**English for Medical Students: Writing research articles in English**

**05 Developing academic literacies: The Discussion section**

These activities focus on the Discussion, which is normally the final section of a typical research article. Research suggests that typically the Discussion section has up to three moves with possible steps, such as the following:

*Highlighting Overall Research Outcome*

*Explaining Specific Research Outcomes:*

(1) Stating a specific outcome.

(2) Interpreting the outcome.

(3) Indicating significance of the outcome.

(4) Contrasting present and previous outcomes.

(5) Indicating limitations of outcomes.

*Stating Research Conclusions:*

(1) Indicating research implications.

(2) Promoting further research.

Not all of these moves and steps will be present in any given article (for example, all of the observations might be consistent with each other!), but they very often are. We will first look at how they are realised in the article we have been reading for the last sections. You will note that the final move has been given a section of its own.

Rasella, D., Harhay, M. O., Pamponet, M. L., Aquino, R., & Barreto, M. L. (2014). Impact of primary health care on mortality from heart and cerebrovascular diseases in Brazil: a nationwide analysis of longitudinal data. *BMJ,* 349, g4014*.*

[http://www.bmj.com/content/349/bmj.g4014.full.pdf+html](http://www.bmj.com/content/349/bmj.g4014.full.pdf%2Bhtml)

1. Read the full section quickly and answer the following questions:
	1. Which of the three moves and steps are present in this article? In what order are they presented?
	2. Colour-code each move and step that you find, labelling each one.
	3. Note down any useful language. Add any particularly useful vocabulary to **Your Vocabulary** List on moodle. Pay particular attention to language that indicate what the results mean, how strong the claims being made are, and how the present research relates to earlier research on this topic.

**Discussion**

To our knowledge, this is the first study to analyse the effect of a countrywide primary health care programme on cardiovascular disease mortality. The results of our study show that the Family Health Program (FHP) coverage is associated with a reduction in hospitalisations and mortality from heart and cerebrovascular disease causes—included in the national ambulatory care-sensitive list—in Brazil. Moreover, its effect increases according to the duration of FHP’s implementation in the municipality. Diseases in this group of causes are considered preventable or treatable at the primary care level and represent an important share of cardiovascular disease mortality in the country, accounting for 42% of the cerebrovascular, ischaemic, and other forms of heart diseases mortality in 2000, and decreasing to 37% in 2009.11 15 16 The effects we found are plausible because an increase in FHP coverage was also associated with other factors potentially involved in reducing cardiovascular disease mortality. For instance, FHP is positively associated with the number of health education activities, domiciliary visits from health professionals, and medical consultations in primary care, while it was associated with reduced numbers of hospitalisations for cardiovascular diseases. The FHP negative association with hospitalisations for cardiovascular disease shows that the reduction in cardiovascular disease mortality is not due to an increase in cardiovascular disease hospitalisations: the FHP has an effect further upstream in the causal pathways of cardiovascular disease mortality. Other studies have already shown FHP coverage to be associated with reductions of hospitalisations for overall ambulatory care-sensitive conditions in Brazil in recent years.29 Finally, in our models the FHP has no significant associations with mortality from accidents, used here as control because FHP does not perform activities for its prevention. This strengthens the plausibility that the associations we identified between cardiovascular disease and FHP coverage are not artefacts of residual confounding.

Our findings are supported by recent studies using individual level data. A cohort study in Brazil identified a strong reduction of recurrent cardiovascular episodes in patients after they had their first stroke or myocardial infarction episode if they were receiving FHP secondary prevention activities.30 Furthermore, studies in Denmark and England have demonstrated both reduction in mortality and increase in life expectancy associated with preventive health screening and consultation at the primary care level.31 32

Primary health care can reduce cardiovascular disease morbidity and mortality through primary prevention of risk factors, secondary prevention of complications resulting from existing risk factors, and rehabilitation and prevention of future complications.33 The greater proximity of primary health care facilities to patients’ homes and the fact that primary health care is usually free of charge (as in Brazil) or requires only low fees can reduce geographical and economic barriers to access and make primary prevention, care, and patient follow-up easier.8 For these reasons, primary health care is considered an extremely cost effective strategy to deal with cardiovascular disease, particularly in developing countries.34 To this end, the FHP in Brazil is playing an important role in the national policy for the comprehensive care of non-communicable diseases and is implementing a special programme, “Hiperdia,” for care and follow-up of diabetes and hypertension, including the free access to drugs for these diseases.35 FHP could reduce cardiovascular disease through health promotion and prevention activities, as shown by the FHP’s effect of increase of educational activities in the community, and through a better monitoring and follow-up at the curative level, as shown by the higher number of domiciliary visits and medical consultations in areas covered by FHP. Previous studies have shown the increase of health promotion and prevention activities by FHP and its association with mortality reduction in children,12 13 and shown that the implementation of the FHP in rural areas has increased population access to healthcare.21

As in any fixed effects regression model on panel data, the longitudinal dimension of the data is used to estimate the associations between dependent and independent variables.27 In particular, our findings show an increasing FHP effect when we consider the average coverage of the programme in the previous four, six, and eight years, demonstrating the importance of the duration of implementation of the programme on its impact on this group of non-communicable diseases. This is expected because interventions to reduce risk of cardiovascular disease could require a certain time lag before having a full effect.36 However, our study also shows that the annual FHP coverage has a strong impact, suggesting a short term effect as well. This is confirmed by previous studies that show that substantial reductions in cardiovascular disease mortality can and do occur within months of the implementation of public health interventions.37 38

*Strengths and limitations of study*

One of the limitations of our analysis is the possibility of ecological fallacy: associations measured at an ecological level do not necessarily reflect associations at the individual level.19 Even if our inference level is ecological (that is, we want to determine the effectiveness of an health policy at an aggregate level), the plausibility of our ecological associations rely in part on individual level associations: the increasing survival of individuals due to FHP healthcare. Specifically, in our study it is impossible to determine with certainty if the individuals who experienced the outcome, in this case death from cardiovascular disease, were under FHP coverage, because the only information available is at the aggregate level of municipalities. However, it has to be considered that in the municipality FHP is implemented with greatest priority in deprived neighbourhoods, where avoidable mortality for cardiovascular disease (due to poor socioeconomic conditions and geographical, economic, and cultural barriers to healthcare) is higher than in the rest of the municipality.39 40 In this case the reduction of these avoidable deaths, controlling for all confounding factors and selection bias, is plausibly and partly due to the inclusion of these vulnerable individuals in a FHP catchment area.25 It has also to be considered that the use of small units of analysis reduce the possibility of ecological fallacy,41 and in our study 75% of the municipalities had less than 25 000 inhabitants.

Even if the association between FHP coverage and cardiovascular disease mortality rates had been adjusted for all major cardiovascular disease determinants, some factors that could have influenced cardiovascular disease mortality, such as specific food manufacture regulations, smoke control policies, or improvements in the cardiovascular disease treatment have not been included in our mathematical models. To our knowledge, during the period under study, the only countrywide policy introduced in Brazil to reduce cardiovascular disease risk factors and not associated with FHP implementation was related with smoking.42 If some other regulations were introduced at the local level, the fact that they were no directly associated with the FHP means they should not be considered in the group of potential confounding factors in our models.19

While the FHP effect estimates have been adjusted for healthcare related variables—such as the number of physicians, the presence of hospital beds, availability of computed tomography and ultrasonography in the municipality—it has not been possible to include a variable related to the introduction of new cardiovascular disease treatments. In such a case, the variable would not be associated with the FHP expansion but instead with general ambulatory services and hospital coverage, and it should not be considered a confounding factor in our models. The associations we found between cardiovascular disease mortality and the number of physicians, hospital beds, and presence of computed tomography and magnetic resonance imaging confirm the relevance, besides the primary health care, of the higher levels of care in Brazil.18

Even if we have not included some determinant of cardiovascular disease mortality in our models, because of the lack of information at the municipal level, our overall strategy of analysis, which included the use of mortality from accidents as a control for the specificity of FHP effects,43 the detection of an effect gradient according to percentage and duration of FHP coverage, and the evaluation of FHP effects in relevant process indicators and hospitalisation rates could reasonably rule out any possible residual confounding in our association of interest.

A strength of the study is the selection of municipalities with adequate vital information quality, which improved the study’s internal validity.20 The quality criteria included a reduced percentage of ill defined causes of death (ICD-10 codes R00–R98) among all death of the municipality (<16-20%), assuring that deaths from cardiovascular disease registered by error as ill-defined could not affect the estimated impact of FHP. Finally, to verify our external validity, we fitted our models with data from all Brazilian municipalities, which showed similar and significant FHP effects, indicating that our main findings could be generalised for all the country.

**Conclusions**

Countries such as Brazil are undergoing profound demographic and epidemiological changes that have engendered a rise in the percentage of deaths due to non-communicable diseases in recent decades.17 18 Thus, in most low and middle income countries, cardiovascular disease mortality has become a huge challenge for health systems that still have to deal with a pre-existing burden of infectious diseases,4 7 8 while in many Latin American countries, even though cardiovascular disease mortality is decreasing, disparities in terms of trends and current rates still remain.44 Our study shows that a countrywide strategy of comprehensive primary health care that includes actions of primary and secondary prevention, care, and follow-up of cardiovascular disease is associated with a reduction of morbidity and mortality from cardiovascular disease in a developing country such as Brazil.

1. Now return to the article that you chose on a topic that interests you.

* 1. Read the Discussions section and do the same activities that you did for (1) above.
	2. Upload your colour-coded analysis to moodle by **2nd September**
1. Think of a piece of research that you have been involved with.
	1. Draft a brief Discussion section for an article about it.
	2. Upload your draft to the moodle site by **2nd September**
2. **By 2nd September**, in the learning blog on moodle, write around 150-200 words in your learning blog, e.g. on the following topics:
* Useful language that you have noticed that is useful in the Discussion section, particularly to do the following:
	+ Highlighting Overall Research Outcome
	+ Explaining Specific Research Outcomes:
	+ Stating Research Conclusions:
* Any final comments/queries you have about research article structure as a whole.

**We will meet as a class on Tuesday 11th September to discuss your progress so far.**