Preventive Medicine Education Provisions in undergraduate Programs in Colombia and Australia: A Comparative Study

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ABSTRACT

This study compared the provision of preventive medicine education in Colombian and Australian medical programs. The aim of medicine is to prevent disease and prolong life. The goal of preventive medicine is to reduce, as early as possible, the risk factors of the patient or the population that contribute to premature morbidity and mortality. There has been an important change in the medical school curricula of developed countries in the last five decades, being the introduction of preventive medicine subjects one of the major changes. Colombia, a developing country in Latin America, has maintained for years the original medical school curricula, with small changes.

Index Entries: Preventive medicine; public health; epidemiology; medical curricula

INTRODUCTION

This study investigated the provision of preventative medicine education in Colombian and Australian medical programs. It appears that medical programs around the world focus on one of two directions. The first is on clinical medicine, that is, on treating diseases after they appear. The second is on preventative medicine, that is, on providing programs where doctors and medical personnel are trained to provide intervention programs to prevent illnesses occurring. Doctors from developing countries such as Colombia might not be as properly trained in preventive medicine as they are in clinical medicine during their undergraduate education. A marked lack of knowledge on preventive measures to the most common diseases among the population as well as a high prevalence of preventable diseases in Colombia might be related to the former.

A comparative description of the current amount of knowledge in preventive medicine Colombian physicians hold and how academic programs in medical schools are related to the health of the population underlies this research. In

this exploratory study the existence and extent of the differences of the amount of preventive medicine knowledge held by physicians working as general practitioners (GPs) in a developing country from Latin America (Colombia), compared with a developed country (Australia) was determined. There is evidence suggesting that the provision of preventative medicine education in Colombia is inadequate, however, no study has been undertaken to establish if this is so. By using a comparative methodology, it was possible to establish a relationship between the provision of preventative medicine education in Colombia and in a country where the provision is known.

MATERIALS AND METHODS

The research method consisted of a comparative study about the preventive medicine education curriculum in selected medical schools from a developed country (Australia) and from a developing country (Colombia). It is clear from the literature review that no studies have been conducted with Colombian doctors in relation to the amount of knowledge they hold in regards to preventive medicine. By saying so, it can be stated that, as there are no clear theoretical leads from the literature, theory generation was required. Therefore, this is a *quantitative and quasi experimental study*.

A tested skill and competency assessment tool (See Figure 1, below) was used to measure the preventive medicine skill of doctors in their first ten years after completion of their undergraduate medical education. The instrument had fixed response categories, which have been shown to measure skills effectively in a testing situation. The topic area for the instrument was *ischemic heart disease* which is a very common pathology both in developed and developing countries. Respondents are queried about common preventive medicine concepts rather than instrument-specific subject matter. Students were graded on their performance on the skill-based instrument on a Likert scale being 1 equivalent to Poor (one, two or three right answers), 2 equivalent to Fair (four, five or six right answers), 3 equivalent to Good (seven, eight or nine right answers) and 4 equivalent to Excellent (ten or eleven right answers)

Table 1. Assessment tool (Likert Scale) Performance

Level of proficiency	Number correct	Pass grade
1 Poor	1, 2 or 3 right answers	Fail
2 Fair	4, 5 or 6 right answers	Fail
3 Good	7, 8 or 9 right answers	Pass
4 Excellent	10 or 11 right answers	Pass

The information provided by a group of twenty medical doctors from Colombia and twenty medical doctors from Australia regarding the extent of preventive medicine knowledge they were trained in at medical school was recorded. Participating doctors must have been graduated from medical school as from the first of January 1996 and no later than the first of January 2006. The original English version of the *preventive medicine testing instrument* (Appendix A) used by Sutphen ET AL in the SUNY study (2003) in New York as used. A mandatory question for participants in Colombia was whether they could read and understand English language fluently, and only participants who responded affirmatively were considered in the study. This instrument was designed, and successfully tested, to measure both preventive medicine skills or competencies and orientation toward population-based prevention in medical students. To avoid selection bias the instrument assessed a common topic to both countries Australia and Colombia: "ischemic heart disease", and tested four key preventive medicine skills areas: (1) using and interpreting data sources; (2) measuring disease frequency, including incidence and prevalence; (3) making inferences and identifying bias in data presentations; and (4) identifying appropriate study design and screening tests. The instrument included eleven questions and was completed in less than twenty minutes per every participant. Electronic calculators and written formulas were permitted during the filling out process. Once the instrument was returned, it was collected and analysed. Forty medical doctors who were graduated from medical school after the first of January 1996 and before the first of January 2006 were assessed using the selected evaluative instrument (twenty volunteer participants from Australia and twenty volunteer participants from Colombia). Despite the small sample size (N=40), doctors from a range of medical schools in both countries were asked to participate, in order to obtain a more representative sample. Participants could not be specialists in any of the five classical rotations: obstetrics and gynaecology, neurology, paediatrics, internal medicine, and orthopaedics, nor Epidemiology or Public Health. They had to be General Practitioners. One university staff member cooperated with the selection and entered a participant code number.

Procedure

The instrument was delivered both in person and via email to the forty selected doctors who replied the test in September 2006. That is, sampling was based on a single-stage *stratified* probability approach. Time and resource limitations inevitably put some restrictions on sample size.

Data was collected by a quantitative questionnaire over a period of one month. The questionnaire took about twenty minutes. Each respondent also completed a one page bio-data sheet. Questionnaire responses were transcribed and formatted for entry into SPSS. Descriptive statistics were obtained by using SPSS Frequencies, SPSS crosstabs, and SPSS Optimal

Scaling. Inferential statistics were obtained by using ANOVA and linear regression. The study's hypothesis is that country of residence will influence test outcomes (questionnaire scores) for a variety of reasons related to training, supervision, etc.

RESULTS

The sample comprised 40 participants, with 20 from Colombia and another 20 from Australia. Of the total, 18 could be identified as female and another 20 as male, with 2 unable to be identified by gender. The ratio of Colombian to Australian GPs is relatively even in that in each case approximately 50% were male (Two Australian GPs did not indicate their gender).

These participants came from 12 universities, comprising seven Colombian and five Australian institutions. Considered in terms of whether these universities were private or public, all five Australian universities were public, as was one of the Colombian. So, of the total number of universities, 16 (43%) could be described as private and the remaining 57% as public institutions. These 40 participants were asked to indicate year of graduations. Five chose not to do so. The remaining 35 participants graduated in a range of years between 1995 and 2005. The ratio of Colombian to Australian GPs was relatively even except that a disproportionately large group of Colombian GPs had graduated prior to 1999. For analytic purposes, this data was used to compute a fresh variable, estimating the length of time since graduation.

As illustrated in Figure 1, when participant characteristics are plotted within a common two-dimensional space, using nonparametric factor analysis procedures available via SPSS Optimal Scaling, two major clusters of participant characteristics can be described relative to the four quadrants.

The lower left quadrant and indeed the left half represents the disproportionate representation of Colombian participants in private universities (Colombia and Private cluster together) and more specifically males who graduated least recently (1995-1998). The upper right hand quadrant and indeed the right half represent the disproportionate representation of Australian participants more generally in public universities and more specifically males who graduated less recently (1999-2002), and females who graduated most recently (2002-2005). In summary, while these samples are statistically non significantly different in terms of many of characteristics, salient differences include public versus private and gender related to year of graduation.

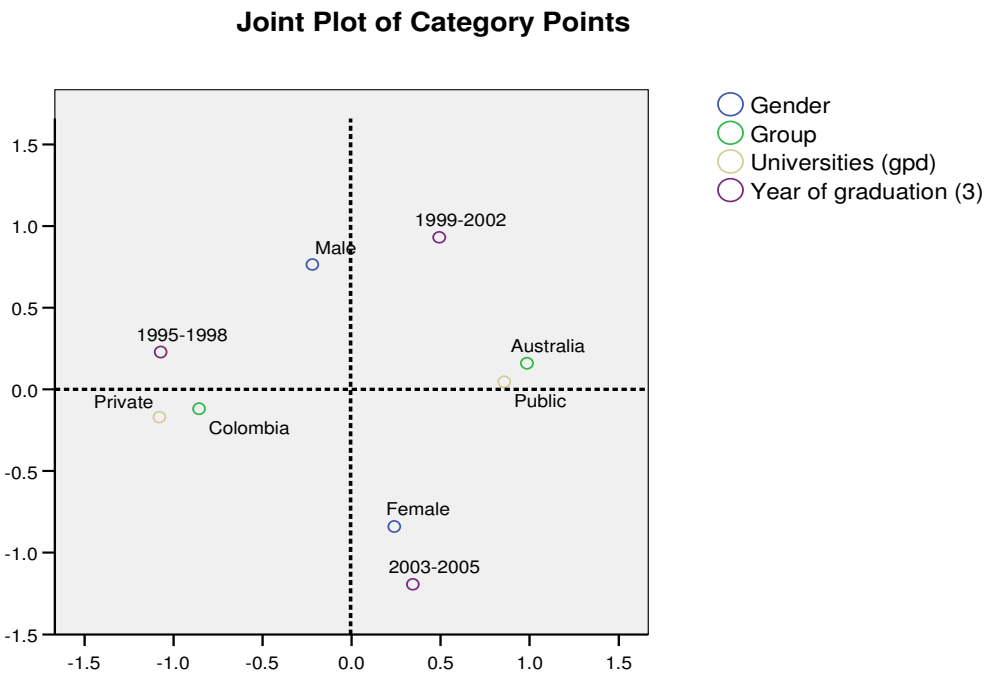
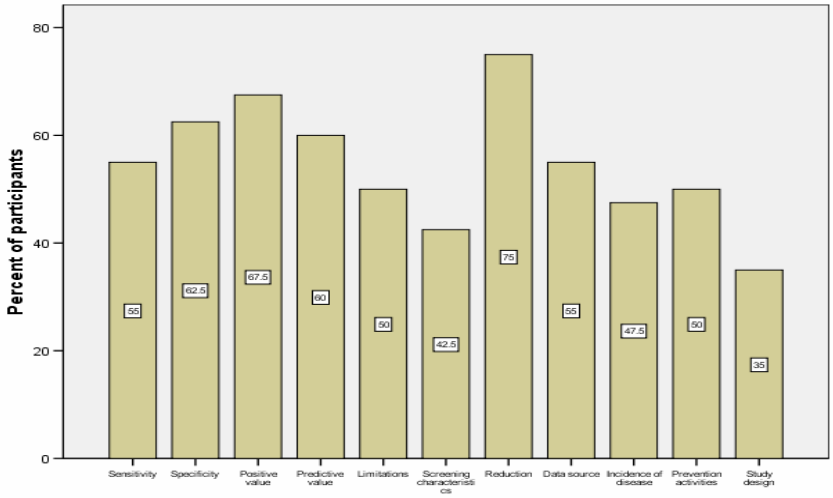


Figure 1. Spatial representation of associations between response categories of demographic variables



(SPSS Optimal scaling)

Figure 2. Percent of participants giving correct responses to each of the 11 questions

As shown in Figure 2, the 40 participants were most likely to provide correct answers to the question about reduction. They were least likely to provide correct answers to the question about study design.

The pattern of participant answers can also be examined with respect to individual questions. For instance, while 55% gave the correct answer (C) to the question about sensitivity, another 40% of the participants (18%, 20%) gave answers B or D instead. While 63% gave the correct answer (B) to the question about specificity, another 33% (18%, 15%) gave answers A or D instead. While 72% gave the correct answer (A) to the question about positive value, others selected the remaining three response categories fairly equally.

While 62% gave the correct answer (B) to the question about predictive value, others selected the remaining three response categories fairly equally. While approximately 51% gave the correct answer (C) to the question about limitations, an appreciable proportion (26%) gave response D instead. While approximately 49% gave the correct answer (C) to the question about screening characteristics, another 40% of the participants (17%, 23%) were likely to give answers A or B instead. While 75% gave the correct answer (D) to the question about reduction, others selected the remaining three response categories fairly equally. While 55% gave the correct answer (C) to the question about data sources, another 33% gave answer B instead. While 48% gave the correct answer (A) to the question about incidence of disease, another 48% (28%, 20%) gave answers B or D instead. While 50% gave the correct answer (B) to the question about prevention activities, the other 50% (18%, 32%) gave answers A or C instead. While 35% gave the correct answer (B) to the question about study design, another 35% of the participants gave answer A instead.

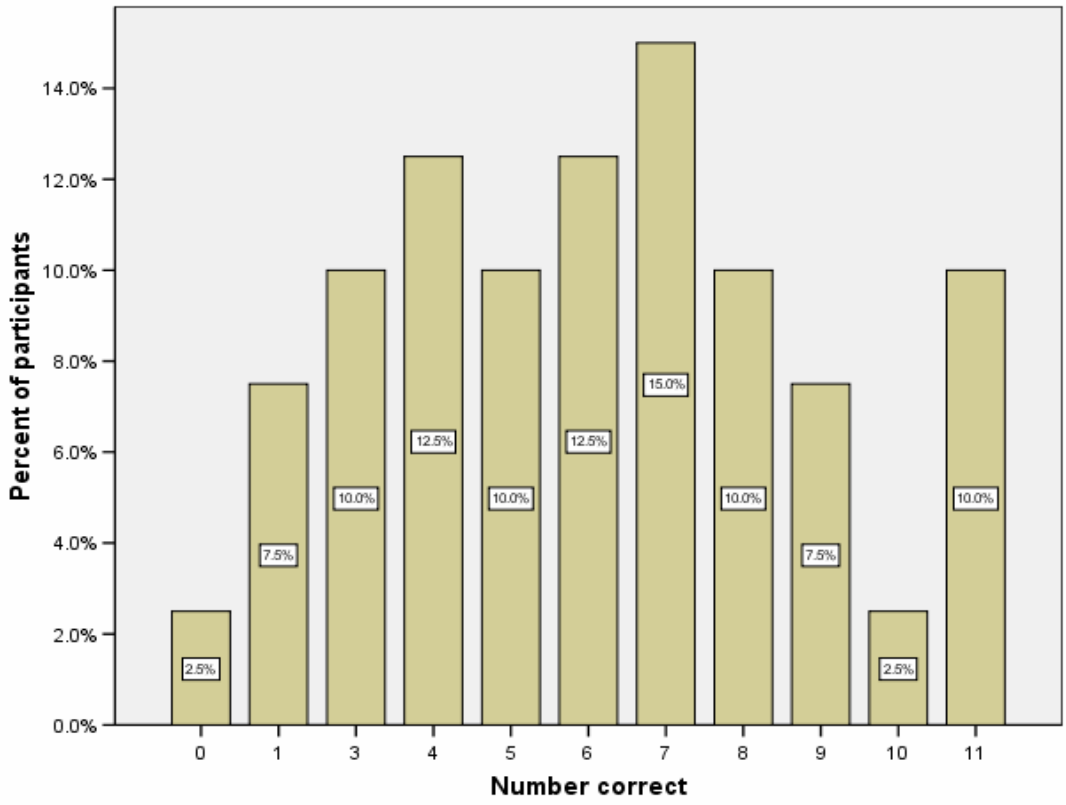


Figure 3. The distribution of correct responses obtained by participants, with the number of participants expressed as a percentage

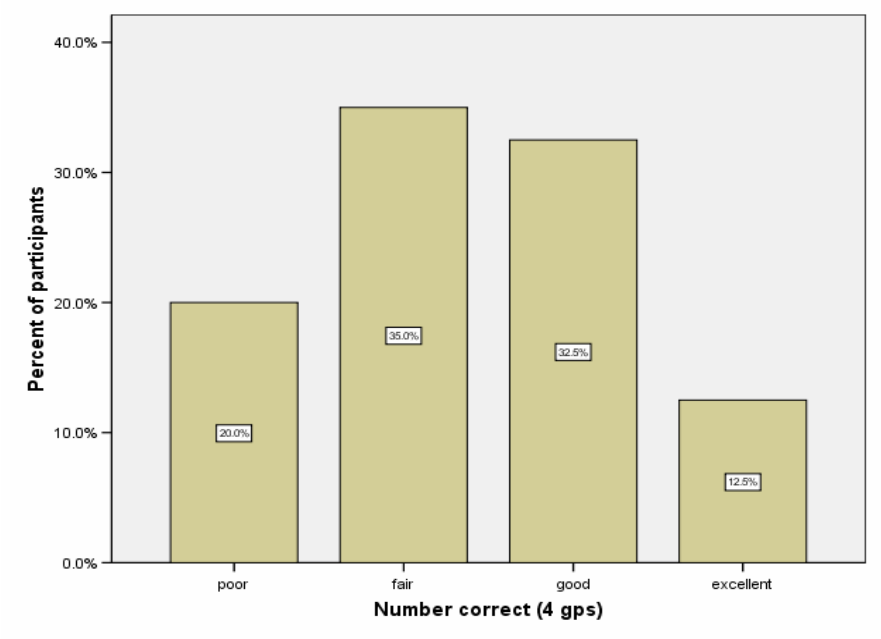


Figure 4. The proportion of participants achieving various levels of excellence expressed as a percentage

As shown in Figure 3, 2.5% of the participants recorded zero correct answers. The largest group (15%) recorded seven correct answers, and 10% recorded 11 correct answers.

A scoring guide to the test suggests that scores of 0-3 are poor, from 4-6 are fair, from 7-9 are good, and 10-11 are excellent. As shown in Figure 4, above, participants obtained a relatively normal distribution of responses, relative to the four bandwidths of excellence suggested by the test designers, with approximately 2/3 obtaining fair (4-6) or good (7-9) outcome scores.

Table 2. Test results as per conventional scoring guidelines

Test result/Country	Colombia	Australia
Fail	**65%**	25%
Pass	35%	**75%**

This test can also be rated on a test fail basis, with a score of **6** or above regarded as the pass mark. Table 2 above indicates a substantial difference in outcomes for Colombian versus Australian GPs such that whereas the majority of Australian GPs (75%) passed this test, the majority of Colombian GPs (65%) did not.

In significance tests reported below, the dependent variable (DV) of choice was either the total test score obtained or the number passing the test.

The effect for gender was non significant. However, the main effect for group was significant ($F_{(1,38)}$=222.439, $p<0.01$), indicating that Australian GPs on

average were likely to obtain higher test scores (7.5) than Colombian GPs (4.5).

Colombian participants came from both private and public universities, so a second analysis was conducted based on the type of university attended. The significant main effect for type of university ($F_{(1,38)}$=15.161, p<0.001) was consistent with participants from public universities faring better than those from private universities. Since none of the Australian participants attended private universities, a third analysis with group (Colombia, Australia) as IV was conducted with participants from private universities excluded. This analysis found non significant main effects for group, an outcome consistent with type of university being more salient than country of residence.

Table 3. Test results per group on pass/fail basis for those from public universities

	Fail		Pass	
Group	Count	% within Group	Count	% within Group
Colombia	1	25.00%	3	75.00%
Australia	5	29.40%	12	70.60%

Because of the importance of this outcome, a follow-up analysis utilized crosstabs and the Chi-Square statistic to compare the number of GPs from Colombia versus Australia that attended public universities and passed the test (See Table 2). The Chi Square statistic was non-significant and the percentage of Colombian versus Australian GPs from public universities highly equivalent (75% vs. 71%), with a slight advantage to Colombian GPs.

Finally, a linear regression analysis with number of years since graduation as the IV indicated it to be a significant predictor of the number of items reported correctly (R^2=0.26, beta=-0.510, t=-3.403, p<0.01). This outcome was consistent with a significantly negative association between years since graduation and number correct such that more recent graduates were likely to obtain significantly higher scores.

In order to examine the interaction between years since graduation and type of university attended, type of university was recoded as a dummy variable, and a second regression undertaken. This statistically significant analysis (R^2=0.428) indicated that while years since graduation remained statistically

influential (Beta=-0.327, t=-2.136, $p<0.05$), attendance at a public university was far more so (Beta=0.450, t=2.935, $p<0.001$).

DISCUSSION

The purpose of this study was to explore and understand if the health education system in Colombia, a developing country, that is going in the same pathway as the industrialised countries are, by evaluating one main area of instruction: preventive medicine. The assumption underlying the dissertation is that medical education in Colombia concentrates on clinical medicine to the exclusion of preventative medicine, and that this situation needs to be rectified.

As stated earlier, the study's hypothesis is that country of residence will influence test outcomes (questionnaire scores) of Colombian versus Australian GPs for a variety of reasons related to training, supervision, etc. What emerges from the reported analyses is that while the difference in test outcomes is statistically significant, this difference relates primarily to type of university together with years since graduation rather than to whether the GP trained and practiced in Colombia or Australia. That is, the operationalised hypothesis was not supported by the outcomes reported above.

As stated above, these outcomes are consistent with public universities, whether in Colombia or Australia providing higher quality training. The significance of years since graduation could be interpreted as either supporting the importance of recency of knowledge acquisition or as indicative of qualitative upgrades in the content of undergraduate medical syllabi.

While every care was taken to match the samples of Colombian versus Australian GPs, and while, for instance, the sample was limited in both cases to GPs, and included equal numbers of men and women, differences in time from graduation, and the Australian reliance on public university training rendered the subsets incommensurable in some respects. This, together with the small sample size, makes for some difficulty in statistically generalizing to the rather larger target populations of GPs in both countries to the effect that type of training and years since graduation are the primary influences on preventative knowledge related to ischemic heart disease. However, despite these methodological short-comings, and others associated with the use of questionnaire based research in semi-natural settings, such conclusions seem at the very least conceptually defensible. One conclusion that follows is that type of training is highly important.

A speculation at this point is that the decrement in scores related to years since graduation suggests a transition from theoretical knowledge of the type available at graduation to a more clinical orientation for GPs regardless of whether they work in developing or industrialised countries. This transition is worthy of further exploration since it seems likely that GP knowledge is

highly practice based and thus not necessarily tapped by such general knowledge tests. An open question here is whether this shift is detrimental from a public health perspective, and if so, whether specifically focussed professional development would be in order.

The influence of educational and financial capital on specific medical knowledge has been reflected in many ways. It is easy to assume that not only are standards for public health higher in first world settings but also that the medical knowledge of GPs would be superior. The rationale for this includes that one would expect training institutions in first world countries to set more rigorous standards and possibly benefit for a better-prepared intake group as well. That is, first world countries such as Australia benefit from differentials in financial and educational capital (Bourdieu, 1979).When a matched sample of 20 Colombian and 20 Australian GPs are compared (Approximately equal numbers of males/females per sub-sample), an initial analysis is consistent with Australian GPs outperforming Colombian GPs. However, when the effect of type of training institution and also years elapsed since graduation from that training, are taken into account, then country turns out not to be a significant factor in differential outcomes. What is important is whether or not the GPs have trained in public institutional settings and how long ago that training ended. GPs from public institutional settings outperform those from private settings, and more recently trained GPs outperform those that completed their training less recently. A methodological perspective on this outcome is that the statistically significant differences of primary interest (type of institution, years since training ended) were not explicitly matched in the sample gathered for this study. Had participant characteristics been more precisely matched then the artefact of apparent country-related differences would not have appeared to be statistically significant in the first place. The spread of participant characteristics can be envisaged as a cube for illustrative purposes though the final dimension of time elapsed since training is tricky.

We would agree with Bourdieu in the reasoning that comparisons in financial and educational capital don't appear to be salient in this sort of study is because despite the well-known differences in the level of these resources in industrialised versus developing countries, the difference in the level is not uniform but rather granular. That is, the concentration of resources devoted to eminent institutions such as the public universities in Colombia mean that their products (e.g., GPs) perform at levels that equate to those from industrialised countries (as per the outcomes of your questionnaire analysis.

It follows that further research with larger sample sizes and from a more broadly representative selection of developing versus industrialised countries would be highly worthwhile both from the point of view of providing an additional rationale for publicly funded training institutions and also from the

perspective of examining the type of knowledge able to be demonstrated by GPs with longer-term clinical practice (more years since graduation).

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