the relative presence of this topic in a broader field could have different variations with time. This occurs according to the variation of the number of publications in the field. For example: even if the number of publications on Induced Abortion has not changed, as the number of bioethics publications has increased, the relative importance of this topic in the bioethics literature has decreased.

The results of this study have shown an increase in the presence of bioethics content in the publications indexed in the Medline database from 1970 to 2004. Comparing these results with Sugarman’s study,<sup>3</sup> which has a similar methodology, there are some differences in the number of total Medline and ethics articles. The results of our studies are around 1% smaller for the Medline articles and 15% smaller for the ethics articles. However, both studies present similar ratios and trends of increase. Sugarman<sup>3</sup> has shown an increase in the percentage of ethics publications over the total Medline publications from 0.6% to 1.2%, in the years 1980 to 1999, and our study has shown an increase from 0.5% to 1.0% in the same period. These



**Figure 3** Bioethics articles per subject.

differences might have occurred due to variations in the Medline database, and as the trends and ratios are similar the results were considered consistent. This increase of bioethical publications could indicate an increase of the conscience of the ethical aspects of medicine, and the importance given to these aspects by the medical community.

The great number of topics (68%) with a relative variation of its ratios higher than 0.7 indicates that the presence of a topic in the bioethics literature is greatly influenced by time. This result confirms the perception of the fast changes of topics in bioethics. There may be several different reasons for these variations and it is out of the scope of this study to properly analyse them. However, we will use the four selected topics as examples to discuss some reasons.

Induced Abortion is defined in the MeSH thesaurus as “the intentional removal of a fetus from the uterus by any of a number of techniques.”<sup>16</sup> This topic has shown an important decrease in its relative presence in the bioethics literature. Its high presence in the first interval (1970–1974) may be related to the discussions about legalising abortion in the United States and the Roe versus Wade case.<sup>17</sup> But why has a decrease of this traditional topic of bioethics been observed? One possibility is that the issues about this topic have been discussed and resolved, achieving consensus or satisfactory answers for the society. But this is hardly the case of abortion, a very polemic topic. Another possibility is that, even with no answers achieved, the discussion on this topic was saturated: most arguments have already been discussed, and new arguments or points of view are difficult to find, resulting in few new articles.

Conflict of Interest has shown to be an emerging topic. Conflict of Interest is defined in the MeSH thesaurus as “a situation in which an individual might benefit personally from official or professional actions”.<sup>18</sup> This topic was added to the MeSH database in 1991,<sup>18</sup> which may influence its small relative presence before this year. There are publications indexed with this descriptor before 1991 because the complete Medline database is updated when changes occur to the MeSH database, and in this process old publications may be given new descriptors.<sup>19</sup> The great importance given to this subject may indicate greater reflection about the ethical issues present in every practice or professional action, not only the paradigmatic cases.

The variation of the presence of the topic Acquired Immunodeficiency Syndrome showed that the interest in a topic can vary greatly in a short time interval. There have been several bibliometric studies on AIDS publications, analysing the number, countries, authors and journals of these publications.<sup>20–22</sup> Although these studies are not limited to ethical literature, they have also shown a rapid increase in publications on AIDS until 1990.<sup>21</sup> The variation of this topic may be related to the epidemiology of this disease in the United States. There are no reported cases before 1980, a great number from 1981 to 1995 (551 thousand) and a significant decrease in the number of new cases in from 1996 to 2000 (228 thousand) and from 2001 to 2004 (163 thousand).<sup>23</sup>

The topic Medical Education showed that some topics can vary little with time, having an almost stable presence in the 35 years studied. The fact that this topic never had a very big presence may contribute to avoid saturation of its discussion, which could result in a faster decrease of its presence. The methodology used might not have detected publications on ethical topics under different headings—for example “professionalism”, increasing interest of which in recent years does not appear to be reflected in this study.

This study has not analysed the variations of topics between countries. It would be interesting to repeat this methodology in local databases and verify the local importance given to the bioethics topics. These results could be compared, allowing analysis of other factors that influence the topics' importance.

## CONCLUSION

The analysis of the bioethics publications indexed in the Medline database from 1970 to 2004 revealed that: there is an increasing presence of ethical content in the Medline publications; the presence of topics in the bioethics literature varies a lot with time; Induced Abortion is a topic with decreasing presence; Conflict of Interest is a topic with increasing presence; Acquired Immunodeficiency Syndrome is a fast changing topic which had an important presence, followed by a rapid decrease; Medical Education is a topic with a slowly changing presence. Some factors were suggested to explain this variation: current legal cases, achieving a resolution for the conflict, saturation of a discussion, new focus and epidemiologic importance.

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