COLORECTAL CANCER IN THE AUSTRALIAN POPULATION - PROSPECTS FOR PREVENTION THROUGH SCREENING

Dr. David Weller MBBS (Adel) MPH FRACGP FAFPHM

A thesis submitted in candidacy for the degree of:

Doctor of Philosophy

Awarded 1995

June, 1994
## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thesis contents</td>
<td>i</td>
</tr>
<tr>
<td>List of Tables and Figures</td>
<td>vii</td>
</tr>
<tr>
<td>Abstract</td>
<td>x</td>
</tr>
<tr>
<td>Declaration</td>
<td>xi</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>xii</td>
</tr>
<tr>
<td>List of Appendices</td>
<td>xiii</td>
</tr>
</tbody>
</table>

**Chapter 1: Colorectal Cancer and its Prevention - Background and Overview of the Literature**

1.1 Introduction                                                        | 1    |

1.2 Natural history of colorectal cancer                                 | 2    |

1.3 Descriptive studies of colorectal cancer                            | 4    |
| 1.31 International comparisons                                         | 4    |
| 1.32 Migrant studies                                                   | 5    |
| 1.33 Changing incidence, mortality and survival over time             | 6    |

1.4 Analytical studies                                                  | 8    |
| 1.41 Diet - general aspects                                            | 8    |
| 1.42 Fibre                                                             | 9    |
| 1.43 Dietary fats, meat and protein                                   | 10   |
| 1.44 Possible mechanisms for dietary risk factors                     | 11   |
| 1.45 Socioeconomic factors                                            | 12   |
| 1.46 Genetic factors: Family history and colorectal cancer risk       | 13   |
| 1.47 Occupation and exercise                                           | 14   |
| 1.48 Other potential risk factors                                     | 15   |

1.5 Implications of epidemiological evidence for primary prevention     | 15   |

1.6 FOBT screening for colorectal cancer - an overview                 | 16   |
| 1.61 Types of fecal occult blood tests                                | 18   |
| 1.611 Guaiic tests                                                    | 18   |
| 1.612 Heme-porphyrin assays                                           | 19   |
Chapter 2: Profile of FOBT screening participants in South Australia, feedback on the programme and yield of cancers

2.1 Introduction

2.2 Background
   2.21 Sources of information in screening evaluation
   2.22 Socioeconomic influences on screening participation

2.3 Methods
   2.31 Postal surveys
   2.32 Test/participants characteristics and Linkage Analysis with Cancer Registry
   2.33 Postcode analysis of IMVS screening participants

2.4 Results
   2.41 Profile of screened individuals and postal survey respondent characteristics
   2.42 Participant feedback on the programme (test-negative participants only)
   2.43 Cause of bleeding in participants with "false positive" results
   2.44 Bowel symptoms in screening participants
2.45 Test characteristics and yield of cancers 73
2.46 Influence of area of residence on participation 75

2.5 Discussion 75
2.51 Comments on sources of information - postal surveys and the SA Cancer Registry 75
2.52 Profile of screening participants and feedback on the programme 78
2.53 Significance of bowel symptoms in screening participants 79
2.54 Measures of programme performance 81
2.55 Influence of area of residence 83
2.56 Detection of polyps through FOBT screening 84

2.6 Summary 86

References - Chapter 2 88

Chapter 3: A cost analysis of screening for colorectal cancer in South Australia

3.1 Introduction 108

3.2 Background 108
3.21 Costs in the IMVS screening programme 109
3.22 Measuring cost-effectiveness 110

3.3 Methods 111

3.4 Results 113
3.41 Costs involved in obtaining and returning the test kit 113
3.42 Diagnostic investigations (test-positive participants only) 114
3.43 Cost of medical consultations 115
3.44 Travel costs for medical follow-up after screening 116
3.45 Time off work 117
3.46 Intangible/psychological costs 117
3.47 Costs borne by participants 118
3.48 Overall costs of the programme 119
3.49 Sources of funding for the IMVS screening programme 120
3.410 Sensitivity Analysis 120
3.5 Discussion

3.51 Costs of medical follow-up 123
3.52 Intangible costs or reduction in quality of life 126
3.53 The overall costs of FOBT screening 127
3.54 Implications of sensitivity analysis 129
3.55 Implications for widespread FOBT screening in Australia 130

3.6 Summary 132

References - Chapter 3 134

Chapter 4: Knowledge, attitudes and beliefs in the general population and in screening participants

4.1 Introduction 146

4.2 Methods 147

4.3 Results

4.31 General population survey (Health Omnibus Survey) 149

4.311 Participation in FOBT screening 149
4.312 Attitudes and beliefs about bowel cancer and screening tests 149
4.313 Participation in other health-screening activities 150
4.314 Determinants of FOBT screening participation 150

4.32 Survey of screening participants 152

4.321 Knowledge, attitudes and beliefs 152
4.322 Intended future participation in health-related activities 153

4.4 Discussion 154

4.41 Awareness to FOBT screening, participation and perceived worthiness 154
4.42 Influence of family history on screening participation 156
4.43 Influence of sociodemographic factors on screening distribution 157
4.44 Influence of reported intended participation in other health-related activities 159
4.45 Responses examining knowledge, attitudes and beliefs in relation to colorectal cancer

4.451 Comparison of results with other research 159
4.452 Ability of these factors to predict health-related behaviour 160
4.46 Other factors which may influence FOBT screening participation 162
Chapter 5: Screening for colorectal cancer: Knowledge, attitudes and practices of South Australian GPs

5.1 Introduction
5.2 Methods
5.3 Results
  5.3.1 Screening and follow-up practices
  5.3.2 Prevention strategies for colorectal cancer - knowledge and attitudes
  5.3.3 Influence of GP characteristics
5.4 Discussion
  5.4.1 Screening practices
  5.4.2 GP cancer-related knowledge and education
  5.4.3 Cancer-screening guidelines for general practitioners
  5.4.4 GP opinions on screening strategies
5.5 Summary
References - Chapter 5

Chapter 6: Conclusions

6.1 The need for caution
6.2 Ethical issues in FOBT screening
6.3 Generalizability of findings from FOBT screening research
6.4 Key issues if FOBT screening is introduced in Australia
  6.4.1 Importance of screening strategies and test characteristics
6.42 The costs and likely benefits of FOBT screening in Australia 224
6.43 The likely acceptability and uptake of FOBT screening in Australia 226
6.44 Integrating FOBT screening with Australia's existing system of primary medical care 228
6.45 Selective screening of high risk groups 230

6.5 Does FOBT screening fulfill criteria of acceptability? 233

6.6 Approaches to reducing mortality from colorectal cancer 234
   6.61 Primary or secondary prevention? 234
   6.62 Screening modalities other than FOBT 235

6.7 Summary 236

References - Chapter 6 238
Abstract

This thesis examines Fecal Occult Blood Test (FOBT) screening as a possible means of reducing mortality from colorectal cancer in Australia. The study upon which the thesis is based consists of an evaluation of a FOBT screening program in South Australia (in terms of numbers of cancers detected, accuracy of the test used, costs of the program and characteristics of participants) and surveys of the general population and of South Australian general practitioners which provide information on knowledge, attitudes and practices in relation to colorectal cancer and its prevention. The main components of the thesis are as follows:

1. Literature reviews which provide an overview of the epidemiology of colorectal cancer, prospects for primary prevention, screening for the disease, results of previous screening programs, acceptability of and compliance with colorectal cancer screening, economic aspects and clinician-related issues such as knowledge, practice and screening guidelines.

2. An evaluation of the FOBT screening program in South Australia, including measures of performance (such as sensitivity, specificity and predictive value) for the immunochemical screening test used in the program.

3. An examination of characteristics of participants in FOBT screening, including socioeconomic status, presence of family history/past history of colorectal cancer and presence of symptoms.

4. A cost analysis of the program. Costs measured include travel costs, time off work, costs of medical investigations and psychological distress. A distinction is made between costs which are borne by the individual and those which are borne by society as a whole, and a cost per cancer detected in the program is calculated.

5. A survey examining knowledge, attitudes and beliefs of general practitioners in relation to colorectal cancer and screening.

6. A population, interview-based survey which examines knowledge, attitudes and beliefs in relation to screening for colorectal cancer in the population.

7. Conclusions about the feasibility and desirability of conducting major FOBT screening programs in the Australian community, based on an examination of information from the various components of the study in the light of existing evidence in the literature.