

GASTROINTESTINAL ILLNESSES CAUSED BY MICROBES IN SYDNEY, AUSTRALIA

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CERTIFICATE OF ORIGINAL AUTHORSHIP

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Date

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Executive Summary

Gastrointestinal illness (GIT) is a leading cause of preventable illness and death worldwide. Only a few studies provide estimates of the prevalence of pathogens associated with GIT illnesses in developed countries. In Australia, there are an estimated 17.2 million cases of GIT occur annually, however, the disease surveillance system only captures a few GIT illnesses, and the majority of pathogens causing illness are unknown. This study therefore seeks to fill this gap in knowledge by providing an overview of the epidemiology and prevalence of specific pathogens, clinical characteristics and risk factor for disease among hospitalised patients in Sydney, Australia.

Chapter One is a general overview which seeks to provide background and context for this study. The chapter sets the study in the Australian context in terms of the health system, infectious disease surveillance, health seeking behaviour and related determinants and also provides some perspective on why a hospital based study was conducted. An overview of the study sites is also provided.

In order to set the broad context for the topic, a systematic review of the literature is presented in Chapter Two. It provides age- and region-specific random-effect estimates of the detection rates of diarrhoeal pathogens in developed and developing settings. The review outlines that developing regions have significantly more pathogens detected than the OECD countries, and individual pathogen prevalence differs between developed and developing settings.

Chapter Three outlines a retrospective cross-sectional survey of laboratory and clinical records for patients seen at four major public hospitals in Sydney, from January 2007 to December 2010. The aim was to describe the clinical and epidemiological characteristics of GIT illnesses, in symptomatic patients presenting to hospital in Sydney. The chapter describes and discusses the prevalence of several viral, bacterial and protozoan pathogens that cause GIT illnesses in older children/adults and children, and associated risk factors.

In Chapter Four, a similar approach is used to describe the distribution of gastrointestinal pathogens in symptomatic children 0-5 years old in Sydney. It presents the clinical features and prevalence of pathogens associated with gastrointestinal illnesses for children 0-5 years old, presenting to two major public hospitals in Sydney with diarrhoea, for the period January 2007-December 2010.

An in-depth analysis of enteric protozoa was undertaken in Chapters Five and Six since enteric protozoa were frequently implicated in diarrhoeal illness and there is limited information about their epidemiology in Australia. Chapter Five evaluates the prevalence of enteric protozoa based on testing algorithms used to diagnose enteric protozoan infections in four hospitals, and suggest that a gold standard approach is needed. Chapter Six then incorporates spatial analysis to describe the epidemiology and geographical distribution of enteric protozoa in the state of New South Wales (NSW). Chapter Seven concludes with a discussion of the implications of the main findings and proposes recommendations to address them.