

**THE EFFECT OF CIGARETTE SMOKING ON
THE FREQUENCY OF COLPOSCOPY VISITS,
TREATMENTS AND RE-REFERRALS**

A Pilot Study

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ABSTRACT

The Effect of Cigarette Smoking On the Frequency of Colposcopy Visits, Treatments and Re-referrals.

Current research has confirmed that cigarette smoking is a risk factor for cervical cancer. The objective of this pilot study was to observe if women who smoked and were referred to the colposcopy department at Christchurch Women's Hospital, required more follow up visits, treatments and re-referrals compared to non-smokers. New patients (n=494) who attended at the Christchurch Women's Hospital colposcopy department in 2001 had their data observed for a six year period. The results identified that women who smoked were three times more likely to need a third follow up visit and twice as likely to need further treatments to remove abnormalities when compared to non-smokers. This pilot study also identified that 71% of Maori women attending the clinic were smokers compared to 44% of non-Maori women.

The results are being used to highlight to health professionals that treatment has a greater chance of success if patients cease smoking. The results have also supported the maintenance and development of the smoking cessation clinic for colposcopy patients at Christchurch Women's Hospital where the link to cervical abnormalities and smoking is explained and behaviour modification is offered. Finally, identification of under representation of Maori women at Christchurch Women's Hospital colposcopy department supports the need for Maori women's clinics where, if preferred, Maori women can choose to be supported by Maori health workers with access to colposcopy, transport and childcare.

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TABLE OF CONTENTS

ABSTRACT	I
ACKNOWLEDGEMENTS.....	II
TABLE OF CONTENTS.....	III
LIST OF TABLES	VI
LIST OF FIGURES	VII
LIST OF ABBREVIATIONS.....	VIII
CHAPTER 1	
INTRODUCTION.....	1
1.1 OBSERVATION FOR CHANGE.....	1
1.2 IMPLICATION OF THIS PILOT STUDY	1
1.3 AIMS OF THE STUDY	2
1.4 STRUCTURE OF THE THESIS	3
1.4.1 Research Questions.....	3
1.4.2 Chapter 1: Introduction.....	3
1.4.3 Chapter 2: Literature Review.....	3
1.4.4 Chapter 3: Methodology	3
1.4.5 Chapter 4: Results.....	4
1.4.6 Chapter 5: Discussion	4
1.4.7 Chapter 6: Conclusion	4
CHAPTER 2	
LITERATURE REVIEW.....	5
2.1 BACKGROUND	5
2.2 CERVIX.....	6
2.3 CERVICAL INTRAEPITHELIAL NEOPLASIA (CIN) AND CANCER.....	7
2.4 PROBLEM INTERNATIONALLY.....	9
2.5 PROBLEM NATIONALLY.....	10
2.6 ETHNICITY AND CERVICAL ABNORMALITIES	11
2.7 CO-FACTORS	13
2.7.1 Tobacco Smoking, HPV and Cervical Cancer	14
2.7.2 Tobacco Smoking in New Zealand and Ethnicity.....	19
2.7.3 Hormonal Contraceptives	20
2.7.4 Parity.....	20
2.7.5 Other Sexually Transmitted Agents and Immunosupresion.....	21
2.8 SMOKING CESSATION	21
2.9 WOMEN’S HEALTH.....	23
2.10 HEALTH PROFESSIONALS AND HEALTH PROMOTION.....	25
2.10.1 Cervical Screening.....	29
2.10.2 Cervical Smear Test.....	29
2.10.3 National Cervical Screening Programme (NCSP)	30
2.10.4 Colposcopy	31
2.11 DIAGNOSTIC AND TREATMENT TYPES.....	33
2.11.1 LLETZ.....	33
2.11.2 Cone Biopsy	34
2.11.3 Laser	34
2.11.4 Cryotherapy	34

2.12	TREATMENT FAILURE.....	35
2.12.1	Tobacco Smoking and Treatment Failure.....	35
2.13	VACCINES.....	36
2.14	CONCLUSION.....	37

CHAPTER 3

METHODOLOGY..... 38

3.1	INTRODUCTION.....	38
3.2	AIMS OF THE STUDY.....	38
3.3	RESEARCH QUESTIONS.....	38
3.4	METHODOLOGY.....	39
3.5	SAMPLE SIZE.....	39
3.6	TIMING.....	40
3.7	DEVELOPMENT OF A DATA BASE.....	40
3.8	INCLUSION CRITERIA.....	40
3.9	EXCLUSION CRITERIA.....	41
3.10	DATA EXTRACTION SHEET.....	41
3.11	DESIGN AND TRIAL OF STUDY.....	42
3.12	CONFIDENTIALITY AND ETHICAL CONSIDERATIONS.....	44
3.13	DATA ANALYSIS.....	45
3.13.1	Data Handling.....	45
3.13.2	Statistical Analysis.....	45
3.14	METHODOLOGICAL LIMITATIONS.....	45
3.15	SUMMARY.....	45

CHAPTER 4

RESULTS..... 46

4.1	INTRODUCTION.....	46
4.2	PATIENT DEMOGRAPHICS.....	46
4.2.1	Age of Participants.....	46
4.2.2	Weight and Height.....	47
4.2.3	Ethnicity.....	47
4.2.4	Religion.....	47
4.2.5	Smoking Behaviour.....	48
4.2.5.1	Numbers of Cigarettes Smoked.....	48
4.2.5.2	Smoking and Ethnicity.....	49
4.2.5.3	Age and Smoking Behaviour.....	49
4.2.6	Gravida and Parity.....	49
4.2.7	Gravida, Parity, Smoking and BMI.....	50
4.3	FIRST COLPOSCOPY SMEAR.....	50
4.4	COLPOSCOPY PUNCH DIAGNOSTIC BIOPSY AT FIRST VISIT.....	51
4.5	PATIENT CONDITIONS.....	52
4.5.1	LSIL/HSIL.....	52
4.5.1.1	CIN - Not Confirmed.....	52
4.5.1.2	Confirmed CIN.....	52
4.5.1.2.1	Confirmed CIN and Age.....	53
4.5.1.2.2	CIN (Confirmed), Gravida, and Parity.....	53
4.5.1.2.3	CIN (Confirmed) and Smoking.....	53
4.5.1.2.4	CIN (confirmed) and Ethnicity.....	54
4.5.1.2.5	CIN (Confirmed) and BMI.....	54
4.5.1.2.6	CIN (Confirmed) and Use of COCP.....	54
4.5.1.2.7	CIN (Confirmed) and Immunosuppression or HIV.....	54
4.5.2	Genital Warts.....	54
4.5.2.1	Genital Warts and Smoking Status, Ethnicity, Age, Gravida, Parity and COCP.....	55
4.5.2.2	Genital Warts and CIN.....	55
4.5.3	Cancer.....	55
4.6	FIRST TREATMENT AT COLPOSCOPY CLINIC.....	55
4.6.1	First Treatment at Colposcopy Clinic and Smoking Status.....	56
4.6.2	First Treatment at Colposcopy Clinic and Ethnicity.....	57
4.6.3	First Treatment at Colposcopy Clinic and Age.....	57
4.6.4	First Treatment at Colposcopy Clinic and Gravida / Parity.....	57
4.7	SECOND TREATMENT AT COLPOSCOPY CLINIC AND SMOKING STATUS.....	57
4.7.1	Second Treatment at Colposcopy Clinic and Smoking Status.....	58
4.7.2	Second Treatment at Colposcopy Clinic and Age.....	58
4.7.3	Second Treatment at Colposcopy Clinic and Ethnicity, Gravida, Parity, and COCP Use.....	59

4.8	FOLLOW UP VISITS AND SMOKING STATUS, ETHNICITY, AGE, GRAVIDA, PARITY AND COCP	59
4.9	NUMBER OF RE-REFERRALS	60
4.10	DID NOT ATTENDS (DNA'S)	60
4.11	SUMMARY	61

CHAPTER 5

DISCUSSION

5.1	INTRODUCTION	62
5.2	CIGARETTE SMOKING AND THE IMPACT ON THE CERVIX.....	63
5.3	SMOKING AND FIRST TREATMENT.....	66
5.4	SMOKING, TREATMENT FAILURE AND PERSISTENCE	66
5.5	AGE OF WOMEN REQUIRING A SECOND TREATMENT	67
5.6	WOMEN REQUIRING A SECOND REFERRAL.....	68
5.7	CIN AND CO-FACTORS	69
5.8	SMOKERS VERSUS NON-SMOKERS AND FOLLOW UP VISITS.....	70
5.9	DNA RATE AND SMOKING	71
5.10	ETHNICITY AND REPRESENTATION AT COLPOSCOPY	72
5.11	ETHNICITY AND DNA.....	73
5.12	ETHNICITY AND CIGARETTE SMOKING	77
5.13	SMOKING CESSATION	77
5.14	LIMITATIONS AND STRENGTHS	80
	5.14.1 Limitations.....	80
	5.14.2 Strengths	81

CHAPTER 6

CONCLUSION.....

REFERENCES.....

APPENDIX A

SEARCH STRATEGY

APPENDIX B

ETHICS APPROVAL

GLOSSARY.....

LIST OF TABLES

	Page
Table 1: Incidence of Cervical Cancer Per 100,000 in 2002	6
Table 2: Survival Rates of Cervical Cancer after Five Years	9
Table 3: Data Extraction Sheet	42
Table 4: Breakdown of Ethnicity	47
Table 5: Age and Smoking Behaviour	49
Table 6: Age and CIN	53
Table 7: Type of First Treatment at Colposcopy Clinic	56
Table 8: Smoking Status and Treatment Type	56
Table 9: Type of Second Treatment at Colposcopy Clinic	58
Table 10: Age and Second Treatment	59
Table 11: Smoking Status and Number of Follow-up Appointments	59
Table 12: Number of Appointments Missed by Study Participants Without Contacting the Colposcopy Clinic	61

LIST OF FIGURES

	Page
Figure 1: Number of Cigarettes Smoked Per Day.....	48
Figure 2: Results of Smear Taken on First Presentation at Colposcopy Clinic	51
Figure 3: Results of Biopsy Taken on First Visit to Colposcopy Clinic.....	52

LIST OF ABBREVIATIONS

ACC	Adenocarcinoma
ASCUS	Atypical cells of uncertain significance
BMI	Body Mass Index
COCP	Combined Oral Contraceptive Pill
CDHB	Canterbury District Health Board
CT	Chlamydia Trachomatis
CWH	Christchurch Women's Hospital
CIN	Cervical Intraepithelial Neoplasia
DNA	Did not attend
FHIT	Fragile histidine triad
HIV	Human Immunodeficiency Virus
HSIL	High grade squamous intraepithelial lesion
HSV-2	Herpes Simplex Virus - 2
HPV	Human Papillomavirus
Hr HPV	High Risk Human Papillomavirus
LSIL	Low grade squamous intraepithelial lesion
NHS	National Health Service
NCR	National Cancer Register
NCSP	National Cervical Screening Programme
OR	Odds Ratio
PID	Pelvic inflammatory disease
SCC	Squamous Cell Carcinoma
SCJ	Squamocolumnar junction
WHO	World Health Organisation

CHAPTER 1

INTRODUCTION

1.1 OBSERVATION FOR CHANGE

The impetus for this study developed from the researcher's observations over ten years that various women who attended Christchurch Women's Hospital (CWH) colposcopy department were smokers and many of these women who smoked appeared to have more repeat visits and treatments to their cervix than non-smokers. The researcher undertook Heart Foundation Quit Card training and in 2004 introduced a smoking cessation programme to the colposcopy department to assist women to become smoke free. This training provided the researcher with the opportunity to prescribe subsidised nicotine replacement therapy to women when they attended for a colposcopy appointment and to conduct a follow up phone counselling support system until completion of their course.

Health education programmes can be seen as the most influential way that a health professional can improve the health of women who present for treatment (McDonald & Thompson, 2005). The researcher is undertaking study and training to become a Nurse Practitioner in Women's Health at Christchurch Women's Hospital (CWH). This thesis evolved as a way of validating the smoking cessation programme currently operating at CWH. The findings from the research will be used to develop knowledge and resources for women who choose to become involved in the smoking cessation clinic. In addition the findings will be disseminated to other health professionals to assist them in the development of their professional role.

1.2 IMPLICATION OF THIS PILOT STUDY

Cigarette smoking is associated with many cancers including cervical cancer. The likelihood of developing cervical cancer is lower in non-smokers and former smokers (Munoz, Castellsague, de Gonzalez, & Gissmann, 2006). The risk of developing cervical cancer decreases once a woman becomes smoke free. However, how long it takes before the risk

declines is unclear (Dresler, Leon, Straif, Baan, & Secretan, 2006; International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). Several authors have noted that when women are told of the link between smoking and cervical cancer, their likelihood of stopping smoking is greater than those who have not received this information (Bishop, Marteau, Hall, Kitchener, & Hajek, 2005; Hall, Bishop, & Marteau, 2006). A recent study in New Zealand identified that some nurses' knowledge in relation to smoking cessation requires more evidence based information and training to enable nurses to effectively deliver appropriate smoking cessation advice (Wetta-Hall et al., 2005).

In New Zealand, women who are of Maori or Pacific ethnicity or who are in a lower social economic group have a higher incidence of smoking and of developing and dying from cancer (New Zealand Ministry of Health, 2003b, 2006g, 2007a). Due to these existing inequalities, it is acknowledged that consultation and collaboration relating to the delivery of services for Maori and Pacific people must be undertaken to assist in improving the outcomes for these groups (New Zealand Ministry of Health, 2004b, 2006b). Recent work undertaken by the researcher has resulted in the development of a health pamphlet written in both Maori and English acknowledging that female health is sacred and smoking may damage the cervix. The pamphlet was developed in consultation with Maori women from throughout New Zealand with the purpose being to encourage women to acknowledge that their female health is sacred and therefore it is important to become smoke free.

The researcher is involved in the education of health professionals within New Zealand and intends to disseminate information from this pilot study to further develop this work. The researcher is unaware of any other smoking cessation programme within colposcopy departments in New Zealand and would like to encourage the development of these programmes.

1.3 AIMS OF THE STUDY

The aim of this thesis is to develop research based knowledge in the form of a retrospective, descriptive pilot study which will compare the persistence and recurrence rates of cervical intraepithelial neoplasia (CIN) in women who attended the CWH colposcopy clinic, with their individual smoking status. Ethnicity will also be examined to discover whether Maori women and other ethnic groups are disproportionately represented at the CWH colposcopy

department. If so, potential explanations will be explored and recommendations for changes within the colposcopy department will be possible.

1.4 STRUCTURE OF THE THESIS

1.4.1 RESEARCH QUESTIONS

- Do women who smoke and present at CWH colposcopy clinic with CIN on their cervix more likely to require more treatment and follow up than those who do not smoke?
- Are Maori and other ethnic groups disproportionately represented when considering the total number of women who present at CWH colposcopy clinic?

1.4.2 CHAPTER 1: INTRODUCTION

The history of how this study evolved was introduced and described in relation to the situation and implications of the study. A summary of the rationale and an overview of the thesis is given.

1.4.3 CHAPTER 2: LITERATURE REVIEW

This review explores the literature that relates to cervical abnormalities, cervical cancer and how they link with tobacco smoking. Associated topics that are considered relevant were reviewed and include the role of the human papillomavirus (HPV), cervical screening, colposcopy, smoking cessation interventions, HPV vaccine, socio-economic factors and ethnic disparities within New Zealand.

1.4.4 CHAPTER 3: METHODOLOGY

The research methodology utilised in this pilot study is outlined including issues that arose during the research process. A quantitative approach has been undertaken which has provided a structured design to identify the smoking and CIN status of 500 women who attended the CWH colposcopy department in 2001.

1.4.5 CHAPTER 4: RESULTS

The results are presented in the form of text, figures and tables and include frequencies, percentages and means. This research provides evidence to support the smoking cessation programme at CWH and other similar programmes implemented by nurses and health professionals throughout New Zealand.

1.4.6 CHAPTER 5: DISCUSSION

The findings from this pilot study are discussed and focused on the results obtained and the significance in relation to the benefits of not smoking and participating in a smoking cessation programme to improve a woman's cervical health. Where under representation or high did not attend (DNA) rates are demonstrated by Maori and other ethnic groups at the colposcopy clinic, some possible ways of improving access are discussed. Potential strengths and limitations that relate to the pilot study will be highlighted.

1.4.7 CHAPTER 6: CONCLUSION

This chapter recognises the most important findings from the study and provides recommendations for future studies. In addition information to aid in the development of educational programmes within New Zealand to support smoking cessation programmes will be explored.

CHAPTER 2

LITERATURE REVIEW

2.1 BACKGROUND

Cervical cancer is the second most common form of cancer worldwide for women (Bosch, Lorincz, Munoz, Meijer, & Shah, 2002; Sankaranarayanan & Ferlay, 2006) and the eighth most common cancer affecting women in New Zealand (New Zealand Ministry of Health, 2007a). There are two main types of cervical cancer that occur, squamous cell carcinoma (SCC) accounting for approximately 80% of cervical cancer and adenocarcinoma (ACC) representing 20% of patients with cervical cancer (Hewett & Ahmed, 2006). Cervical screening is a screening tool that can assist in the detection of abnormal cells before they develop into cervical cancer (New Zealand Ministry of Health, 2002a). The specificity of the smear test is over 90% accurate while the sensitivity of the test ranges between 50-80%. The sensitivity of three consecutive smears is recognised as being over 90% accurate in the detection of cervical abnormalities. This demonstrates the importance of regular screening (Patnick, 2006).

Currently in New Zealand 200 women are diagnosed each year with an invasive cancer of the cervix and approximately 60 of these women will die (New Zealand Ministry of Health, 2006b). Cervical cancer is the third most common form of cancer in Maori women in New Zealand and the fourth leading cause of death (New Zealand Ministry of Health, 2007a). Maori women are approximately twice as likely to develop cervical cancer and four times as likely to die from this cancer than non-Maori women (Sadler, Priest, Crengle, & Jackson, 2004).

Using data from 2002 New Zealand women developed cervical cancer at an incidence of 6.9 per 100,000 (New Zealand Ministry of Health, 2006b). This rate was the same in Australia and lower than the 8.3 per 100,000 rate in the United Kingdom. The highest incidence of cervical cancer recorded is in Latin America with an incidence rate of 33.5 per 100,000. Some of the lowest incidence rates have been recorded in China with a rate of 2.7 per 100,000 (see Table 1) (Parkin, 2006).

Cervical cancer impacts significantly on younger women and is recognised as a serious cause of lost years of life for women in developing countries. For example, in countries in Latin America and Eastern Europe cervical cancer causes more years of life lost than tuberculosis, AIDS and maternal circumstances. It is estimated globally that cervical cancer is responsible for 2.7 million years of lost life (age-weighted) (Yang, Bray, Parkin, Sellors, & Zhang, 2004).

Table 1 Incidence of Cervical Cancer Per 100,000 in 2002

Country	Rate per 100,000
New Zealand	6.9
Australia	6.9
Canada	7.7
United States	7.7
Sweden	8.2
United Kingdom	8.3
Latin America	33.5

(Munoz et al., 2006; New Zealand Ministry of Health, 2006e; Wain, 2006).

2.2 CERVIX

The cervix is the lower part of the female uterus and has a cylindrical shape. It is approximately 3 - 4 cm long and 2.5 cm in diameter. Support for the cervix is from the cardinal and uterosacral ligaments. Approximately half of the cervix is in the vagina and is called the portio vaginalis with the superior half above the vagina. The cervix consists of firm fibro-muscular tissue which is supplied with a lymphatic, nerve and vascular network (Sellors & Sankaranarayanan, 2003).

Anteriorly the cervix is separated from the bladder by connective tissue known as the vesicovaginal septum where the uterine arteries are contained. Posteriorly the serous membrane known as the peritoneum lines between the supravaginal cervix and the posterior vaginal wall (Jordan & Singer, 2006).

The ectocervix is the section which is visible once a speculum has been utilised. The ectocervix is covered by squamous epithelium and this also lines the vagina. Where the endocervix and ectocervix meet is identified as the squamocolumnar junction, (SCJ). The

transformation zone is the new squamous epithelium distal to the squamocolumnar junction. Nearly all cervical carcinogenesis will occur in this area (Sellors & Sankaranarayanan, 2003).

2.3 CERVICAL INTRAEPITHELIAL NEOPLASIA (CIN) AND CANCER

For cervical cancer to develop exposure to HPV has nearly always occurred and this has been identified as a cause both biologically and epidemiologically (Bosch & Munoz, 2002; Munoz et al., 2006). Infection with HPV types 16 and 18 are believed to be the most significant factor in the development of cervical disease. However, there is more to be learnt about the development of invasive cervical cancer. It is not yet understood why many women will have a HPV infection at some point in their lives but over 90% of these women will not develop CIN (Ganesan & Rollason, 2006). In studies undertaken throughout 22 countries HPV Deoxyribonucleic acid has been found in 99.7% of all cervical cancers (Clifford, Franceschi, Diaz, Munoz, & Villa, 2006). A well established method of detection of HPV, CIN and cervical cancer is colposcopy (Sellors & Sankaranarayanan, 2003).

HPV has the potential to remain latent and may reactivate at a later time (Professional Advisory Board, 2007). Over 100 types of HPV have been identified with 13 types of HPV considered high risk for the development of cervical cancer, of them HPV 16 and 18 are considered the most common. There are believed to be five low risk types and include HPV types 6 and 11 which are reported to be present in 70% to 100% of visible genital warts (condyloma) (Bosch & Munoz, 2002; Farnsworth, 2007; Munoz et al., 2006). Prevalence of HPV transmission is highest in younger women (20-25%) reducing by 10% at age 30 and then a gradual decline of HPV occurrences across the remainder of life (Burchell, Winer, de Sanjose, & Franco, 2006).

Many associated risk factors exist which assist the development of HPV to cervical cancer, including tobacco smoking, long term use of hormonal contraceptives, high parity, Human Immunodeficiency Virus (HIV), young age at first intercourse and increased number of sexual partners (Hewett & Ahmed, 2006; Munoz et al., 2006). Possible co-factors include herpes simplex virus 2 (HSV-2) co infections, Chlamydia trachomatis co infection, immunosuppression, diet and nutrition (Munoz et al., 2006).

HPV causes cervical disease through the virus entering the basal epithelial cells of the lower ano-genital tract. Replication of the virus occurs in the squamous cells and the virus is released as the squamous cells shed. The E6 and E7 viral proteins are essential in this process and infection by either high or low risk HPV types alter the exchange with cell cycle proteins (pRb and p53). This process establishes either cellular propagation or malignant conversion (Munoz et al., 2006). Due to the interference of the cell's regulatory genes CIN can allow development of intraepithelial lesions or carcinoma (Beckmann et al., 2006).

Squamous cell cervical cancer is believed to originate from the basal cells of the transformation zone and the earliest stage of invasive cervical cancer is identified by small buds of squamous cells in the underlying tissue. This cancer is usually preceded by a lengthy period of pre invasive disease CIN (Sellors & Sankaranarayanan, 2003). CIN is a term which was introduced in the 1960's and relates to the epithelium on the cervix and is divided into three grades, CIN 1, mild dysplasia, CIN 2, moderate dysplasia and CIN 3, severe dysplasia. A two grading system was introduced in the 1980's which classes CIN 1 as LSIL (low grade squamous intraepithelial lesion) and CIN 2 and 3 as HSIL (high-grade squamous intraepithelial lesion) (Sellors & Sankaranarayanan, 2003). Invasion does not always progress from CIN 3 and may arise from CIN 1 (Ganesan & Rollason, 2006). However, there is a greater likelihood of HSIL developing into cervical cancer than LSIL (Sellors & Sankaranarayanan, 2003).

It has been deemed logical to consider HPV and CIN 1 as comparable lesions (Professional Advisory Board, 2007). An important risk factor for developing HSIL or cervical cancer is that of a persistent high risk (Hr HPV) (Professional Advisory Board, 2007).

Adenocarcinomas of the cervix are a varied group of neoplasms with the majority being of the endocervical cell type. The origin of adenocarcinoma is believed to be from the reserve cell of the columnar epithelium (Ganesan & Rollason, 2006). The risk factors are similar to those of squamous cell carcinoma. HPV 18 is closely associated with cervical adenocarcinoma (Ganesan & Rollason, 2006).

HPV has an incidence in men and women of around 75% for at least one lifetime infection (Professional Advisory Board, 2007). Even though women are frequently exposed to HPV the development of cervical neoplasia is not common. In the majority of cases HPV infection is considered a sexually transmitted disease and for males and females the associated risk is impacted by sexual behaviour. Safer sexual practices and cervical screening are very useful in

preventing cervical cancer for women (Munoz et al., 2006; New Zealand Ministry of Health, 2004a).

For the majority, LSIL is transient and has approximately a 60% regression rate (Ganesan & Rollason, 2006; Sellors & Sankaranarayanan, 2003). HSIL have an approximate 12% likelihood of progression to cervical cancer over a ten to twenty year period (Sellors & Sankaranarayanan, 2003). A study at National Women’s Hospital in Auckland carried out from the 1960’s to 1980’s demonstrated that 36% of women with a diagnosis of CIN III developed invasive cervical cancer over twenty years (McIndoe, McLean, & Jones, 1984). However, the time frame between CIN and invasive carcinoma is variable. A small percentage of women may present with no interval between normal and invasive cancer that is shown by cytology, histology or colposcopy (Ganesan & Rollason, 2006).

2.4 PROBLEM INTERNATIONALLY

Internationally, 83% of deaths from cervical cancer occur in developing countries. In 2002 there were approximately half a million incidences of cervical cancer with 274,000 deaths occurring worldwide. In developing countries cervical cancer accounts for 15% of all female cancers (Parkin & Bray, 2006). Rates of survival from cervical cancer vary with increased success in developed countries. For example, a 73% survival rate at five years is experienced in the United States of America (National Cancer Institute, 2002) but only a 30.5% survival rate is experienced by the African population in Harare, Zimbabwe (Gondos et al., 2004).

Table 2 Survival Rates of Cervical Cancer after Five Years

Country	Rate per 100,000
Canada	74%
United States	73%
Australia	72%
New Zealand	72%
Sweden	68%
United Kingdom	63%
Latin America	55%
Zimbabwe	30.5%

(American Cancer Society, 2006; Cancer Society UK, 2006; E. L. Franco, Duarte-Franco, & Ferenczy, 2001; Gondos et al., 2004; New Zealand Ministry of Health, 2006c; Parkin & Bray, 2006).

Cervical cancer has a significant impact on the number of years of lost life and is the largest single cause of years of lost life from cancer in the developing world (Parkin & Bray, 2006). Predictions for 2020 without other significant change occurring are that 0.7 million cases of cervical cancer will occur. This represents a 40% increase from 2002 (Parkin & Bray, 2006). Approximately 5% of all women in developing countries receive cervical screening (Jordan & Singer, 2006). In New Zealand approximately 70% of all eligible women receive cervical screening (New Zealand Ministry of Health, 2007c).

Mortality from SCC is as high as 35 per 100,000 in Eastern Africa compared with mortality rates in countries with screening programmes of closer to 5 per 100,000 (Sankaranarayanan & Ferlay, 2006). New Zealand had a mortality rate of 5 per 100,000 in 1990, which decreased to 2 per 100,000 in 2001.

2.5 PROBLEM NATIONALLY

A significant factor relating to the lower incidence of cervical cancer in New Zealand has been the success of the National Cervical Screening Programme (NCSP) which originated in New Zealand in the 1990's (New Zealand Ministry of Health, 2005). The Ministry of Health is responsible for the NCSP which to be successful needs to screen at least 85% of the eligible population every three years. Currently 48.6% of Maori, 48.9% of Pacific and 44.9% of Asian women are screened. Approximately 80% of European women engage in cervical screening (New Zealand Ministry of Health, 2008b). This programme has greatly assisted in reducing the rates of cervical cancer but scrutiny of the numbers screened demonstrates that the needs of Maori, Pacific, Asian and some non-Maori women are not being met (New Zealand Ministry of Health, 2007c).

Mortality in New Zealand from cervical cancer has reduced from 5 per 100,000 in 1990 to 2 per 100,000 in 2001 (New Zealand Ministry of Health, 2005). For Maori women the rate of mortality from 1996 to 2001 decreased from 11 per 100,000 to 6 per 100,000 (New Zealand Ministry of Health, 2006e). The decline in the rate for Maori women has been greater than non-Maori women but a significant gap still exists.

The New Zealand Cervical Cancer Audit report raises concerns over the inequalities that exist relating to ethnicity, low income, low education and those of an older age. Approximately

50% of women who had developed cervical cancer had not been screened in the preceding three years and 80% had not been screened regularly (Sadler et al., 2004). The findings in relation to these concerns are supported by the NSCP where it has been identified that Maori women are less well served by the screening programme (New Zealand Ministry of Health, 2006c). Maori women have been identified as having to wait longer for investigation and diagnosis of cervical abnormalities and treatment than non-Maori (Sadler et al., 2004). The NSCP in an attempt to address this issue of inequality launched a major communications campaign in September 2007 to increase screening coverage.

Reasons for these inequalities occurring are varied but some may relate to indigenous people being affected by discrimination (Fredlund, 2007). For some women gender and ethnicity can have a negative impact on their lifestyle which can result in increased levels of mortality, poverty and low literacy rates (Fredlund, 2007). This is apparent as on average Maori have the poorest health status of any ethnic group in New Zealand with Maori women experiencing the highest rates of mortality from cervical cancer (New Zealand Ministry of Health, 2006e). In response the government has expressed a commitment to reduce the inequalities that exist (New Zealand Ministry of Health, 2006e).

2.6 ETHNICITY AND CERVICAL ABNORMALITIES

While the role of culture is considered significant for all women, of prime focus is the significance for Maori and Pacific women as their rates of cervical cancer and smoking are significantly higher and require special consideration. Maori women have experienced a mortality rate from cervical cancer of 8.1% as opposed to the non-Maori rate of 1.9% (cumulative rates) (New Zealand Ministry of Health, 2007a). Pacific Island women in New Zealand have twice the incidence rate and three times the mortality rate for cervical cancer than the overall rates for the New Zealand female population (New Zealand Ministry of Health, 2007a).

For Maori women the differences in screening compared to non-Maori vary but possibly the main one is considered to be whakamaa, sacredness of the genital area (New Zealand Ministry of Health, 1997). The concepts of health for Maori are holistic and include physical, mental, spiritual wellbeing, family, language, land and culture (New Zealand Ministry of Health, 1997). Article Two of the Treaty of Waitangi acknowledges tino rangatiratanga over what

belongs to Maori; this includes the health of Maori (New Zealand Ministry of Youth Development, 2003). Information and ideals require formulation in ways that are relevant to Maori cultural views and beliefs (New Zealand Ministry of Youth Development, 2003).

He Korowai Oranga - the Maori Health Strategy support opportunities for Maori to have influence relating to their own health and well being (New Zealand Ministry of Health, 2002b). This strategy requires District Health Boards to involve Maori in their decision making and service delivery (New Zealand Ministry of Health, 2002b).

It has been identified that all cancers account for 29 percent of mortality in New Zealand with one third of these cancers believed to be preventable by early detection and treatment (New Zealand Ministry of Health, 2003b). The government, in line with the Primary Health Care Strategy 2001 and the New Zealand Cancer Control Strategy 2003 reinforce the relevance of the reduction of the incidence, impact and inequalities in relation to cancer (New Zealand Ministry of Health, 2003b).

An American study involving major ethnic groups, African Americans, Latina, Asian Americans and Caucasian involved 51 women in focus groups. This was a qualitative study to discover the health related quality of life effects that cervical cancer and dysplasia can have (Kimlin et al., 2004). Many of the participants reported experiencing pessimistic feelings including embarrassment that cervical cancer is associated with a sexually transmitted infection and promiscuity. It was felt that many of their feelings would not normally be discussed due to emotional discomfort. For many of the participants their domestic situation would take precedence over their own health. Factors in considering treatment involved loss of work, pay or difficulties with child care. The most significant finding was that poverty and socio-economic status were the main contributors to the development of cervical cancer. A further barrier to obtaining health care for some of the participants was the doctor-patient relationship. Experiences of feeling frightened by doctors and too embarrassed to ask questions were apparent. Cultural insensitivity, not allowing enough time and poor communication were also identified as other obstacles. The ethnic minority demonstrated a lack of empowerment, understanding and ability to find the way through the health care system (Kimlin et al., 2004).

A New Zealand study explored the barriers for cervical screening for Pacific Women (Jameson, Sligo, & Comrie, 1999). Interviews were undertaken with 20 Pacific women. This

study showed that there was a high awareness of cervical screening programmes and the barriers identified related to not being identified as a “Pacific” problem, embarrassment, belief’s that related to sexuality, concerns about lack of confidentiality and the relationship between cervical smears and sexual activity (Jameson et al., 1999).

In relation to under representation for Maori and Pacific Island women in New Zealand for outpatients such as colposcopy the DNA (did not attend) rate for these groups are identified as being higher than for non-Maori and non-Pacific Islands. This adds to their underrepresentation both in being seen for health-related issues and potentially not receiving appropriate treatment. A New Zealand study undertaken in a South Auckland hospital outpatient department in 2001 explored potential reasons why the Maori DNA rate was so high for men and women (Coffin, Emery, & Zwier, 2003). This study found a DNA rate of 24% with the three main reasons being that the patients did not have the correct information, ability to get to the clinic and lacked motivation to attend (Coffin et al., 2003). This South Auckland study is supported by a further study undertaken in Wellington hospital outpatient clinic in 2004-2005 where the overall DNA was 9% (Hudson, 2006). The DNA rates for Maori were 24% and Pacific people 29.5%. In the Wellington study over 50% of the participants who DNA their appointment identified hospital administration failures or hospital barriers as the reasons for their non-attendance (Hudson, 2006).

2.7 CO-FACTORS

Co-factors are considered likely to assist in the progression from HPV to cervical cancers as many women who develop HPV infections do not get cervical cancer (Munoz et al., 2006).

Three groups of potential co-factors are:

- environmental factors that include tobacco smoking, hormonal contraceptive, parity co-infection with other sexually transmitted agents and age at first intercourse (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Munoz et al., 2006).
- viral co-factors related to infection with specific HPV types (Munoz et al., 2006).
- host co-factors that include endogenous hormones, genetic factors and the immune system (Munoz et al., 2006).

The main co-factor to be discussed relates to tobacco smoking. However hormonal contraceptives, high parity, immunosuppression and co-infection with genital warts were included in the research and will be discussed. Other genetic and immunological host factors including viral factors, the viral load and integration are thought to play a role in the development of cervical cancer but to date these have not been but to date there has been minimal research conducted on these variables (Munoz et al., 2006).

2.7.1 TOBACCO SMOKING, HPV AND CERVICAL CANCER

A relationship between smoking and cervical cancer was established in the 1970's but it was not until 1995 when the International Agency for Research on Cancer performed an extensive literature review and found the association was consistent in studies that adjusted for HPV Deoxyribonucleic acid, or where women had HPV (Bosch & Munoz, 2002; International Agency for Research on Cancer, 1995). The Surgeon General in the USA supported the hypothesis that there was an increased risk for cervical cancer if a woman smoked. It was also noted that the extent of this link is uncertain in relation to the association with HPV (Public Health Service, 2002).

An earlier Swedish study involving 27,732 women followed the women from 1963 to 1972 and examined the relationship of smoking and some other social variables to mortality and cancer morbidity (Cederlof, Friberg, & Hrubec, 1975). The seven-year incidence of cervical cancer was 28.7 per thousand for those aged 18 through to 69 who smoked more than 15 cigarettes per day in comparison to a rate of 4.0 per thousand for non-smokers. These data also revealed that the strongest association between cigarette smoking and cancer for women resulted in cancer of the cervix (Cederlof et al., 1975).

The results from the Swedish study have been confirmed by later studies where women who smoke have been found to have a considerably increased risk of developing squamous cell carcinoma compared to women who have never smoked (Franco, Schlecht, & Saslow, 2003; International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Odongua et al., 2007; Winkelstein, 1990). Three possible reasons for this occurring are: a decrease of the immunoresponse in the cervix; impact on the metabolism of the female hormones; and genetic damage caused by carcinogens found in tobacco (Munoz et al., 2006).

Smoking has been demonstrated to damage the Deoxyribonucleic acid in cervical epithelium by the production of Deoxyribonucleic acid adducts (El-Ghobashy & Herrington, 2005; World Health Organization & International Agency for Research on Cancer, 2004). These adducts have been identified as the beginning of carcinogenesis and involved Deoxyribonucleic acid binding to a cancer causing chemical. This binding to blood proteins by carcinogens present in tobacco smoke has been shown to occur at significantly higher levels in smokers than non-smokers. Some of these adducts include the aromatic amines, polycyclic aromatic hydrocarbons and tobacco specific nitrosamines, benzene acrylamide and acrylonitrile (World Health Organization & International Agency for Research on Cancer, 2004). These polycyclic hydrocarbon Deoxyribonucleic acid adducts may lead to induction of mutations, which are more common in biopsies from women who smoke than those who do not (El-Ghobashy & Herrington, 2005).

In the cervical mucus of smokers high levels of nicotine and cotinine are present and are responsible either alone or in conjunction with HPV in the progression of the disease. The combination of HPV and tar from smoking are considered to be significant in the aetiology of cervical cancer (El-Ghobashy & Herrington, 2005; Hellberg, Nilsson, Haley, Hoffman, & Wynder, 1988). Cellular immune defence in the cervical epithelium may also be altered by the activation of carcinogenic nitrosamines. A number of studies indicate a strong association between HPV, CIN, smoking and cervical cancer (Kjellberg et al., 2000).

One study examined the effect of smoking cessation on cervical lesion size. This small study undertaken in 1991 and 1992 recruited 82 women who had LSIL and had agreed to attempt to stop smoking for six months. The researchers wished to ascertain if smoking had an effect early in the natural course of cervical cancer (Szarewski & Cuzick, 1998). Documentation of the appearance of the cervix and photographs were taken and the image was digitized and computer-aided image analysis was used to monitor lesion size. From the original group 17 women stated they were smoke free for six months. Four of the 17 women who stopped smoking (confirmed by salivary cotinine concentration) had no visible lesion on their cervix, 10 had at least a 50% reduction in the size of the lesion reported. From the original group 47 women did not significantly reduce their smoking and showed very little change in lesion size (Szarewski et al., 1996). The main findings were that smoking cessation may result in a reduction in the size of low grade cervical lesions and this information supported a link between smoking and cervical disease (Szarewski et al., 1996).

The tumour suppressor gene (fragile histidine triad FHIT) which has been demonstrated to be altered in 80% of tobacco associated lung cancers was studied in the cervical tissue from 58 women identified with squamous cell carcinoma of the cervix (Holschneider, Baldwin, Tumber, Aoyama, & Karlan, 2005). This American study demonstrated that the FHIT gene showed loss of function and suggests this may demonstrate a molecular target with the association of cigarette smoking and cervical carcinogenesis (Holschneider et al., 2005).

An Italian study by Sozzi and others explored the association between cigarette smoking and the FHIT gene alteration in lung cancer (Sozzi et al., 1997). This study identified that 80% of the group who developed cervical cancer were smokers whereas only 22% of the non-smoking group developed cervical cancer ($p=0.001$). This study demonstrated a loss of one aspect of the FHIT in smokers when compared to non smokers. This association also demonstrated primarily but not exclusively an association between squamous cell lung cancers (Sozzi et al., 1997). This review supported the hypotheses of Dr Winkelstein in 1977 where he found that smoking and squamous cells tumours from a number of sites would be affected by cigarette smoking. His findings demonstrated a high incidence of cancer of the uterine cervix and lung cancer in men (Winkelstein, 1990).

Nicotine has been demonstrated, when in circulation and in cervical squamous epithelial cells, to encourage quick tumor growth and spread by the lymphatic system in the anogenital region. This research also demonstrated that the spread of HPV in cervical cancer cell lines is not facilitated by nicotine (Lane, Gray, Mathur, & Mathur, 2005).

Data pooled from 23 epidemiological studies with 13,541 women with cervical cancer and 23,017 without cervical cancer provided evidence that smokers have a higher likelihood of developing squamous cell cancer but not adenocarcinoma (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). The studies demonstrated the likelihood of developing squamous cell carcinoma is greater in current smokers, increased by numbers of cigarettes smoked, and being of a younger age when starting smoking (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). Women who were currently smoking had a significantly increased risk of squamous cell carcinoma of the cervix compared to those who had never smoked (RR 1.60 95% CI; 1.48-1.73, $p=0.001$) (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). Eight of the studies involved had tested women's cervical HPV-Deoxyribonucleic acid and for women who tested positive there was a greater risk of SCC for those who were current smokers compared to those

who had never smoked (RR=1.95 (1.43-2.65)). This investigation is the most significant to date and included approximately seventy per cent of the available published data internationally. The potential limitations to this review are the combining of different studies with different methodology and the variability of exposure to HPV infection. The extent of the impact of tobacco smoking was unable to be precisely measured (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006).

An American study undertaken between 1996 and 1998 researched the possible confounding effect of oncogenic human papillomavirus (HPV) infection in relation to smoking (McIntyre-Seltman, Castle, Guido, Schiffman, & Wheeler, 2005) A total of 5,060 women who presented with atypical squamous cells of uncertain significance (ASCUS) (see Glossary) or LSIL on their smear test were eligible for the study. The cohort were monitored every six months for an additional two years (McIntyre-Seltman et al., 2005). In this study 506 of the women were found to have CIN III or cancer while the other 3,133 were shown to have an oncogenic HPV or LSIL. The results showed that current smoking was only minimally associated with increased HPV infection. However, women with an oncogenic HPV and a LSIL who smoked were up to three times more likely to be found to have CIN III or cancer. The longer period of time that women had smoked and the number of cigarettes smoked increased the association (McIntyre-Seltman et al., 2005). The effects of the greater number of cigarettes smoked and the longer time period of smoking appeared additive (McIntyre-Seltman et al., 2005). A recommendation from this study is that women who smoke and who have an oncogenic HPV with mildly abnormal smears should be considered for smoking cessation trials (McIntyre-Seltman et al., 2005).

Two studies examined found no correlation between CIN and cigarette smoking. The first study took place in Norway in 1995 and was looking to see if HPV causes HSIL. This was a retrospective study which matched with controls from a randomly selected group of women whose data was obtained from a central population data bank (Olsen et al., 1995). This study examined records from 337 women aged between 20 to 44 years of age. CIN II and CIN III were histologically confirmed among 103 of the cases. Of the 103 cases, 91% were found to have HPV Deoxyribonucleic acid and 15% of the 234 matched controls had HPV Deoxyribonucleic acid detected via cervical smear tests (Olsen et al., 1995). The study which was adjusted for the causal agent, HPV, would now be considered inappropriate as the information relating to HPV being a causal agent is widely accepted (Professional Advisory Board, 2007). If this study was unadjusted current smokers were 70.3%, $p < 0.001$ of the cases

and 30.7% of the controls. This would fit with the co-factor status of smoking (Munoz et al., 2006).

The second study took place in three New Independent States of the former Soviet Union between 1998 and 2002. The researchers studied information relating to smoking as an independent risk factor for oncogenic HPV infection but not for high grade CIN (Syrjänen et al., 2007). The cohort included 3,187 women of which 854 had histologically confirmed LSIL changes on their cervix. This study found no increase in LSIL or HSIL among current smokers (Syrjänen et al., 2007). The authors found that an increased risk of cervical cancer was associated with sexual behaviour of the members of the cohort and that smoking was linked to the sexual behaviour of the cohort (Syrjänen et al., 2007). Two possible limitations of this study relate to the number of biopsies taken to confirm abnormalities, (497 from the original cohort) and that the selection of participants included an unidentified number from a sexually transmitted disease clinic. This study did however find that persisting HR HPV infections were to some extent higher among smokers (36.4%), than never smokers (30.2%) or previous smokers (21.3%), but this was not significant. In relation to predictors of HR HPV current smoking was highly significant ($p=0.0001$) (Syrjänen et al., 2007).

It would appear clear from more current and detailed research that cigarette smoking has an association with LSIL and HSIL, but the association between condyloma and smoking is unclear. An observation from one study which demonstrated only a 58% response rate from 144 subjects found no association between cigarette smoking and condyloma (Habel et al., 1998). A review of 12 studies, demonstrated only two studies showing an association between smoking and the risk of genital warts but the 10 studies which examined HPV infection of the cervix did not show an association (Habel et al., 1998). The review by Habel demonstrated that the risk of condyloma is mainly related to sexual activity. No clear relationship was demonstrated between condyloma and many potential co-factors for anogenital cancer. Two limitations in relation to the studies in the review are the study size and the fact that the associated studies were undertaken approximately 15 years ago (Habel et al., 1998).

The largest and most current study on the link between smoking and the persistence of HPV was on data collected by the International Agency for Research on Cancer and involved information from over 10,000 women in 10 different countries. The study attempted to ascertain if smoking increased the risk of acquiring or the persistence of HPV (Vaccarella et al., 2008). The study examined the IARC HPV Prevalence Survey which showed that current

tobacco smoking had an association with HPV (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). The researchers found that it was not clear whether smoking was associated with an increased likelihood of obtaining, or the persistence of, HPV. This association is difficult to ascertain due to the confounding aspect of sexual behaviour (Vaccarella et al., 2008). However current smokers were demonstrated to have an increase of HPV incidence with those smoking greater numbers of cigarettes more likely to have HPV (Vaccarella et al., 2008). This study acknowledged that smoking cessation can impact positively on early cervical abnormalities and that smoking cessation is entirely appropriate for cervical cancer prevention (Vaccarella et al., 2008).

An earlier study on the clearance of HPV infection in women examined data from 621 women in total with 222 women having a HR HPV, 105 having a low risk HPV (Richardson et al., 2005). The women were followed for two years and the researchers found that women who smoked approximately one to two packets of cigarettes per day over a year were less likely to clear the HR HPV (HR, 0.5; 95% CI, 0.2-1.1) or low risk HPV (HR, 0.3; 95% CI, 0.1-1.1) infections in comparison with women who did not smoke (Richardson et al., 2005). This study did not attempt to control for sexual behaviour as in the study by Vaccarella, (2008). However, the first recommendation from this study to assist with HPV persistence was to encourage smoking cessation for women (Richardson et al., 2005).

2.7.2 TOBACCO SMOKING IN NEW ZEALAND AND ETHNICITY

Tobacco smoking is recognised as the chief cause of preventable death in New Zealand. It is estimated that, on average, 4,700 men and women die each year from smoking-related illnesses (Health Sponsorship Council, 2007). For all ages of Maori in New Zealand there is a 47% rate of smoking with Maori women demonstrating a smoking rate of 50% (New Zealand Ministry of Health, 2007d). Teenage Maori girls aged 15-19 having a 60% smoking prevalence compared to teenage Maori males who have a 32% prevalence rate. For Pacific teenagers there is a greater rate of smoking for teenage males at 46% than for Pacific teenage females at 28% (New Zealand Ministry of Health, 2006g).

A culturally appropriate smoking programme developed by Maori for Maori women and their whanau (Aukati Kai Paipa) was undertaken over a two year period and demonstrated a rate of 29% of participants becoming smoke free (New Zealand Ministry of Health, 2003a). This rate was notably higher than the cessation rate of 12.5% for Maori women smokers in the general

population without cessation intervention (New Zealand Ministry of Health, 2003a). The programme compared favourably to the Smoke Change programme who work with only pregnant women where a 27% reduction in smoking occurred in 2006 (Smokechange, 2007). The success of the Aukati Kai Paipa programme was credited to the fact that it was appropriate and accessible for Maori (New Zealand Ministry of Health, 2003a).

2.7.3 HORMONAL CONTRACEPTIVES

Oral contraceptives are a combination of synthetic oestrogens and progestogens and it is estimated that worldwide 100 million women take the combined oral contraceptive pill (COCP) yearly (Jordan & Singer, 2006). The risk of developing cervical cancer for women that have taken the COCP for ten years is doubled when compared to women who have never taken the COCP (Munoz et al., 2006). There is limited data that suggests the risk is decreased after stopping the COCP (Jordan & Singer, 2006). It is believed that the mechanism that acts as a contributing factor to cervical cancer is the oestrogen or progestogen which permit HPV gene-expression in the cervix by progesterone-receptor mechanism and effects the viral genome (Cogliano et al., 2005; Jordan & Singer, 2006; Munoz et al., 2006).

Taking the COCP can increase the risk of developing CIN. In some cases this association could be due to detection bias as users of the COCP are more likely to have regular gynecological examinations than women who do not take the COCP (Irwin, Rosero-Bixby, & Oberley, 1998).

The physical appearance of the cervix may be altered by taking the COCP and this depends on the dosage of oestrogen and progestogen and length of time used (Jordan & Singer, 2006). The most obvious change occurs at the squamocolumnar junction of the cervix. The more delicate cells of the endocervix are likely to extend out onto the ectocervix which is frequently described as an ectropion. Due to the effects of oestrogen the exposed endocervical columnar cells increase their mucus secretion production which is visible as a thick and viscous mucoid secretion (Jordan & Singer, 2006).

2.7.4 PARITY

A further risk factor for squamous cell cervical cancer but not adenocarcinoma is believed to relate to a higher number of live births (Jordan & Singer, 2006). This may be due to a

hormonal effect in pregnancy in the transformation zone (Jordan & Singer, 2006; Munoz et al., 2006). The International Agency for Research on Cancer (IARC) multicentre pooled analysis confirmed that high parity increases the risk of cervical cancer (Munoz et al., 2006).

The relative risk for squamous cell invasive cervical cancer is increased with the number of full term pregnancies (RR=1.10; CI 1.08 - 1.112) with each further pregnancy. This may be related to the effect of pregnancy leading to the transformation zone being on the ectocervix which in turn could increase exposure of the transformation zone to other HPV's (Munoz et al., 2006).

2.7.5 OTHER SEXUALLY TRANSMITTED AGENTS AND IMMUNOSUPPRESSION

In addition to HPV there are three other sexually transmitted infections which are thought to be associated with the development of cervical cancer, HIV, Chlamydia trachomatis and herpes simplex virus type-2 (HSV-2) (Castle & Giuliano, 2003; Munoz et al., 2006; Palefsky & Holly, 2003; Smith et al., 2002). It is believed that the increased cancer risk associated with HSV-2 and Chlamydia trachomatis may be related to the inflammatory response that is connected to the progression of genetic instability and the production of free radicals (Castle & Giuliano, 2003). Women immunosuppressed with HIV infection or organ transplantation are at a greater risk of HPV related infections (Palefsky & Holly, 2003).

2.8 SMOKING CESSATION

In 2006 the International Agency for Research on Cancer arranged for 17 scientists from eight countries to assess the evidence on the reversal of health risks after quitting smoking cigarettes. In relation to SCC the risk was found to be lower in former smokers than current smokers with a RR = 1.12 (1.01-1.25) in comparison to current smokers with RR = 1.60 (95% CI: 1.48-1.73, p=0.001) (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). No clear trend existed with time since stopping (p=trend = 0.6) (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006) (Dresler et al., 2006). It was believed by the researchers that there are overwhelming health

benefits to becoming smoke free and that smoking cessation should be increased internationally (Dresler et al., 2006).

A recent study, believed to be the first to research practice nurses attitudes in relation to smoking cessation was undertaken in the United Kingdom (Hall & Marteau, 2007). This study found that many practice nurses felt more confident discussing smoking cessation with patients in relation to cardiovascular or diabetes than cervical cancer. More barriers were seen in relation to smoking cessation and cervical screening and many nurses felt that woman could feel annoyed at having the subject raised while presenting for a cervical smear test (Hall & Marteau, 2007). One possible reason for this information not always being communicated to patients is that the United Kingdom screening programme, while mentioning smoking as a risk factor CIN and cervical cancer, advice from smear takers to women was not commented on (NHS Cancer Screening, 2008). This study relied on nurses' self reports of giving smoking cessation advice and the practice nurses who responded were from a national sample, giving good representation of different practices in the United Kingdom (Hall & Marteau, 2007).

A further 2004 pilot study in the United Kingdom was undertaken to assess the usefulness of a brief smoking cessation intervention given as part of cervical screening (Hall, Reid, Ukoumunne, Weinman, & Marteau, 2007). A trial was undertaken involving eight GP practices where nurses took cervical smears from 242 women who smoked. All women were given routine cervical smear tests information and half the group (n=121) received brief smoking cessation advice and the other half (n=121) did not receive this advice. The nurses involved in giving the information had received one and a half days training in giving smoking cessation advice. The nurses planned to speak to each woman on one occasion for approximately three minutes about smoking cessation and in addition gave the women written information about smoking cessation. In relation to follow up, 31 of the intervention group were unable to be followed up as were 39 of the control group. The results for the remaining participants demonstrated that brief smoking cessation advice given by practice nurses during routine cervical smear tests was appropriate; however the average time of the entire consultation was almost five minutes. The intention of women to return for a smear test in the future was not reduced and the intervention group demonstrated a greater intention to stop smoking at follow up visits, two weeks and ten weeks later (P=0.06) and (P=0.03). Two possible limitations of this study were that the nurses involved were not blinded to group allocation and possible selection bias with nurses involved knowing at recruitment to which group the women were allocated. This study demonstrated that smoking cessation advice did

not appear to deter women from having a smear test and possibly was an appropriate time to discuss becoming smoke free (Hall et al., 2007).

A Cochrane review which examined 42 studies on nursing intervention for smoking cessation demonstrated that there were potential benefits of smoking cessation advice given by nurses to patients with evidence that this is effective. However, when interventions are brief and provided by nurses who do not specialise in health promotion the intervention was found to be weaker. The authors considered that the challenge for the future is that patient's smoking and smoking cessation intervention needs to be included as part of usual nursing practice with people being given advice with appropriate follow up (Rice & Stead, 2008).

Another Cochrane systematic review examined 48 studies related to the effect of telephone counseling to assist with smoking cessation (Stead, Perera, & Lancaster, 2006). This included a variety of calling systems with 10 of the trials involving people who had contacted a quit line and 29 of the studies where proactive counseling took place. There was a reasonable amount of heterogeneity between the 29 trials which involved people being phoned up to twelve times and 19 of the trials having a brief face to face meeting. The authors concluded that proactive telephone counseling assisted smokers who were keen to become smoke free with evidence of a dose response. The more phone calls made the better the chance of becoming smoke free compared to minimal intervention (Stead et al., 2006).

2.9 WOMEN'S HEALTH

One description of health is "a state of total wellbeing, not just the absence of sickness" (World Health Organization, 1986). This is comprehensive and is inclusive of more than just physical aspects of health and includes emotional, political, financial, spiritual and community aspects (McDonald & Thompson, 2005). People's beliefs about health vary widely and may include their own experiences, knowledge, values and expectations as well as their opinion of what is required by them to contribute to their health in everyday life. Health professionals may consider health as being free of a medically defined disease or disability but this may differ from the values and beliefs of lay people (Ewles & Simnett, 2003). Many varied views also exist between health professionals as to what is health. An example of other view points could relate to practitioners of complementary medicine and their varying methods used to restore health (Ewles & Simnett, 2003).

The Ottawa Charter for Health Promotion 1986 outlined principles for health promotion and published a charter for action to improve 'Health for all by the year 2000 and beyond'. This charter has been utilised by the Ministry of Health in New Zealand to support the development of health promotion and is recognised as one of the tools that should be used (New Zealand Ministry of Health, 2006d). Concepts relating to health promotion in New Zealand can be undertaken by aligning the Ottawa Charter and Te Tiriti o Waitangi which include the beliefs that health is a positive perception encompassing a holistic approach (New Zealand Ministry of Health, 2006d). This also incorporates principles where priority is given to groups where inequalities impact on outcomes and where health promotion gives people greater control over their health while ensuring participation of health professionals to facilitate this process (Morgaine & Moore, 2007). An example of this would be the equitable accessing of cervical screening for all ethnic and social groups within New Zealand.

A further consideration is that many women are responsible for improving the health of their family. Women frequently take on the role of primary caregiver for raising children which is an important factor for both current and future generations (Fredlund, 2007). Policies that support the maintenance and improvement of the health of all women in New Zealand, but particularly Maori and women who are socially disadvantaged require careful consideration (New Zealand Ministry of Women's Affairs, 2004). Refugee women and their families are recognised as often having had minimal or no family planning education, cervical or breast screening and often have to cope with psychological problems (New Zealand Ministry of Women's Affairs, 2004). Potential barriers in relation to access for health may relate to language, financial, and cultural barriers (New Zealand Ministry of Women's Affairs, 2004).

The contribution of social, economic and cultural elements to poor health outcomes is a significant factor for Maori women as is ethnicity. The way society is structured to support the majority often leads to greater inequalities for the minority (New Zealand Ministry of Women's Affairs, 2004). Acknowledging cultural and ethnic differences in the way that information is communicated is essential. The European way of conveying information is usually by more factual and documented means. However, this is not the preferred manner for Maori communities (New Zealand Ministry of Health, 1997) who prefer a more face to face communication style (korero) (Maori Language Commission, 2008).

When sharing information with Maori, community based programmes have been found to be more successful than other more traditional settings (New Zealand Ministry of Health,

2003a). If the environment is seen as culturally safe then the service and programme will be more acceptable to Maori (New Zealand Ministry of Health, 2003a). The constitution of knowledge and how this has been decided has consequences in relation to the valuing of Maori knowledge and the transmission of this knowledge. The use of knowledge requires a collective approach, realising Maori aims and being Maori led (Barnes, 2006).

The New Zealand Government has a commitment to promoting women's health and rights and the Ministry of Women's Affairs (New Zealand Ministry of Women's Affairs, 2003) is one way the government obtains guidance to develop and support women within New Zealand. After commissioning by the government, the MWA developed the Action Plan for New Zealand Women (New Zealand Ministry of Women's Affairs, 2003). This Action Plan demonstrates a commitment to advance a number of outcomes for women and decrease inequalities between certain groups of men and women. *Maori Women: Mapping Inequalities and Pointing Ways Forward* is a report from the MWA where the purpose is to identify disparities between Maori and non-Maori and analyse the status of Maori women and girls against other groups (New Zealand Ministry of Women's Affairs, 2001). An example of the government's support for advancing women's health is in the financial support for this researcher in training to become a Nurse Practitioner in Women's Health.

2.10 HEALTH PROFESSIONALS AND HEALTH PROMOTION

The Primary Health Care Strategy has identified two of its population health objectives as firstly reducing smoking and secondly reducing the incidence and impact of cancer (New Zealand Ministry of Health, 2001). This is a five- to ten- year plan and the principles include acknowledging the Treaty of Waitangi, reduction of inequalities, consultation with the communities affected and a collaborative approach to health. The work of this researcher is in line with these principles and the author has established a two-hour smoking cessation programme that was set up in 2004 in the colposcopy department at Christchurch Women's Hospital. Advocacy for staff working in smoking cessation and education requires endorsement by District Health Boards.

A 2007 survey examining the extent of knowledge related to tobacco and smoking cessation among nurses in New Zealand has highlighted several areas for improvement (Wong et al., 2007). Of the one thousand questionnaires posted to a random selection of nurses from the Nursing Council register of those with current practicing certificates responses were received from 371 (37%). The majority of nurses reported understanding that nicotine dependence causes people to stay smoking but over 50 per cent of the nurses believed that patients would not stop smoking if instructed to by them. Sixty-three percent believed that nicotine was the major element for causing cancer and was also responsible for heart disease. The impact of smoking tobacco on impotence and infertility was not fully realised, whereas the significance to emphysema and mouth cancer were (Wong et al., 2007). A limitation of this study could relate to the low response rate. The study does not mention if the nurses were assured of confidentiality and participants were required to return a consent form agreeing to take part in the study (Wong et al., 2007).

A study undertaken in Belgium to assess general practitioners' perception of risk factors for cervical cancer development in relation to patient education involved 60 GPs and 28 trainees (Baay, Verhoeven, Peremans, Avonts, & Vermorken, 2006). The study demonstrated that the majority of GPs were well informed of sexual habits as risk factors for cervical cancer development and the role of HPV. The role of the general practitioners delivering smoking cessation was identified as not being fully clear. Two different issues were acknowledged, one being the knowledge to inform women and second, the communication skills required to effectively deliver this message. This study measured general practitioners knowledge in relation to the disease process (Baay et al., 2006). While this setting is outside the New Zealand environment it is of some interest to the researcher as the way the smoking cessation message is delivered is important.

A further Australian review examined general practitioners' and nurses' work in relation to effectiveness of brief intervention for smoking cessation. This study acknowledged that brief interventions in relation to smoking cessation can be very effective in encouraging people to reduce their cigarette smoke, as well as being cost effective (Roche & Freeman, 2004). However, this review noted that there is some reluctance by front line staff to utilise brief interventions (Roche & Freeman, 2004). Potential barriers identified in this review showed some general practitioners failing to use brief smoking cessation interventions as priority may be given to traditional areas of prevention such as high blood pressure, breast cancer, cervical cancer and diabetes. This review found that the practice nurse role was consistent for

screening and brief smoking cessation interventions while also more likely to be cost effective than general practitioners interventions. Two recommendations from this review were that further research should be undertaken to examine the effectiveness of practice nurse-led brief interventions in Australia while also aiming to improve general practitioner's uptake of brief interventions (Roche & Freeman, 2004).

A small qualitative study of patients' perceptions of doctors' advice to quit smoking was undertaken in a Wales smoking intervention study. The aim of the study was to find "patient orientated evidence that matters". The findings were not expressed numerically but what was of interest was the remarkable similarity with the findings of those who had quit and those who did not quit. The data were pooled due to these responses (Butler, Pill, & Stott, 1998). The main themes that emerged were that the patients; had decided their own beliefs around their smoking, did not believe that the doctor could influence their decision, and also believed that becoming smoke free was an individual choice. Some of the participants reported feeling guilty and annoyed and this impacted on their decision to visit their doctor for other health related issues (Butler et al., 1998). Three types of broad groups of smokers were identified in this study and categorised as contrary, matter of fact, and self-blaming. An awareness of harming the doctor-patient relationship was evident particularly with the groups that were defined as contrary and self-blaming (Butler et al., 1998). Smoking interventions that patients thought would be the most appropriate included being treated respectfully, not being preached at, offering support, and acknowledging the person as an individual (Butler et al., 1998).

It can be seen that interventions to increase smoking cessation may be useful but requires appropriate delivery by staff that are well prepared. In relation to the change process it is considered that all successful strategies are socially-based and action-oriented (Wilkinson, 2003). This involves considering the whole life experience of the person, their anxiety levels, the social relationships and the quantity of control that each individual has and the social status. To assist in the change process it is considered essential to develop a good relationship. Once this has occurred changes in behaviour can occur due to collaboration and the development of trust which can impact on the social identity of the person (Fullan, 2006).

For health promotion to be effective it is believed that it should be delivered from two levels, the social system and the individual (JanBen & Pfaff, 2005). The social system in New Zealand is supportive of smoking cessation and has developed a policy of active opposition to smoking. This was achieved by successful lobbying over a 15-year period which has resulted

in a ban on smoking in eating places, bars and workplaces (Barnett, 2005). The second level is that of health practitioners promoting appropriate individual health by direct influence and disease preventative behaviour in significant parts of the population (JanBen & Pfaff, 2005; Kjellberg et al., 2000).

These concepts are supported by Martha Rogers, a well known nursing theorist who stated that any study of human beings could only be meaningful when the person's wholeness is evident (Schuiling & Likis, 2006). Another theorist who provides a conceptual framework for nursing care is Madeleine Leininger who proposed that caring is the essence of nursing and is universal throughout all cultures. Both these theories uphold the belief that care should be provided within the patients cultural context and that cultural beliefs influence the individuals belief system. Improved health outcomes are considered more likely when the patient's connotation of health is considered (Schuiling & Likis, 2006).

A significant way of improving public health is believed to be achievable by developing a strong primary health care system. In New Zealand the Government has developed a strategy to assist with this process. The New Zealand Government has developed a definition of primary health care in the Primary Health Care Strategy which was published in 2001 (New Zealand Ministry of Health, 2001). This definition is based on the World Health Organization (WHO) Alma Ata Declaration which includes community health improvement, preventive services with education, counselling, screening and access to first level services such as maternity, family planning and sexual health services (New Zealand Ministry of Health, 2001).

Health professionals can play a leading role in counselling and education to assist with preventative strategies to maintain healthier lifestyles and to reinforce positive health style choice that have been already established (Schuiling & Likis, 2006).

Another health factor is the consideration that people may be prepared to compromise their health in an exchange for other benefits. An example of this is smoking where the emotional benefit of smoking may be accepted as the price for smoking-related problem (Ewles & Simnett, 2003).

2.10.1 CERVICAL SCREENING

Cervical cancer demonstrates better than any other cancer the impact of prevention, early diagnosis and curative therapy on the mortality rate (Baliga, 2004). The Papanicolaou cytological screening test developed by Dr George Papanicolaou in the late 1940s' and widely referred to as the Pap test has enabled the detection of cervical precancer and cancer for over 50 years. Screening with this test has helped reduce the incidence of cervical cancer (Baliga, 2004). The developed countries with a screening programme significantly reduced mortality due to cervical cancer. Further interventions are required to help developing countries with cervical screening (Parkin & Bray, 2006).

Screening is considered to be useful when a screening test is offered that will show a varying percentage of people in the group who have a greater chance of being assisted by further tests or intervention to lessen or eliminate the harmful effects of the disease (New Zealand Ministry of Health, 2004a). Screening is also required to have formal evaluation and needs to reflect evidence-based practice that the screening will do more good than harm (New Zealand Ministry of Health, 2004a).

2.10.2 CERVICAL SMEAR TEST

The cervical smear test is taken once the cervix is exposed with a speculum examination (see Glossary). A narrow brush, soft broom, plastic or wooden spatula are used to scrape or brush some of the cells from the cervix and these are either placed into a specific liquid to preserve the cells or placed onto a glass slide for preservation (New Zealand Ministry of Health, 2002a). The specimen is then sent to a laboratory for examination. A report on the result of the smear test is undertaken by a cytologist (see Glossary) and forwarded to the smear taker. The cervical smear test does not in itself prevent cervical cancer, however this test can detect changes on the cervix that are cancerous or changes that if left untreated could develop into cervical cancer. This screening test has a detection rate of 80% of abnormalities and therefore it is important for women to have regular three yearly routine screening (New Zealand Ministry of Health, 2002a). If an abnormality is missed on a first test it is likely that it will be detected on the next test (New Zealand Ministry of Health, 2002a).

2.10.3 NATIONAL CERVICAL SCREENING PROGRAMME (NCSP)

Prior to the inception of the NCSP in New Zealand, groups such as the Cancer Society and the Department of Health had been working towards establishing a screening programme. However the NCSP was developed after the government supported the decision of Judge Cartwright in a 1988 inquiry into a research trial at National Women's Hospital in Auckland to have a national screening programme (Sadler et al., 2004).

The benefits of cervical screening include the identification of abnormalities which by treatment can lead to a reduction of incidence and mortality of cervical cancer (New Zealand Ministry of Health, 2004a) and the ability to detect early abnormal changes that can be treated before more invasive procedures such as hysterectomy are needed. Early treatment is also likely to be cost effective (New Zealand Ministry of Health, 2004a). Recommendations from the Cervical Cancer Audit highlight the need to prioritise Maori women, ensure inequalities between Maori and non-Maori are not increased, and prioritise groups who are disadvantaged by social status, income and age (Sadler et al., 2004).

The NSCP have set guidelines for colposcopy services to ensure that women receive appropriate care to ensure timely diagnosis for abnormalities (New Zealand Ministry of Health, 2006f). Recently, an audit of all colposcopy services in New Zealand has been undertaken to ensure compliance with the NSCP guidelines (New Zealand Ministry of Health, 2006f).

A further role of the NCSP was the development of a register of women enrolled in the programme which provides an accurate history for women of the results of their cervical smear tests. This register is also able to show the decline of cervical cancer since the instigation of the programme (New Zealand Ministry of Health, 2000). The register has a record of ethnic groups and this information can give assistance to policy makers, funders and providers to plan for further developments. The register is also used as a means of following up on women if they miss out on their regular smears or treatment if they move throughout New Zealand. A benefit for women enrolled in the programme is that the cervical smear test reduces the chance of developing and dying from cervical cancer by approximately 90% (New Zealand Ministry of Health, 2004a). By engaging in having three-yearly smears women keep the number of smears needed over a lifetime to a minimum (New Zealand Ministry of Health, 2004a).

Information relating to ethnicity on the National Cancer Register (NCR) and the National Cervical Screening Programme Register is considered inaccurate for approximately 20% of Maori women. Monitoring of Maori women's health is impacted on with this level of misreporting (Sadler et al., 2004). Screening of Maori women in the 2000-2002 audit for cervical cancer was higher, 42% that the 1993 study involving 46 Maori women with cervical cancer where 24% had been screened (Ratima, Paul & Skegg, 1993).

The detection of HSIL has increased by 40% and corresponds with the decline in incidence of cervical cancer (New Zealand Ministry of Health, 2005). The level of screening with smear tests increased from approximately 18% in 1991 to 73% in 1996 and has continued to remain constant (New Zealand Ministry of Health, 2005). Rates of HSIL are still highest for Maori women, women living in deprived communities in New Zealand including some areas in Northland and Gisborne (New Zealand Ministry of Health, 2005; New Zealand Treasury, 2001). The NCSP has a target to achieve cervical screening for 75% of women eligible within all population groups (New Zealand Ministry of Health, 2007c). Current screening rates in New Zealand in January 2008 demonstrate that 71.5% of women are involved in three-yearly screening with the target being 75%. Maori women have a three-year screening rate of 48.6%, Pacific women 48.9% and Asian women of 44.8% (New Zealand Ministry of Health, 2008b). The rates of Maori women screened may be higher than what the NCSP report, due to a lack of accurate staging of cervical cancer reports in the audit for approximately 25% of the women (Sadler et al, 2004). When women have a smear test and receive an abnormal result that warrants investigation they are referred for a colposcopy appointment where further investigation, diagnosis and possible treatment occurs.

2.10.4 COLPOSCOPY

Colposcopy literally means inspection of the vagina and is commonly associated with inspection of the cervix (Kyrgiou et al., 2006). This is a technique used to examine the cervix, vagina and vulva with a white light source and magnification. The aim of colposcopy is to identify human papillomavirus infection, cervical intraepithelial neoplasia and cancer of the cervix, vagina and vulva (Baliga, 2004). Routinely two solutions, acetic acid and iodine are utilised to assist in the detection of abnormalities (Sellors & Sankaranarayanan, 2003).

The process to identify abnormalities on the cervix with colposcopy initially involves the use of a green filter on the colposcope to observe the patterns of blood vessels. Of significance are

punctuation, mosaics and atypical vessels. Acetic acid (see Glossary) is then applied to the cervix which may result in cytoplasmic dehydration. This drying out process causes the cells to turn different shades of white depending on the grade of abnormality and is identified as acetowhite changes (Sellors & Sankaranarayanan, 2003). Longer lasting areas of acetowhite changes are observed in HPV, CIN and cancer (Baliga, 2004).

Transformation early in the process of metaplasia allows the capillaries to elongate to the surface causing them to become condensed vertically by neoplastic epithelium. This leads to the visualisation of colposcopic changes and in this instance, punctuation. A further development ensures the capillaries reach halfway up the epithelium and this results in a further visual colposcopic change mosaicism. If further neoplastic changes occur the capillaries are pressed down and acetowhite epithelium occurs (Baliga, 2004).

Squamous epithelium is receptive to hormonal stimulation and requires oestrogen (see Glossary) for complete development. If deficiencies occur due to menopause or high levels of progesterone, full maturation will not occur on the surface of the epithelium. This lack of full maturation may affect interpretation by the colposcopist, cytologist and histologist to assist with interpretation of colposcopy, cytology and histology results. Topical oestrogen can be used prior to inspection to assist in determining whether or not disease is present (Baliga, 2004).

The application of iodine is effective as CIN epithelium contains minimal or no glycogen whereas newly formed mature squamous metaplastic epithelium is glycogenated. Iodine is glycophilic and in the presence of iodine normal glycogen-containing squamous epithelium stains brown or black. An area of CIN and invasive cancer will appear a dark yellow. Delineating of the borders of a lesion will occur with iodine (Sellors & Sankaranarayanan, 2003).

Colposcopy is considered a subjective technique and lacks a certain amount of sensitivity and specificity in relation to the prediction of the relevant histological nature of cervical abnormalities (Jordan & Singer, 2006). Therefore diagnostic biopsy is considered the major means of confirming an abnormality (Jordan & Singer, 2006). After identification of an abnormality on the cervix it is necessary to take a biopsy from this area under colposcopic direction to obtain information on the abnormality from the pathologist (Sellors & Sankaranarayanan, 2003). For women with HSIL they are required to be treated within eight weeks of histological confirmation and women with LSIL are to be treated within 26 weeks of the decision to treat (New Zealand Ministry of Health, 2000).

2.11 DIAGNOSTIC AND TREATMENT TYPES

Two main methods of treatment are utilised internationally and these consist of excision and ablation (Jordan & Singer, 2006). In New Zealand the most common method is excision by a large loop excision of the transformation zone (lletz) and then cone biopsy. Laser and cryotherapy are used but to a lesser degree. An advantage of using a lletz biopsy over laser or cryotherapy is that it will give a histological report with confirmation of the lesion and whether or not excision of the abnormality is complete (Jordan & Singer, 2006). Biopsy also allows reassessment of the most severe grade of the lesion and to ascertain the adequacy of excision (Sellors & Sankaranarayanan, 2003). A diagnosis of squamous cell carcinoma or adenocarcinoma warrants immediate treatment either surgery, radiotherapy, chemotherapy or a combination of two or more treatment options (Sellors & Sankaranarayanan, 2003). Surgery may be undertaken by cone biopsy, radical trachelectomy or radical hysterectomy. A radical hysterectomy (Wertheim's hysterectomy) removes the uterus, tissue holding the uterus in place, the top of the vagina and lymph nodes around the uterus.

2.11.1 LLETZ

A lletz biopsy involves a wire loop with an electric current to remove the abnormal cells. Local anaesthetic is required for this method which can cause slight discomfort. A smoke evacuator is required to perform this procedure to enable the colposcopist to see clearly and remove any odour. An electrically insulated speculum is required to prevent an electrical shock to the patient or the operator should the loop, needle or ball electrode accidentally touch the speculum (Sellors & Sankaranarayanan, 2003). The majority of women in New Zealand are expected to have a lletz treatment managed as an outpatient under local analgesia (New Zealand Ministry of Health, 2000). The treatment success rate for a lletz treatment is about 95% (New Zealand Ministry Of Health, 2007b).

The criteria for the utilisation of a lletz biopsy include:

- CIN has been confirmed by cervical biopsy.
- If the lesion extends into the endocervical canal the distal edge of the lesion is visible with a depth of no more than 1 cm.
- No incidence of invasive cancer or glandular dysplasia.
- No evidence of pelvic inflammatory disease (PID) or other infection.

- Written consent is to be obtained after a detailed explanation of the sequelae and risks have been explained (Sellors & Sankaranarayanan, 2003).

2.11.2 CONE BIOPSY

Cone biopsy is a treatment where a cone shaped piece of the cervix is removed under a general anaesthetic. The criteria for a patient having a cone biopsy include:

- The lesion extending into the endocervical canal and the inability of the colposcopist to confirm the extent.
- The lesion extends further into the canal than would be able to be removed adequately by a lletz biopsy.
- Repeatedly abnormal cytology, indicating neoplasia but no equivalent abnormality of the cervix to biopsy.
- Cytology indicates a more serious lesion than is confirmed by biopsy.
- Cytology indicating atypical glandular cells that imply glandular dysplasia or adenocarcinoma.
- Colposcopy indicates atypical glandular cells that imply glandular dysplasia or adenocarcinoma.

2.11.3 LASER

Laser treatment using a carbon dioxide (CO₂) laser involves using a laser beam to destroy the abnormal cells. The laser beam is colposcopically directed and the laser light is mainly absorbed by tissue and water with minimal transmission through healthy tissue. CO₂ laser vaporisation provides the greatest precision in tissue destruction with the diameter of the beam measuring 1.5-2mm (Jordan & Singer, 2006). An advantage of using the laser is the ability to continue the vaporisation of abnormal tissue on the surface of the vagina.

2.11.4 CRYOTHERAPY

Cryotherapy is a means of destroying abnormal tissue by freezing LSIL and HSIL with compressed refrigerant gases. The advantage of using this method is that the costs are lower than lletz biopsy. This method is not suitable for large lesions, those involving the endocervix

and has a failure rate of between 5-10% in women which is slightly higher than for a lletz biopsy (Sellors & Sankaranarayanan, 2003).

2.12 TREATMENT FAILURE

A large study in Finland examined patients records on 7,599 women who were treated for CIN between 1974 and 2001 (Kalliala, Anttila, Pukkala, & Nieminen, 2005). The objective of the study was to examine the long term risk of cervical and other cancers after treatment for CIN. Follow up of the women occurred until the end of 2003 unless death or emigration excluded women. The average follow up time was 11.9 years. From the entire cohort 448 new cases of cancer were diagnosed with the risk for cancer of the cervix identified as 2.8 (1.7 - 4.2). Data recorded demonstrated that 22 women developed invasive cancer with 11 of the women being diagnosed 0.5-9 years after treatment, 10 after 10-19 years and one after 20 years. Although the smoking status was not recorded the authors noted there was a strong correlation with an increase risk of lung cancer and length of time post treatment (Kalliala et al., 2005). This study demonstrated that risk of invasive cervical cancer is present for at least 20 years after treatment for CIN with the proportion progression being similar for both 0.5-9 years and 10-20 years. In the study 837 cases of CIN III were treated with three eventually developing invasive cancer. Without the treatment the authors suggested that approximately 30% would have progressed to cervical cancer (Kalliala et al., 2005).

2.12.1 TOBACCO SMOKING AND TREATMENT FAILURE

A study undertaken in Northern England between 1995 and 1999 on a cohort of 958 women examined the relationship between smoking status, CIN and persistent HPV infections (Acladiou et al., 2002). From the cohort 154 controls were selected with matching criteria, with 77 (8%) of cases being identified as experiencing treatment failure. The likelihood of treatment failure was found to be 3.17 times higher (95% 1.68-5.91) for the women who smoked compared to those who did not smoke. In relation to the significance of HPV status no significance was detected on being HPV positive at the time of treatment. The main finding of this study was that independently of HPV infection, cigarette smoking influenced the treatment outcomes negatively. Smokers and women who were HPV positive at follow up appeared to require more follow up visits and intervention than women who did not smoke

and were not HPV positive. Of interest was that the more cigarettes smoked on a daily basis the more likelihood of treatment failure (Acladiou et al., 2002).

One Italian study undertaken between 1989 and 2001 found no relation between cigarette smoking and treatment failure (Frega et al., 2003). This study had a cohort ranging from 12-21 years of age and included 268 young women recruited into the study. The number was reduced as no evidence of HPV infection was found for 21 women, 12 others were excluded due to the previous treatment of HPV lesions. One woman was found to have CIN III and was treated so was also excluded from the study. The young women in this study were recruited if they had a smear or examination suspicious of HPV lesions (condyloma, genital warts). The most common site of HPV lesions was on the vulva, perianus and perineum. The young women were documented as smokers if they smoked five or more cigarettes on a daily basis. A recognised limitation by the researchers of this study was the large number of the group lost to follow up with 104 (44.4%) of the original group for HPV lesions completing the study. A further limitation could relate to the smoking status of the participants (Frega et al., 2003). While it is recognised that the greater smoking intensity the greater the risk of being diagnosed with HSIL or cervical cancer, it is unclear what the risk is for women smoking <5 cigarettes per day (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005).

2.13 VACCINES

In 2008 the New Zealand Government agreed to fund the HPV vaccine for girls aged 17 to 18 years and in 2009 this vaccine will be available to all girls aged 12 to 18 from 1 September 2008 (New Zealand Ministry of Health, 2008a). This HPV vaccine will offer protection against two HPV types that cause seven out of 10 squamous cervical cancers and nine out of ten cases of genital warts for a person not previously infected (New Zealand Ministry of Health, 2008a). This HPV programme plans to reduce the incidence of cervical cancer in the future. Cervical screening is still required for all women eligible as protection against all HPV's is not available (New Zealand Ministry of Health, 2008a). The HPV Virus Like Particles vaccine containing types 6, 11, 16 and 18 has been released under the trade name of Gardasil and Cervarix, for types 16 and 18 (Stanley, Lowy, & Frazer, 2006).

Gardasil received licensure in New Zealand in July 2006 for females aged 9-26 years and males 9-15 years. Trials to date have demonstrated that Gardasil can provide up to 96% protection against HPV 6, 11, 16 and 18 for up to five years. Further research is being undertaken to establish if the vaccines can be used therapeutically (Professional Advisory Board, 2007). However, evaluating the efficacy of the vaccines will take approximately 30 years and issues may exist relating to administration and compliance of the vaccines (Jordan & Singer, 2006). The vaccine is currently funded in Australia, England and recently in New Zealand (New Zealand Ministry of Health, 2008a) and is available for purchase in 82 different countries. The HPV vaccine Gardasil has been approved in New Zealand by Medsafe (New Zealand Ministry of Health, 2008a).

2.14 CONCLUSION

This literature review has discussed issues that relate to the link between smoking, cervical abnormalities and cervical cancer. Also included were related topics of colposcopy, co-factors of cervical abnormalities and cervical cancer, smoking cessation, ethnicity, tobacco, cervical screening, the HPV vaccine, health professionals knowledge, women's health management in relation to education, government and some of the social policies that impact on women in New Zealand. A discussion of some of the inequalities that currently exist within New Zealand Aotearoa has also been undertaken and consideration of possible solutions that may help in reducing these inequalities has been put forward.

A link between smoking and cervical abnormalities has been established. For cervical health it is beneficial to encourage women who attend colposcopy to engage in smoking cessation. Smoking reduction is a clear aim of the New Zealand Government and many health providers within New Zealand. An important area in relation to smoking cessation is the role by health professionals. It would appear that the majority of nurses believe it is their role to be involved in smoking cessation. To deliver this message effectively appropriate training is required to ensure evidence-based information is being given to patients. It has been demonstrated that women are often not aware of the link of smoking and the effects that this can have on the cervix. The levels of understanding around smoking and smoking cessation need to be raised so that there is consistency among health professionals to ensure patients receive evidence-based and appropriate interventions.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the methodological approach taken and the methods adopted in collection and analysis of data for this thesis. This pilot study is limited to women that attended the Christchurch Women's Hospital Colposcopy Department in 2001 who were new patients. These women were then followed until 31 December 2006. The aim was to explore if women who smoked and had CIN on their cervix were more likely to require more intervention in the form of visits to the colposcopy department and treatment to their cervix than non-smokers.

3.2 AIMS OF THE STUDY

The aim of this thesis was to develop research-based knowledge in the form of a retrospective, descriptive pilot study which compared the persistence and recurrence rates of CIN in women who attend at CWH colposcopy clinic with the women's smoking status. Ethnicity was also examined to discover whether Maori women and other ethnic groups were disproportionately represented in presenting at the CWH colposcopy department. If relevant, potential reasons why any differences were occurring were explored and recommendations made as to how the colposcopy department could rectify the situation.

3.3 RESEARCH QUESTIONS

- Do women who smoke and present at CWH colposcopy clinic with CIN on their cervix require more follow up and treatment than those women who do not smoke?
- Are Maori and other ethnic groups represented disproportionately when considering the total number of women presenting at CWH colposcopy clinic?

3.4 METHODOLOGY

To best answer these questions a quantitative approach was undertaken as this is generally considered the most appropriate means of identifying relationships between variables (Polit & Beck, 2004). This allowed the researcher to approach the research questions in a systematic way while being able to minimise biases and ensuring that precision and validity were fully considered (Polit & Beck, 2004). Information obtained in this study was analysed to determine if women who smoked are more likely to require more intervention to their cervix than women who do not smoke. The obtaining of statistically relevant information may prove to be a suitable means to justify and develop the current smoking cessation programme.

A pilot study is suitable for a small scale study and depending on the results consideration may be given to developing the study by the author in the future. Advantages of a pilot study include allowing the researcher to develop experience by working with the setting, methodology and methods of measurement. This pilot study enabled the researcher to establish if the study was feasible and if the prospect of a larger study is viable. The identification of problems with the design and the opportunity to undertake data analysis techniques is also presented in a pilot study (Burns & Grove, 2005; Polit & Beck, 2004). A stratified random sampling method was utilised as some of the variables in the population were known and were essential to achieve representativeness.

3.5 SAMPLE SIZE

Initially the author considered recording data from 1000 patient notes to gather the information but after consultation with a biostatistician it was deemed appropriate and relevant to record data from 500 patient records who met the inclusion and exclusion criteria. Three patients identified as being outside the inclusion criteria upon completing the data collection were removed from the data sheet. Upon double checking the data it was noted that three entries were duplicates and these two were removed before analysis was carried out. This left a total of 494 participants. The time allotted to data collection was deemed appropriate by a biostatistician and academic supervisor to gather the appropriate amount of information to complete the study.

3.6 TIMING

This study examined records from patients who attended for the first time at Christchurch Women's Hospital colposcopy clinic from 1 January 2001 to 31 December 2001. If this information for the 500 participants could not all be located from the year 2001 it was documented in the proposal that the study would examine patients notes in 2000 to ensure an appropriate sample was obtained. However this was not necessary.

3.7 DEVELOPMENT OF A DATA BASE

Consultation with a biostatistician took place prior to commencement of the development of a data base to ensure the appropriateness of the population and the sub-groups would enable the aims of the study to be fulfilled. This consultation established that it would be relevant for each sub-group to be proportionally stratified meaning the appropriate representation of different groups from the population (Schneider, Elliot, LoBiondo-Wood, & Haber, 2003).

The data analyst at Christchurch women's Hospital was able to locate records of all new patients seen in the colposcopy department throughout 2001. This totalled approximately 1100 and these notes were requested. Not all 1100 patients' notes were available as some were in use, however, 500 records were available for new patient's details of those who met the inclusion criteria with 30 sets of spare notes. Approximately 535 notes did not meet the inclusion criteria. For ease of obtaining the patient records a request was made that all the records be obtained alphabetically in relation to the NHI (National Health Index). The information analyst at Christchurch Women's was able to perform this task.

3.8 INCLUSION CRITERIA

- New patient.
- No previous colposcopy.
- Presented at CWH colposcopy department in 2001.
- Age 20 years of age to 69 inclusive.

- Had LSIL or HSIL on their cervix.
- Smoking status documented.

3.9 EXCLUSION CRITERIA

- Had a glandular abnormality.
- Below 20 years or 70 and over.
- Had a previous colposcopy.
- Vulval abnormalities that may or may not include the cervix.
- Women who had stopped smoking in the 2 years prior to the colposcopy appointment, where this information was recorded.
- If the woman informed staff at the colposcopy at appointment or soon after that they would be seen privately, at another centre or overseas and would require their treatment or follow up there.
- Had been seen at the Christchurch Sexual Health Centre for colposcopy and then referred to the CWH colposcopy clinic for treatment.

3.10 DATA EXTRACTION SHEET

An EXCEL database was created to store the data collected. This information was then entered into a spreadsheet in EXCEL for safe storage. A list of acceptable values that related to value ranges were created on the spread sheet which flagged a number of incorrect entries at the time of collection which were able to be corrected (McCartney, Burchinal, & Bub, 2006).

Variables used for stratification in this study are shown in Table 3. The rationale for identifying whether or not a treatment was performed under local or general anaesthetic is that it is a requirement of the National Cervical Screening Programme that the majority of treatments should be performed under a local anaesthetic (New Zealand Ministry of Health, 2000). The researcher wished to investigate whether this was occurring.

Table 3 Data Extraction Sheet

NHI	Ethnicity	Age	Smoking	Number smoked	LSIL/HSIL
COP	Co-factors	Parity	Gravida	Smear	Biopsy
Treatment type	Number of treatments	Follow up 1	Follow up 2	Follow up 3	Follow up 4
Follow up 5	Genital warts	Religion	Cancer	DNA's	Re-referral
Weight	Height	First treatment	Treatment General/Local Anaesthetic	Second treatment	

3.11 DESIGN AND TRIAL OF STUDY

The design of the data sheet was undertaken with the researcher's academic supervisor and then a trial of twenty sets of notes was undertaken to ensure that the information required could be obtained and that the appropriate inclusion and exclusion criteria had been used. Also this process ensured that the data collection tool collected all data needed to answer the research questions. Selection of this method for sampling involved there being a critical variable and the study population being found to have sufficient information available. The information obtained from the 20 sets of notes demonstrated that the data collected had failed to capture some of the data need to answer the research questions. This short pilot study revealed that the data collection sheet only recorded 1st treatment and that if a subsequent treatment was carried out information on the nature of the subsequent treatment was missing. The data collection sheet was amended to capture this additional information and the notes of women who had undergone two treatments were recalled and the information entered onto the spreadsheet. This involved recalling four sets of notes.

The academic supervisor was consulted throughout the data collection period to ensure the collection process was appropriate. Further discussion with the researcher's academic supervisor was undertaken and minor corrections made to the data extraction sheet to ensure clarity for interpreting the information. The amended data extraction sheet was utilised as an aid in recording the information extracted from hospital records on the first 500 women patients aged 20 - 69 who were new patients to the colposcopy department.

This study identified weaknesses relating to the collection of religion as only 19 people had this information recorded from the 500 documented notes and thus this information could not

be analysed. The question relating to religion was not a question on the form asked by the receptionist at the colposcopy department in 2001 (personal communication, 2007), however, if a patient required an inpatient admission this question was available with the most common response being recorded as none. The rationale for this question relates to religious groups who practice male circumcision experiencing lower rates of cervical cancer than other groups and case-control studies have demonstrated for women who develop cervical cancer that their male partners are less likely to be circumcised (Castellsague, Bosch, & Munoz, 2000). The question relating to a male partner being circumcised was not asked at the colposcopy department however this could be considered in a future prospective study.

There was some missing data in relation to patients who did not attend (DNA) after a first visit and a record of the follow-up sequence was unable to be recorded. This missing data has been coded appropriately on the SPSS package using a code representing lost to follow up. In a small number of cases presenting once, a patient required treatment or follow up overseas, at a different centre in New Zealand or privately. These women were excluded to avoid the inclusion of missing data. The quality standards issued by the Ministry of Health in relation to providing a colposcopy service require all colposcopy departments to have written protocols for management of DNA's. The standard specifies that less than 15% of women failing to attend for first appointment and less than 15% of women failing to attend for follow up appointment should be DNA's (New Zealand Ministry of Health, 2004a).

The New Zealand Cancer Control Audit found that insufficient numbers of Maori and low income women had regular and timely smears in New Zealand and were waiting longer for investigations and diagnosis than non-Maori. The recording of ethnicity for Maori women on the Cancer Registry and, NCSP-Register and the stage of cervical cancer requires improvement to ensure adequate planning for health promotion and programme monitoring (Sadler et al., 2004). The quality standards issued by the Ministry of Health require colposcopy departments to utilise Maori support services to assist with the locating, support and treatment of women referred for treatment (New Zealand Ministry of Health, 2004a).

3.12 CONFIDENTIALITY AND ETHICAL CONSIDERATIONS

“Participants have the right to expect that any data they provide will be kept in the strictest confidence” (Polit & Beck, 2004). No single woman will be identified in published information, only trends identified, that exists amongst the cohort. This study required the collection of identifying information which was essential in the location of patient records and the recording of this information on a data extraction sheet. The researcher and the supervisor of the study were the only people who viewed the patient data once recorded and this was for the purpose of data analysis.

The researcher was able to recall some patient records during the study to confirm the types of treatments that some of the women underwent. The EXCEL spreadsheet has been stored on a computer data base which can only be accessed with a password known only to the author. A back up copy of this was made on a memory stick and this is stored in a locked filing cabinet along with the hard copies of patient’s NHI and name that were utilised to locate the medical records. These will be stored for 10 years before being destroyed appropriately. The researcher is the only person who has access to the filing cabinet.

Approval from the Upper South B Regional Ethics Committee was granted (Appendix B). However modifications from the University of Otago Board of Studies included limiting the participants to smoking or non-smoking status and not previous smokers. The Board of Studies also believed it would be difficult information to obtain data recorded of women who were previous smokers. An issue that came to light after commencement of the study in relation to this point was that for 15 sets of notes this information had been documented. These women were then excluded from the study if they had stopped smoked within the two previous years prior to 2001. Information was not recorded on women who had stopped smoking more than two years prior. This is another limitation of the study as some women recorded their smoking status as being a non-smoker with no clarification as whether they had ever been a smoker.

In relation to ethnicity every attempt was made to validate the correct ethnicity by locating each admission recorded in the records and clarifying how the ethnicity status was recorded. Consultation with the Maori Research Office took place prior to commencement of the study and a Maori Research Manager requested that the finding’s related to Maori women be disseminated appropriately to Maori research, health providers and health professionals.

3.13 DATA ANALYSIS

3.13.1 DATA HANDLING

Data was entered onto an EXCEL spreadsheet by the researcher where it was then checked for errors. The checked data was then imported into the Statistical Package for Social Sciences (SPSS). The above steps were taken under the direction of the researcher's supervisor.

3.13.2 STATISTICAL ANALYSIS

“Interpretation of the findings must take into account all available evidence about the study's reliability and validity” (Burns & Grove, 2005). Initially, data was checked for normal distribution in order to determine whether statistical tests could be performed. All data was found to be normally distributed. The data collected in this study utilised descriptive statistics to describe and characterise demographic data. This information is reported as frequencies, mean, median, risk estimate, odds ratio, and percentages. Analytical tests included Pearson Chi-square, Fisher's Exact Test and Spearman's co relational procedure. Bivariate descriptive statistics were utilised to describe relationships between paired variables (Burns & Grove, 2005).

3.14 METHODOLOGICAL LIMITATIONS

A major limitation of this research is that whilst numbers of women and variables that exist for this cohort can be measured questions as to why women smoke or why many do not attend for appointments cannot be answered. This style of research has been described as a sedimented view and one which does not entirely realise human experience (Burns & Grove, 2005).

3.15 SUMMARY

This chapter has outlined the methodological approach taken and the methods adopted in the collection and analysis of data for this thesis. Confidentiality and ethical considerations were identified as was the main limitation of this method. Chapter 4 will outline the results of the study.

CHAPTER 4

RESULTS

4.1 INTRODUCTION

A data collection tool was developed and 20 notes were randomly sampled to ensure that firstly, the research questions could be answered and secondly to see if the data collection tool collected all the data variables needed to answer the research questions. This short pilot study revealed that the data collection sheet only recorded 1st treatment and that if a subsequent treatment was carried out information on the nature of the subsequent treatment was missing. After review with the researcher's supervisor the data collection sheet was amended to capture this additional information.

A list of women who presented at the Christchurch Women's Hospital colposcopy department for the first time between 1 January 2001 and 31 December 2001 was generated. The first 500 sets of notes containing all information pertinent to the present study were selected. Data from each of the 500 sets of notes was recorded directly into an EXCEL database. On scrutinising the database it was found that three subjects were not eligible for inclusion into the study as all three women were under 20 years of age. There were also three sets of duplicate notes identified which were also removed. Data analysis was therefore carried out on the remaining 494 subjects.

4.2 PATIENT DEMOGRAPHICS

4.2.1 AGE OF PARTICIPANTS

Ages for all 494 women taking part in the study were collected. The range of ages was from 20-69 years with a mean age of 29.83 (SD. 8.87 years).

4.2.2 WEIGHT AND HEIGHT

Weight was documented for 174 women (mean 68.67 kg, SD 14.36 range 42.3 kg to 118.7kg) and the heights for 143 women (mean 173.8 cm, SD 7.18, range 147 to 190cm). Only 142 women had both measurements and thus could have their body mass index (BMI) calculated. For these 142 study participants the mean BMI was 25.61 (SD 5.14) ranging from 17.61 to 44.41). In the majority of cases weight and height were only recorded when a woman was to undergo a general anaesthetic for surgery to remove abnormalities from the cervix.

4.2.3 ETHNICITY

Ethnicity of the entire group studied was available. Table 4 illustrates the ethnic make up of the study population. In the data collection tool thirteen different ethnic categories were identified. However, as there were no entries for Fijian, Samoan, Middle Eastern and only one for a Tongan this number of groups was reduced to nine. The Tongan subject was entered under the Pacific Islander entry. European Pakeha demonstrated the largest percentage of participants with 84.4% and Maori the next highest at 5.7% (see Table 4).

Table 4 Breakdown of Ethnicity

Ethnic group	Frequency	Percent
European	418	84.6
Other European	26	5.3
Maori	28	5.7
Pacific Islander	4	0.8
Chinese	6	1.2
Japanese	4	0.8
Indian	1	0.2
Thai	3	0.6
Korean	4	0.8
Total	494	100.0

4.2.4 RELIGION

Results showed that 474 (96%) women had no religion recorded. It would appear that the data was not collected as part of routine admission to an outpatient clinic. The entries that were made in relation to religion were most commonly recorded at the time of inpatient admission

before surgery. Of the 20 participants who had a religious affiliation recorded 15 identified as Christian, three identified as Roman Catholic and two were of other affiliations. No meaningful data analysis could be carried out as numbers were so low.

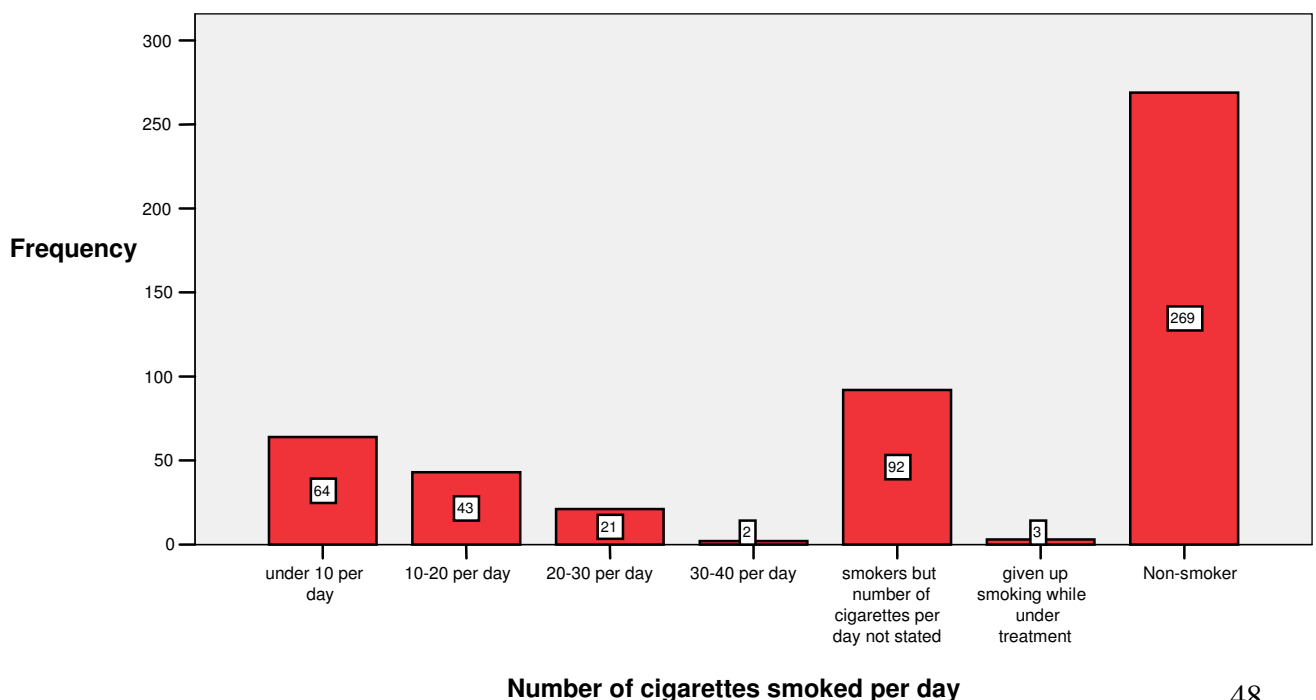
4.2.5 SMOKING BEHAVIOUR

The smoking status of women attending the colposcopy clinic was routinely collected at each clinic appointment in order to complete the medical history. Smoking status at the time of first clinic visit was therefore known for all 494 women included in the data analysis. Results showed that 222 (44.9%) women were smoking and 272 (55.1%) of women were not smoking at the time of the first visit.

4.2.5.1 Numbers of Cigarettes Smoked

The number of cigarettes that a women smoked on a daily basis was recorded into eight groups as shown in Figure 1. No women reported smoking over 40 cigarettes per day. Among the sample there were 272 (55%) women who had never smoked. For women who reported a history of smoking the largest group was “smokers but number of cigarettes smoked per day was not stated”. This group accounted for 92 women (18.6%) in the study group. The group who smoked under 10 cigarettes a day made up the next highest number of women smoking with 64 (13.0%) of the study group.

Figure 1 Number of Cigarettes Smoked Per Day



4.2.5.2 Smoking and Ethnicity

When European women were compared to women in all the other ethnic groups combined it was found that women with other ethnicity had 1.25 (CI 0.70 to 2.25) greater odds of being a current smoker than European women. This difference did not reach statistical significance ($p = 0.46$). There were 28 (5.7%) Maori women in the study of which 20 (71.4%) reported smoking. Maori women were over 3 times more likely to report smoking when compared to all other women in the study (OR 3.27, 1.41 to 7.57). This difference was statistically significant ($p = 0.005$) however, numbers of Maori women attending the colposcopy clinic were low.

4.2.5.3 Age and Smoking Behaviour

In relation to age group and smoking (see Table 5) there was a higher rate of reported smoking in women age between 20-29 years (50.1%) than in any other group. Reported rate of smoking appeared to decline as the age of the women increased. When the rate of reported smoking in 20-29 age group was compared to the other age groups it was found that there was a statistically significant difference in the occurrence of smoking between women in the 20-29yr compared to women in the 40-49yr age groups ($p = 0.05$) and a nearly statistically significant difference in the occurrence of smoking between women in the 20-29yr compared to women in the 50+yr age groups ($p = 0.07$).

Table 5 Age and Smoking Behaviour

Age group	Smokers	Non-smokers	OR (CI)	p
20-29	147	145	1.00	
30-39	55	77	0.71 (0.47 to 1.07)	0.12
40-49	14	35	0.39 (0.20 to 0.76)	0.05
50+	6	15	0.40 (0.15 to 1.05)	0.07

4.2.6 GRAVIDA AND PARITY

Gravida status for all women was also recorded and showed that study participants had a mean of 1.43 (SD 1.57) and a range of 0 to 8 pregnancies. Eight was the maximum number of pregnancies any women in the study cohort had and was recorded for two (0.4%) study participants. Of women who had been pregnant the most common number of pregnancies was

two occurring in 99 (19.8%) of women. This was closely followed by women who had been pregnant once (n= 96, 19.2%).

Parity for all women was recorded and showed that study participants had a mean of 1.11 children (SD 1.37, range 0 to 7). Women who had never given birth made up the largest group with 242 (49.0%) entries, the second largest consisting of 87 women (17.6%) having given birth to one live child, closely followed by woman having had two births at 85 (17.2%). The smallest group was two (0.4%) women recording eight births.

4.2.7 GRAVIDA, PARITY, SMOKING AND BMI

Smokers were found to have a higher mean number of pregnancies (1.66) compared to non-smokers (1.24). This difference was statistically significant ($p = 0.003$). Smokers were found to have a higher mean parity (1.21) compared to non-smokers (1.01). This difference was however, not statistically significant ($p = 0.122$).

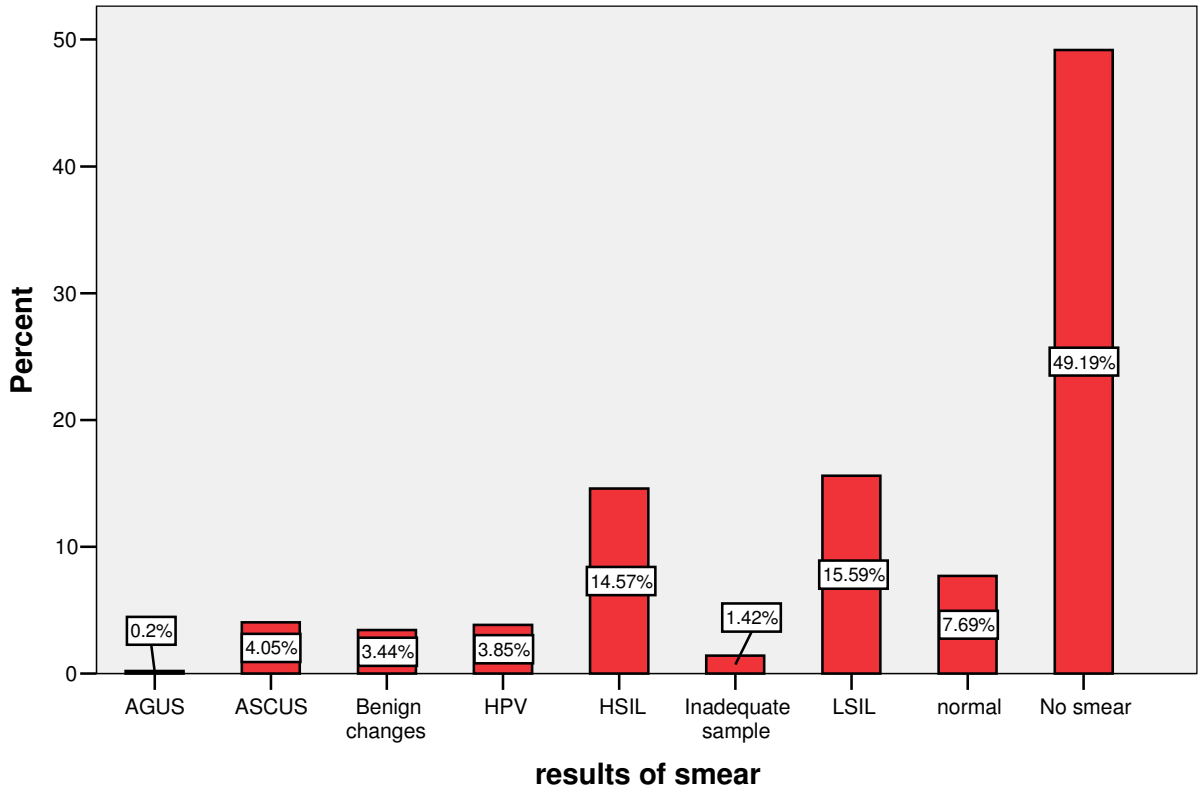
The BMI of smokers (84/142) and non-smokers (58/142) were compared. Smokers had a mean BMI of 25.78 (SD 5.01) compared to 25.65 (SD 5.38) in non-smokers. This difference was not statistically significant ($p = 0.94$).

Gravida was found to be significantly positively correlated with BMI with a correlation coefficient of 0.223 ($p = 0.008$). However while parity was also found to be positively correlated with BMI with a correlation coefficient 0.163 this correlation did not quite reach significance ($p = 0.053$).

4.3 FIRST COLPOSCOPY SMEAR

Data was collected on whether a cervical smear was taken on a women's first presentation to the colposcopy clinic. The results of the smear were recorded under 10 sub-headings ranging from a normal result through to a recording of ASCUS. Results showed that 243 (49.2%) women did not have a smear taken, 77 (15.6%) recorded LSIL while 72 (14.6%) recorded HSIL. No women had an invasive cancer detected by their first smear. A total of seven (1.4%) cervical smears were reported as inadequate specimens (see Figure 2).

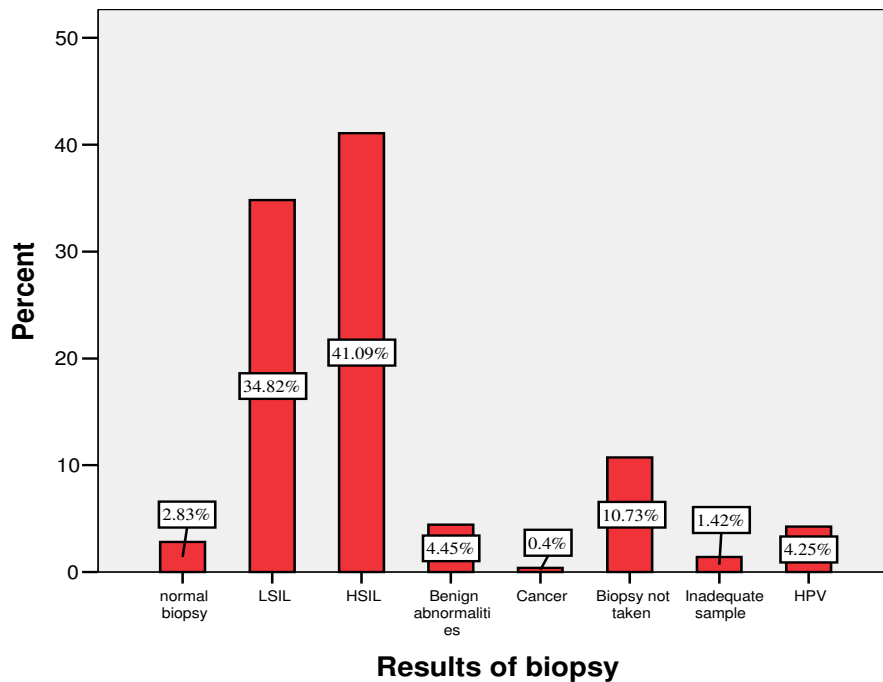
Figure 2 Results of Smear Taken on First Presentation at Colposcopy Clinic



4.4 COLPOSCOPY PUNCH DIAGNOSTIC BIOPSY AT FIRST VISIT

At their first visit to the colposcopy clinic 441 of the 496 women had one or more colposcopy punch diagnostic biopsies taken from their cervix. The coding of results from their biopsies was classified under eight sub-categories ranging from a normal result through to a finding of HPV. HSIL was the most common results from a biopsy with 203 (41.1%) recording this result. LSIL was recorded 172 (34.8%) times and invasive cancer two (0.4%) times. Seven (1.4%) biopsies were classed as inadequate samples (see Figure 3).

Figure 3 Results of Biopsy Taken at First Visit to Colposcopy Clinic



4.5 PATIENT CONDITIONS

4.5.1 LSIL/HSIL

4.5.1.1 CIN - Not Confirmed

The grading of the referral smear was recorded on the data collection tool into four groups consisting of LSIL, HSIL, ASCUS and ASC-H. The women who had a LSIL smear on referral were the largest group and accounted for 278 (56.3%) smears. The women who had a HSIL smear made up 181 (36.6%). Twenty one women (4.3%) had an ASCUS smear and 14 (2.8%) with an ASC-H smear.

4.5.1.2 Confirmed CIN

The number of women who had CIN confirmed by biopsy on their cervix accounted for 375 from the 494 women (75.9%).

4.5.1.2.1 *Confirmed CIN and Age*

From the 375 with CIN, 239 (63.7%) were aged 20-29 years. In relation to age group and CIN (see Table 6) there was a higher rate of reported CIN in women age between 20-29 years (81.8%) than in any other age group. Rate of CIN appeared to decline as the age of the women increased. When the rate of CIN in the 20-29 age group was compared to the other age groups it was found that there was a statistically significant difference in the occurrence of CIN between women in the 20-29 year group and all the other age groups (see Table 6).

Table 6 Age and CIN

Age group	CIN	Non-CIN	Rate in %	OR (CI)	p
20-29	239	53	81.85%	1.00	
30-39	97	35	73.48%	0.62 (0.38 to 1.00)	0.05
40-49	31	18	63.27%	0.38 (0.20 to 0.73)	0.007
50+	8	13	38.10%	0.14 (0.05 to 0.35)	<0.001

4.5.1.2.2 *CIN (Confirmed), Gravida, and Parity*

Data was examined on gravida of the 494 study participants and a history of CIN (n=375). Results showed that mean gravida for women with CIN was 1.34 (SD 1.56) and for women without CIN was 1.71 (SD 1.61). This difference was statistically significant (p = 0.026). When mean parity was examined it was found that women with CIN had a mean parity of 1.02 (SD1.34) compared to 1.35 (SD 1.45) in women who did not have CIN. This difference was statistically significant (p = 0.028).

4.5.1.2.3 *CIN (Confirmed) and Smoking*

In relation to reported smoking and CIN, 174/222 (78.4%) of smokers had CIN compared to 201/272 (73.9%) non-smokers, however this difference was not statistically significant (RR= 1.06, p = 0.29).

4.5.1.2.4 CIN (confirmed) and Ethnicity

In relation to ethnicity and CIN, 20/28 (71.4%) study participants who identified as Maori had CIN compared to 355/466 (76.2%) women who identified as non-Maori, however this difference was not statistically significant (RR= 0.93, p = 0.65).

4.5.1.2.5 CIN (Confirmed) and BMI

Data was examined on the 142 women who had a BMI recorded and history of CIN. Results showed that 105 women had CIN and 37 did not. Mean BMI for women with CIN was 25.61 and for women without CIN was 25.37. There was no statistically significant difference in BMI for women with or without CIN (p = 0.32).

4.5.1.2.6 CIN (Confirmed) and Use of COCP

Information relating to the use of the combined oral contraceptive pill was recorded on all 494 participants. Analysis of COCP use and CIN was carried out and results showed that 150/185 (81.0%) women who took the COCP had CIN compared with 225/309 (72.3%) of women who did not take the COCP giving an OR of 1.60 (CI 1.03 to 2.50). This difference was statistically significant (p = 0.04).

4.5.1.2.7 CIN (Confirmed) and Immunosuppression or HIV

Data on HIV and immunosuppression was obtained for the 494 study participants and results showed five (1%) of the participants had immunosuppression and no women had HIV. Of the 5 women with immunosuppression 3 (0.6%) recorded having CIN. When reported smoking behaviour was examined it was found that 3 of 5 women with immunosuppression were smokers. The numbers were too small to run any meaningful statistical tests on CIN or smoking behaviour in this group.

4.5.2 GENITAL WARTS

The presence of genital warts was also recorded and showed that 13 (2.6%) of the cohort had genital warts when presenting for 1st appointment at the colposcopy clinic.

4.5.2.1 Genital Warts and Smoking Status, Ethnicity, Age, Gravida, Parity and COCP

When women who reported smoking were compared to women who did not smoke it was found that smokers had over 4.0 greater odds of presenting with warts (OR 4.23, CI 1.15 to 15.56). This difference was statistically significant ($p = 0.023$) however, numbers were small and so need to be treated with caution. Ethnicity, age, gravida, parity and COCP use were not statistically significantly associated with having genital warts.

4.5.2.2 Genital Warts and CIN

Results showed that from the 13 (2.6%) women who had genital warts, 10 (77%) had CIN present. A chi-square test was carried out with results showing that women with CIN were about six percent more likely to have genital warts but numbers were very small and this difference was not statistically significant.

4.5.3 CANCER

There were seven (1.7%) study participants who were identified as having a squamous cell carcinoma. Four of these seven women were recorded as non-smokers and three reported smoking. The numbers were too small to carry out any meaningful analysis. Six of these women eventually had a hysterectomy and the seventh woman had two cone biopsies.

4.6 FIRST TREATMENT AT COLPOSCOPY CLINIC

Treatments to remove abnormalities from the cervix were recorded as no treatment, lletz biopsy, cone biopsy, laser treatment, hysterectomy, ablation and private follow up. Amongst the 494 study participants, 366 (74.1%) first treatments were carried out. The lletz procedure was the most common accounting for 214 (43.3%) procedures. Hysterectomy's accounted for only one (0.2%) procedure while two (0.4%) of the women had private follow up (see Table 7).

Table 7 Type of First Treatment at Colposcopy Clinic

Treatment type	Frequency	Percent
No treatment	128	25.9
Lletz	214	43.3
Cone biopsy	62	12.6
Laser	43	8.7
Hysterectomy	1	0.2
Ablation	44	8.9
Private f/up	2	0.4
Total	494	100.0

4.6.1 FIRST TREATMENT AT COLPOSCOPY CLINIC AND SMOKING STATUS

Data analysis on the 364 (73.7%) women who had treatment at the clinic (two participants went private) and smoking status was carried out. When women who reported smoking were compared to women who did not report smoking results showed that smokers had over 2.0 greater odds of needing a treatment as non-smokers (OR 2.10, CI 1.37 to 3.21). This difference was statistically significant ($p = 0.001$). Types of first treatment need by smokers and non-smokers is shown in Table 8.

Table 8 Smoking Status and Treatment Type

Treatment type	Smoking		Total
	Smoker	Non-smoker	
No treatment	41	87	128
Lletz	112	102	214
Cone biopsy	31	31	62
Laser	21	22	43
Hysterectomy	1	0	1
Ablation	16	28	44
Total	222	270	492

4.6.2 FIRST TREATMENT AT COLPOSCOPY CLINIC AND ETHNICITY

Of the 28 Maori women who attended the colposcopy clinic 24 (85.7%) needed treatment compared to 340 (73.3%) women who identified as non-Maori. Results of a chi-square test showed that Maori had 2.19 greater odds of needing a treatment as non-Maori (OR 2.19, CI 0.74 to 6.43). This difference was not statistically significant ($p = 0.19$).

4.6.3 FIRST TREATMENT AT COLPOSCOPY CLINIC AND AGE

In relation to age and needing treatment the mean age of the 364 women needing treatment was 29.96yrs (SD 8.59) compared to a mean of 29.50yrs (SD 9.66) in the 128 women who did not have a treatment. This difference was not significantly different ($p = 0.64$). When divided by groups as above no statistical differences in age groups and needing a treatment were observed.

4.6.4 FIRST TREATMENT AT COLPOSCOPY CLINIC AND GRAVIDA / PARITY

Data was examined on gravida of the 494 study participants and having to have treatment. Results showed that mean gravida for women needing a treatment was 1.52 (SD 1.66) and for women not needing a treatment was 1.15 (SD 1.25). This difference was statistically significant ($p = 0.008$).

When mean parity was examined it was found that women needing a treatment had a mean parity of 1.19 (SD 1.44) compared to 0.84 (SD 1.13) in women who did not need a treatment. This difference was statistically significant ($p = 0.006$).

4.7 SECOND TREATMENT AT COLPOSCOPY CLINIC AND SMOKING STATUS

Hysterectomy was the most frequent second treatment carried out with 12 (2.4%) women requiring this procedure (see Table 9).

4.7.1 SECOND TREATMENT AT COLPOSCOPY CLINIC AND SMOKING STATUS

When women who reported smoking were compared to women who did not report smoking results showed that smokers had 1.9 greater odds of needing a second treatment as non-smokers (OR 1.90, CI 0.84 to 4.31). However, numbers of study participants needing a second treatment were very low (n = 25) and this difference did not reach statistical significance (p = 0.15). Types of second treatment needed by smokers and non-smokers are shown in Table 9.

Table 9 Type of Second Treatment at Colposcopy Clinic

Treatment type	Smoking		Total
	Smoker	Non-smoker	
No treatment	207	262	469
LLETZ	1	2	3
Laser	0	1	1
Cone biopsy	6	2	8
Hysterectomy	7	5	12
Ablation	1	0	1
Total	222	272	494

4.7.2 SECOND TREATMENT AT COLPOSCOPY CLINIC AND AGE

In relation to age and needing a second treatment the mean age of the 25 women needing a second treatment was 34.52yrs (SD 10.34) compared to a mean of 29.58yrs (SD 8.72) in the 469 women who did not have a second treatment. This difference was statistically significant (p = 0.03). When divided by groups as above and needing a second treatment (see Table 10) there was a lower rate of second treatment in women age between 20-29 years (3.4%) than in any other age group. Rate of needing a second treatment appeared to increase as the age of the women increased. When the rate of second treatment in the 20-29 age groups was compared to the other age groups it was found that this difference was only statistically significant in the 50+ age group (see Table 10). However numbers were small and caution is needed when comparing these results.

Table 10 Age and Second Treatment

Age group	2 nd treatment	No 2 nd treatment	Rate in%	OR (CI)	p
20-29	10	282	3.4%	1.00	
30-39	8	124	6.1%	1.82 (0.70 to 4.72)	0.30
40-49	3	46	6.1%	1.84 (0.49 to 6.94)	0.41
50+	4	17	19.0%	6.64 (1.89 to 13.36)	<0.01

4.7.3 SECOND TREATMENT AT COLPOSCOPY CLINIC AND ETHNICITY, GRAVIDA, PARITY, AND COCP USE

Results showed that ethnicity, gravida, parity and COCP use were not statistically significantly associated with needing a second treatment.

4.8 FOLLOW UP VISITS AND SMOKING STATUS, ETHNICITY, AGE, GRAVIDA, PARITY AND COCP

The cohorts of 494 were observed in relation to the number of follow up visits each participant needed and their smoking status (see Table 11). It can be seen from Table 11 that when women who reported smoking were compared to women who did not report smoking, the odds ratio was 60% higher (OR 1.61) to need a second follow-up appointment, the odds ratio was tripled to need a third and fourth follow-up appointment and nearly tripled to need a fifth follow-up appointment than non-smokers. These differences were all statistically significant (see Table 11). Ethnicity, age, gravida, parity and COCP use were not statistically significantly associated with number of follow-ups.

Table 11 Smoking Status and Number of Follow-up Appointments

	Smokers (rate %)	Non-smokers (rate %)	OR	CI	p
Follow-up 1	222 (100%)	272 (100%)			
Follow-up 2	92	83	1.61	1.11 to 2.34	0.014
Follow-up 3	58	27	3.21	1.95 to 5.28	<0.001
Follow-up 4	37	15	3.43	1.83 to 6.43	<0.001
Follow-up 5	19	9	2.74	1.21 to 6.17	0.018

4.9 NUMBER OF RE-REFERRALS

Of the 494 study participants, 454 (91.9%) required only one referral to colposcopy. There were 40 (7.3%) women who required a second referral after being previously discharged from the colposcopy clinic. Within the 12-month study period the maximum number of re-referrals was three. Four (0.8%) women required a third re-referral. Of the 40 women requiring second referral, 25 women reported smoking. Analysis revealed that smokers had 2.12 greater odds of needing a second referral (OR 2.12, CI 1.12 to 4.23). This difference was statistically significant ($p = 0.03$). Two of the women who needed a third referral reported smoking and two did not. Numbers were too low to carry out any meaningful analysis. Age, ethnicity, gravida, parity and COCP use were not statistically significantly associated with needing more than one referral.

4.10 DID NOT ATTENDS (DNA'S)

The DNA rate for the women in the study cohort was recorded. Results showed the numbers of women who failed to appear for their appointments without letting the clinic know. A maximum of eight appointments were sent to any one woman with no attendance or contact at previous clinic appointments (see Table 12). Results showed that women who DNA without contacting the colposcopy clinic was younger with a mean age of 26.33yrs (SD 6.50) compared to 30.90yrs (SD 9.22) in women who always attended or contacted the colposcopy clinic to cancel. This difference was statistically significant ($p < 0.001$). Women who reported smoking had a 3.02 greater odds ratio to DNA than non-smokers (OR 3.02, CI 1.95 to 4.67). This difference was statistically significant ($p < 0.001$). Results on ethnicity showed that if women identified as Maori they had 3.05 greater odds ratio to DNA than non-Maori (OR 3.05, CI 1.41 to 6.63). This difference was statistically significant ($p = 0.006$). Gravida, parity and COCP use were not statistically significantly associated with DNA's.

Table 12 Number of Appointments Missed by Study Participants Without Contacting the Colposcopy Clinic

	Frequency	Percent
Always attended appointment or cancelled	378	76.5
DNA without contacting clinic only once	41	8.3
DNA without contacting clinic twice	50	10.1
DNA without contacting clinic three times	10	2.0
DNA without contacting clinic four times	7	1.4
DNA without contacting clinic five times	3	0.6
DNA without contacting clinic six times	1	0.2
DNA without contacting clinic seven times	3	0.6
DNA without contacting clinic eight times	1	0.2
Total	494	100.0

4.11 SUMMARY

This chapter has presented the results from the study. Information obtained from the 494 patients included in this study has examined the patients demographics which include the ethnicity, age, religion, smoking status, number of cigarettes smoked, oral contraceptive pill use, parity, gravida and then information relating to their colposcopy visit. This encompassed the referral smear, biopsies taken at the first visit and then followed the patient for their second visit and five follow up visits and outlined type and number of treatments.

Representation by Maori women and other ethnic groups was studied and demonstrated that Maori were slightly under-represented as were Pacific Island women. Numbers of other ethnic groups were low and this will be discussed in chapter 5.

The results of the study have been presented in a series of tables and accompanying texts. This information has demonstrated that for women who smoke and attended the colposcopy department with CIN as either a LSIL or HSIL that the women who smoke are more likely to require more follow up visits and treatments to their cervix than women who do no smoke. The results in relation to smoking, age and CIN have identified that women aged 20-29 are the most likely group of women to be attend the clinic, have CIN on their cervix and smoke.

CHAPTER 5

DISCUSSION

“Among other adverse health effects, women who smoke have double the chance of developing cervical cancer compared with women who do not smoke” (Szarewski & Cuzick, 1998).

5.1 INTRODUCTION

This research study posed two key questions:

1. Do women who smoke and present at CWH colposcopy clinic with CIN on their cervix require more treatment and follow up than those who do not smoke?
2. Are Maori women and other ethnic groups disproportionately represented when considering the total number of women who present at CWH colposcopy clinic?

The results show conclusively that cigarette smoking impacts significantly on the frequency of colposcopy visits, treatments and re-referrals. The results identified that for women who smoked; the odds ratio was tripled to need a third follow up visit and doubled to need further treatments to remove abnormalities when compared to non-smokers. Women who smoked had over double the odds ratio to require a second referral for colposcopy than women who did not smoke.

It is evident that in this study Maori women are slightly under-represented not only in attending for colposcopy despite having a higher rate of incidence than non-Maori of SCC in New Zealand (Sadler et al., 2004), but once identified as attending colposcopy, the odds ratio was tripled in relation to DNA than non-Maori women. This pilot study also identified that 71% of Maori women attending the clinic were smokers compared to 44% of non-Maori women.

The clear link between smoking and the frequency of colposcopy visits, treatment and re-referrals supports the need for intervention to encourage smoking cessation. This need is particularly evident in the care of Maori women who are more likely to smoke.

Both the research results and the literature indicated not only how important it is to combine colposcopy interventions with smoke free behaviour, but also support the value of the smoking cessation programme set up at the colposcopy clinic at CWH. Further, as the literature has indicated, the link between smoking and CIN needs wider promotion not only to health professionals but among women and their families. Girls reaching puberty should also be targeted with the information that cigarette smoking can damage the cervix, and that the risk of HSIL and cervical cancer is greater for those starting smoking at a young age (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Tolstrup et al., 2006).

5.2 CIGARETTE SMOKING AND THE IMPACT ON THE CERVIX

While the Ministry of Health (2006b) found that approximately 23% of the Canterbury female population was smoking in 2001, the population of women attending the colposcopy clinic who smoked was about double the Ministry of Health results at 44.9%. Of the women attending the colposcopy clinic over half who smoked were in the 20-29 age group (50.1%). The smallest rate of smoking was in the 50+ aged group where only 6/21 (28.57%) women reported as current smokers. These results are in keeping with results reported by the Ministry of Social Development where women over 50 years are much less likely to smoke than younger people and have shown the largest decline in smoking prevalence for the last 20 years (New Zealand Ministry of Social Development, 2007).

Previous research has identified that many women, regardless of their smoking status, may come into contact with HPV, but at some point in the disease process cigarette smoking either encourages acquisition of the HPV or assists in the disease progression (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005; Munoz et al., 2006) and the current study confirms these findings. Women who presented at CWH colposcopy clinic with CIN were found to have 1.28 greater odds of

smoking when compared to non-smokers. This was not statistically significant ($p = 0.29$). McIntyre-Seltman et al's (2005) study of 5,060 women demonstrated that the development of HPV was only weakly associated with cigarette smoking but the development of HPV to CIN III was greater in women who smoked compared to women who did not smoke (OR, 1.7; 95% CI, 1.4-2.1).

Some recent studies have examined the link between number of cigarettes smoked daily and the incidence of SCC and CIN. McIntyre-Seltman et al's (2005) study found the risk increased for HSIL with the numbers of cigarettes smoked and the duration of smoking was strongly associated with CIN III ($p, 0.001$). A Cochrane review that included 23 epidemiological studies reported that the RR of SCC increased with the greater numbers of cigarettes smoked (>15 per day v never smokers RR = 1.98 (1.78-2.21) (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005). Due to the design of these studies specific questions relating to the length of time and numbers of cigarettes smoked were able to be recorded. Unfortunately this information was not available on the participants of the present study but would be taken into consideration when developing a future study.

Tolstrup et al. (2006) found that the risk of HSIL was greater for those starting smoking at a younger age. Tolstrup et al., (2006) examined data from 545 women with a Hr HPV with a median age of 24.9 years and identified nearly half of the cohort as current smokers (48.0%). This study demonstrated that current smokers had an increased risk of HSIL (OR = 1.99; 95% CI: 1.21 -3.28) (Tolstrup et al., 2006). Results from the current study are supported by the findings of Tolstrup et al. (2006) where from the 222 women identified as smoking, 147 of 222 were aged 20-29 years of age (66.2%). From a total of 375 women with CIN, 239 (63.7%) were aged 20-29 years. While information relating to the age at which smoking commenced was not able to be recorded in the researcher's study, it would be included in any future study.

The current study identified that 239 of the women with CIN (63.7%) were aged between 20 and 29 years of age. These results identifying young women as being the most likely age group to have CIN, and the most likely to be smoking, highlight a need for education to this group. Educational material and verbal communication to women attending for colposcopy should be relevant to this age group in particular. As a further consideration, young girls prior

to commencing sexual activity and cigarette smoking could benefit from being informed about the associated risks of cigarette smoking and cervical abnormalities.

While Tolstrup et al., (2006) and McIntyre-Seltman et al., (2005) identified that cigarette smoking increased the risk of HSIL, the way this occurs is not fully recognised but is thought to affect the clearance of HPV thus allowing a persistent infection or perhaps acting on a still unknown pathway (McIntyre-Seltman et al., 2005; Tolstrup et al., 2006).

Two previously discussed studies which found no correlation between CIN and cigarette smoking involved one study, undertaken in the New Independent States of the former Soviet Union which found that although smoking was an independent risk factor for oncogenic HPV it was not a risk factor for HSIL (Syrjänen et al., 2007). However, in this study population less than a quarter of the participants were identified as smoking and the population was obtained from three sources, a sexually transmitted disease clinic, women attending at a gynaecology outpatient clinic and women engaged in cervical cancer screening. Three potential limitations of the study would relate to the lower number of women who reported smoking, the small number of histological biopsies taken to confirm abnormalities, (15.6%) and the selection of an unknown number of the women from a sexually transmitted disease clinic (Syrjänen et al., 2007). In comparison, from the researcher's study 441 (89.3%) of the participants' had punch biopsies taken with 375 (76.2%) having either a HSIL or LSIL. In Christchurch the Sexual Health Centre has its own colposcopy clinic and colposcopist so patients identified at the Sexual Health Centre as requiring colposcopy would have been seen at the Sexual Health Centre. If treatment was required a referral would have been made to the CWH colposcopy clinic, but these women did not meet the inclusion criteria.

The second study by Olsen et al. (1995) also found no link between CIN and cigarette smoking. This study was an older study and adjusted for the now accepted information of certain types of HPV being the casual agent certain types of CIN and cervical cancer. If this study was unadjusted for HPV, smoking would be identified as a co-factor (Professional Advisory Board, 2007).

It is still unclear whether smoking increases the risk of obtaining, or persistence of, HPV, though smoking has been found to increase the risk of SCC (Koushik & Franco, 2006; Richardson et al., 2005; Vaccarella et al., 2008). Two recent studies further support the current study where it was found that women who smoked had an increase incidence of HPV

and women with a greater smoking intensity were more likely to have HPV (Richardson et al., 2005; Vaccarella et al., 2008). The larger recent studies and reviews also support the current research where women who develop CIN and cervical cancer were more likely to be smokers (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005; Munoz et al., 2006).

5.3 SMOKING AND FIRST TREATMENT

The researcher's study found that for women who smoked, the odds ratio was doubled to need a treatment to remove pre cancerous abnormalities (OR 2.10, CI 1.37 to 3.21; $p = 0.001$). The current study is supported by recent studies where it has been found that women who smoke have been reported to have a higher incidence of risk of CIN III and cervical cancer (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Munoz et al., 2006). Once a woman has a confirmed result from a biopsy of CIN and has undergone a treatment to remove the abnormality they can be reassured that there is an approximately 95% chance that this will return their future cervical smear to normal (Sellors & Sankaranarayanan, 2003).

5.4 SMOKING, TREATMENT FAILURE AND PERSISTENCE

While women who have had treatment for CIN have been identified as being at an increased risk of developing further CIN (Cestero, 2006; Kalliala et al., 2005), the risk for women requiring a second treatment who smoke is greater than for women who do not smoke (Acladius et al., 2002). The researcher's study demonstrated that for women who smoked the odds ratio was doubled to need a treatment when compared to women who did not smoke (OR 2.10, CI 1.37 to 3.21; $p = 0.001$). These results are supported by a UK study which examined the same relationship and found the risk of treatment failure was 3.17 times higher for women who smoked when compared to those who did not smoke (Acladius et al., 2002). This same study also observed the intensity and duration of smoking and confirmed that the greater number of cigarettes smoked the greater the tendency for treatment failure (Acladius et al., 2002).

In relation to second treatments at the colposcopy clinic at CWH the researcher's results showed that 5.1% of women required a second treatment. The percentage of women in this group would be considered an acceptable level (New Zealand Ministry of Health, 2005; Sellors & Sankaranarayanan, 2003). From this group of women who required a second treatment it was found that the odds ratios was nearly doubled for smokers when compared to non-smokers (OR 1.90, CI 0.84 to 4.31). This result did not reach statistical significance. However numbers were low so caution is required. The fact that women who do not smoke are less likely to need a second treatment may provide an incentive for smokers to become smoke-free.

One study which examined the risk factors for persistence and recurrence of CIN and HPV found no correlation between cigarette smoking and treatment failure (Frega et al., 2003). While a potential strength of this study was that it was prospective, three potential limitations identified related to, firstly the young women smoking were only considered smokers if they smoked five or more cigarettes per day. While information has been located that demonstrates an increased risk of developing HSIL and SCC with the greater number of cigarettes smoked and length of time smoking it is not clear what the impact is of smoking five or less cigarettes per day in relation to CIN or cervical cancer cervical (Acladiou et al., 2002; International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Munoz et al., 2006). Secondly, results demonstrated a loss of over half the study population to follow up and thirdly the age of the participants was particularly young (mean age 19 years) (Frega et al., 2003). The age of the majority of the participants were outside the screening recommendations within New Zealand (New Zealand Ministry of Health, 2002a). The majority of women, regardless of whether or not they smoke, will acquire HPV within their lifetime and most will clear the virus within a two-year period (Farnsworth, 2007).

5.5 AGE OF WOMEN REQUIRING A SECOND TREATMENT

The results from the researcher's study demonstrated that women requiring a second treatment were about five years older than women who did not require a second treatment. This difference in ages was statistically significant ($p = 0.03$). A trend was present that the rate of requiring a second treatment increased from 20-29 year old age group to the 50+ age

group. However, caution is advised when interpreting these results as the number in the 50+ age group were small. The Cochrane review identified that the mean age for women developing cervical cancer was 46 years of age and for CIN III was 35 years (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006). While a strength of Cochrane review could be the large numbers of women who had their data examined, potential limitations could relate to an over representation in the controls of women from hospitals and the under representation in the population-based controls who may have been reluctant to be involved in studies identifying their smoking status (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006).

5.6 WOMEN REQUIRING A SECOND REFERRAL

The researcher's study identified that 454 of the women required one referral to the colposcopy department in the study period. In relation to second referral 40 (7.3%) required a second referral. For women in this second referral group it was identified that smokers had a doubled odds ratio to have a second referral when compared to non smokers (OR 2.12, CI 1.12 to 4.23). This difference was statistically significant ($p = 0.03$). In relation to women requiring three referrals, four women were seen with two of this group smoking and two not smoking. Analysis was not performed on this group as it was too small to be meaningful. Age, ethnicity, gravida, parity and COCP use were not statistically significantly associated with needing more than one referral.

Two studies previously discussed support the current study (Acladiou et al., 2002; Vaccarella et al., 2008). These studies demonstrated that women who smoke are more likely to have persistence and recurrence of HPV, LSIL and HSIL. It is expected that women who experience the persistence and recurrence of HPV and CIN will require more interventions which may include additional examinations, diagnosis and treatments to remove cervical abnormalities.

Two studies two which found no relationship between smoking and CIN has been previously discussed. The first was undertaken by Olsen et al in 1991 and 1992 looked at HPV to see if it caused HSIL. This study was adjusted for the causal agent HPV (Olsen et al., 1995). It is widely accepted that certain types of HPV are the causal agent for CIN and cervical cancer and if this study was unadjusted smoking would be identified as a co-factor (Olsen et al., 1995; Professional Advisory Board, 2007).

The second study, carried out by Syrjanen et al (2007), identified smoking as an independent risk factor for oncogenic HPV but not for HSIL. Sexual behaviour was considered to be the main risk factor for developing SCC. This study began with a reasonable number of participants (n=3,187), though this group reduced to 854, 26.8% of the participants. While this study was prospective, the median length of time for follow up was 16.7 months which demonstrates the shortest period of follow up when compared to other studies examined. While the researcher's study did not control for oncogenic HPV, CIN was diagnosed histologically and recommendations support considering HPV and CIN 1 as similar lesions (Professional Advisory Board, 2007). A further potential limitation identified by the researchers was that of this group only 58.2% had biopsies taken for histological confirmation of abnormalities. This study is in contrast to the majority of other studies which have had larger numbers of women included in their studies, followed them for longer periods of time and have had greater histological confirmation of abnormalities (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005; Sozzi et al., 1997).

5.7 CIN AND CO-FACTORS

Other risk factors for the development of CIN include high parity, use of hormonal contraceptives, sexually transmitted infections and immunosuppression (Munoz et al., 2006). The results from the present study are in line with other large studies and reviews that confirm the more pregnancies and births that women have the greater likelihood of requiring treatment (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005; Munoz et al., 2006). The researcher's study found the mean gravida for women having a treatment was 1.52 (SD 1.66) and for women not needing a treatment was 1.15 (SD 1.25). This difference was statistically significant ($p = 0.008$). The mean parity of a women needing treatment was 1.19 (SD 1.44) compared to 0.84 (SD 1.13) in women who did not need a treatment ($p=0.006$). Of interest in the researcher's study was that the younger women who did not have children had a higher incidence of CIN than the women with children and this also applied to the number of times that each woman was pregnant. A possible explanation for this was the mean age for pregnancy was 29.96 and includes a number of women in the 30-40 age groups. These results are in line with the large and recent review where it was found that the likelihood of developing ongoing and persistent CIN that leads to cervical cancer occurs with greater age. The median age for developing cervical cancer was found to be 46.4 years (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Munoz et al., 2006).

The taking of the COCP for 10 years doubles a women's risk of cervical cancer when compared to women who have not taken the COCP (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Munoz et al., 2006). The researcher's study found that women first attending colposcopy clinic who took the COCP were more likely to have CIN than women who did not take the COCP, (OR 1.60, CI 1.03 to 2.50). This difference was statistically significant ($p = 0.04$).

The presence of genital warts was recorded and was the only STI noted due to the likelihood of women having usually been diagnosed and treated for other STI's such as Chlamydia and Gonorrhoea at the time of seeing the doctor or smear taker for a cervical smear test. Treatment is likely to have occurred from their doctor or the Sexual Health Centre. While the numbers of women with genital warts was not expected to be very high it was considered worthy of reporting as it is believed that it is likely that the presence of genital warts may increase the transmission of other HPV's (Professional Advisory Board, 2007). While of interest, it should be considered that all the women who present at colposcopy have been referred from another health professional and it is most likely that the diagnosis and treatment of genital warts would have occurred at this stage. This could indicate that this group with genital warts could have persistence or a new infection. Only 13 women in the cohort had genital warts recorded and from this group 10 had CIN present. These numbers were very small and the difference was not statistically significant. In relation to smoking and genital warts it was found in the researcher's study that the women who had genital warts were more than four times as likely to be smokers when compared to women who did not smoke (OR 4.23, CI 1.15 to 15.56). This difference was statistically significant ($p = 0.023$). These results need to be treated with caution due to the very small numbers involved. Other co-factors which included ethnicity, age, gravida, parity and COCP did not show any association with having genital warts.

5.8 SMOKERS VERSUS NON-SMOKERS AND FOLLOW UP VISITS

Cigarette smoking is a recognised risk factor for SCC and CIN after adjusting for potential confounders (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Koushik & Franco, 2006; Munoz et al., 2006). Therefore women who smoke are at a greater risk of developing cervical abnormalities than women who do not smoke (Franco et

al., 2003; International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Tolstrup et al., 2006). This may mean for some women who smoke and have CIN that they may require more interventions than women who do not smoke and have CIN.

The researcher's study recorded data in relation to the first to fifth follow up visits and the results demonstrated that for all second, third, fourth and fifth follow up visits the women who attended were more likely to be smokers than non-smokers. At follow up 1 a women had a 60% (CI 1.11 to 2.34; $p = 0.014$) likelihood of being reported as a smoker when she presented as a new patient in 2001. At the third and fourth visits women who smoked the odds ratio was tripled to attend for these visits than women who did not smoke. At follow up five the numbers of women needing a colposcopy were 28 with 19/28 of this group reported as smoking (OR 2.74, CI: 1.21 to 6.17; $p= 0.018$). While it was observed that smoking and the number of follow up visits demonstrated a link other variables which included ethnicity, age, gravida, parity and COCP use were not statistically significantly associated with number of follow-ups. These results demonstrate that the women who smoked required more follow up than women who did not smoke. A number of other studies examined support the researchers results where women who smoke are at a greater risk of developing CIN III or SCC than women who do not smoke (Gunnell et al., 2006; International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; McIntyre-Seltman et al., 2005).

5.9 DNA RATE AND SMOKING

The maximum accepted DNA rate at colposcopy clinics within New Zealand has been set at 15% by the NSCP, (New Zealand Ministry of Health, 2000) with all women having three separate attempts to contact them in relation to attending their colposcopy appointment. The DNA rate for the women in the researchers study for one DNA was 23%. The younger the women, the more likely they were to DNA with this group having a mean age of 26.33 years compared to a mean of 30.9 years for women who attended for their appointment or arranged another appointment. Of interest, was that women who reported smoking had an odds ratio of 3.02 to DNA than women who identified as being a non-smoker (OR 3.02, CI 1.95 to 4.67; $p=0.001$).

A confounding factor could be related to women who smoke being less likely to attend for follow up appointments and thus being more likely to develop SCC due to lower participation

in cervical screening and colposcopy appointments. The study by McIntyre-Seltman et al., (2005) reinforces the results from the researcher's study where women in their study who smoked were found to be almost twice as likely to be lost to follow up after not attending for all their colposcopy appointments.

In response to question one, the results from the researcher's study have shown that women who smoke cigarettes are more likely to undergo more follow up visits, more treatments, re-referrals, more DNA to the colposcopy clinic than for women who do not smoke. This demonstrates a greater persistence and recurrence of HPV and CIN amongst smokers.

Question two

The second question asked was whether Maori women and other ethnic groups who attended the colposcopy clinic were disproportionately represented when considering the total number of women seen at the CWH colposcopy clinic. Cartwright reported in 1988: (p.115).

Our cultural mores of modesty are not understood by, or even recognised by most health professionals and especially doctors...The cultural inhibitions on modesty and what is or isn't proper exposure is ingrained into most Maori girls at an early age. Exposure of the pubic area is forbidden and proper behaviour and practice during menstruation especially is taught at the onset of menses.

Quoted in: (New Zealand Ministry of Health, 1997, p14)

5.10 ETHNICITY AND REPRESENTATION AT COLPOSCOPY

Maori women were found to be poor attendees for colposcopy when compared to non-Maori. This was shown by the identification of slight under representation initially but subsequently in relation to DNA, it was found that Maori women were more likely to DNA than non-Maori (OR 3.05, CI 1.41 to 6.63). This difference was statistically significant ($p = 0.006$). The researcher identified that 5.7% (n=28) of the women that attended the colposcopy department identified as Maori. The percentage of the regional population belonging to Maori ethnic group aged between 20 and 69 years living in Canterbury in 2001 was 6.4% (n=31635) (Statistics New Zealand, 2001). While this demonstrates only slight under representation at

the colposcopy department it is still of considerable interest as in New Zealand Maori women are significantly under represented in cervical screening and over represented in relation to incidence and mortality from cervical cancer (Sadler et al., 2004). One of the most likely reasons is thought to be sacredness of the genital area for Maori women (New Zealand Ministry of Health, 1997). Other reasons are likely to be varied in relation to cervical screening uptake in New Zealand by Maori and non-Maori.

The researcher's study found that non-Maori women had a 1.28 greater odds ratio of having CIN but this was not statistically significant ($p = 0.65$). Seven of the women in the study were recorded as having SCC with one identified as being Maori. These low numbers would be expected as the purpose of colposcopy is to remove abnormalities before they become a cancer. Due to the low numbers no analysis was performed. However, throughout New Zealand Maori women are shown to have the highest rates of mortality from cervical cancer and are closely followed by Pacific Island women (Sadler et al., 2004). Maori women were identified in the New Zealand Cervical Cancer Audit as experiencing a death rate four times that of non-Maori women (Sadler et al., 2004). Maori women were also found to be less well served by the NSCP, colposcopy and hospital services for both investigation and diagnosis. A recommendation from the audit was that where ethnic disparities in investigation or diagnosis for colposcopy are occurring that appropriate means of correcting these issues are to be addressed (New Zealand Ministry of Health, 2005; Sadler et al., 2004).

5.11 ETHNICITY AND DNA

The impact of the DNA rate may also reflect the underrepresentation of Maori at the colposcopy clinic. It is possible that reasons for not attending in the first place may make it more difficult for some of these women to continue to attend. The current study demonstrated a 23% DNA rate overall and for Maori women 46.4%. Maori women in this study had a 3.05 odds ratio to DNA than non-Maori. Two New Zealand studies were located where it was found that Maori men and women had a DNA of 24% in a general South Auckland outpatient clinic and 24% in a Wellington outpatient clinic. In comparison at the Wellington outpatient clinic, New Zealand Pakeha had a DNA of 7.2% (Coffin et al., 2003; Hudson, 2006). The three main reasons given why the Maori DNA rate was so high in South Auckland at 24% was that they did not have the correct information about their appointment, were unable to get to their appointment and thirdly lacked the motivation to go to the hospital (Coffin et al.,

2003). The pilot study by Hudson, undertaken in a general Wellington hospital outpatient clinic in 2004-2005 found the overall DNA was 9% (Hudson, 2006). The DNA rates for Maori and Pacific people were 24% and Pacific people 29.5% respectively. In the Wellington study over 50% of the participants who DNA their appointment identified hospital administration failures or hospital barriers as the reasons for their non-attendance (Hudson, 2006).

Factors that could contribute to the reduction of some of these barriers identified by the participants of the service could be the use of Maori health workers. The women are able to assist in the delivery of the service from the initial appointments through to supporting partners. An example of this at the CWH colposcopy clinic is the utilisation of female Maori health workers contacting women who DNA their colposcopy appointment. They are able to visit women in their own homes, offering childcare and transport to support women to attend their appointment. Currently the researcher is in the process of discussion with a number of hospital staff and Maori health workers from the community about how a Maori women's clinic could be offered for a women's first visit if she wished to utilise this service. This process would identify Maori women prior to their appointment and offer in their appointment letter the opportunity to attend a Maori women's clinic if they preferred. This would involve having the Maori health promoter from cervical screening who is a weaver of flax (mahi raranga) to meet and sit with the women and show how to weave small items of flax while they wait for their appointment. The Maori health worker from cervical screening plans to bring Maori items to decorate the waiting room to give it a more comfortable feel for the women. Female health workers from He Waka Tapu, a Ministry of Health supported social services agency are available to support women to attend their appointments. A Maori female doctor may also be available to examine the women.

Further reasons why the DNA rate for Maori women is so high require the examination and identification of barriers that may exist. Examples of these potential barriers could relate to areas such as waiting areas being culturally inappropriate, lack of easily accessible breast feeding facilities while women wait for appointments and areas relating to communication to staff within hospitals. A future study maybe planned to attempt to identify areas which may contribute to DNA for women at the colposcopy department at CWH.

To ensure a better delivery of services for Maori an understanding of the concepts surrounding Maori health is essential as Maori have a belief that health services should be

appropriate to Maori patients (New Zealand Ministry of Health, 2003a). Discussions about Maori health should originate with the acknowledgement of the Treaty of Waitangi (New Zealand Ministry of Health, 1997). The document is a living document and acknowledges the special tangata whenua status of Maori and the relationship between Maori and the government (New Zealand Ministry of Health, 1997). Health is considered widely by Maori as 'taonga' (anything prized or valued (New Zealand Ministry of Health, 2002b). The same protection is required for health as other taonga of Aotearoa and includes lands, fisheries and language. The New Zealand Government supports this concept which is in line with concepts from the Ottawa Charter (New Zealand Ministry of Health, 2002b). "Whare tapa wha" is a health model that is considered to be generally acceptable to Maori. The model is a comparison of health to the four walls of a house with all four being necessary to enable strength and balance (Durie, 1998). Each wall representing a different aspect: taha wairua (the spiritual side), taha hinegaro (thoughts and feelings), taha tinna (the physical side) and taha whanau (the family) (Durie, 1998).

The number of other ethnic groups who attended at the colposcopy department in 2001 were low, with only four (0.8%) identifying themselves as of Pacific Island descent and 18 (3.6%) as Asian women. In Canterbury in 2001 Pacific Islanders accounted for 1.7% of the Canterbury population (Statistics New Zealand, 2001). This meant that only half the Pacific Island women who could be reasonably expected to attend were seen. Pacific Island women demonstrated a 50% DNA rate at CWH colposcopy clinic, though only four Pacific Island women attended, so caution is needed when interpreting these results.

It is recognised that Pacific models of care are preferred by Pacific people and improve health outcomes more than other models (New Zealand Ministry of Health, 2004b). The Pacific health workforce requires development, career pathways are needed to encourage Pacific people to have greater participation in the health workforce (New Zealand Ministry of Health, 2004b). Discussions around Pacific health are planned in the future and will require consultation with local Pacific Island groups. This would include cervical screening, local church groups, and Pacific Island health workers to discuss ways to improve representation for colposcopy either at CWH, or the possibility of a mobile colposcopy unit going to the community.

For Asian women, 18 (3.65) were seen in the colposcopy department in 2001. For this period Asian women accounted for 1.4% of the eligible population for cervical screening. This may

demonstrate that Asian women were well represented at the CWH colposcopy department. However, in 2007 in New Zealand the cervical screening register demonstrated that only 44.9% of Asian women were engaging in cervical screening as compared with Maori women at 48.6% and Pacific Island women 48.9% (New Zealand Ministry of Health, 2007c). This may relate to the numbers of Asian women immigrating to New Zealand within recent years (New Zealand Ministry of Health, 2006a). The NSCP are working on ways to improve coverage for this group as well as Maori and Pacific women (New Zealand Ministry of Health, 2008b). The results from the researcher's study are supported by the lower cervical screening figures for Pacific Island women and higher rates of incidence and mortality from cervical cancer (Sadler et al., 2004).

Of further concern for the Asian population are inequalities that appear to be developing in relation to New Zealand's Asian population. Almost 77% of New Zealand Asians are migrants who have lived in New Zealand for less than ten years. The health of many of these people has suffered since migrating to New Zealand (De Silva, 2008). There are two reasons why this may be occurring. Firstly, Asian women have the lowest engagement of any group in New Zealand for cervical screening (New Zealand Ministry of Health, 2008b). Secondly, is the limited understanding that some Asian women have in relation to sexuality and contraception (Goodyear-Smith & Arroll, 2003). Many Asian women who have presented for termination of pregnancy in New Zealand believe that oral contraceptives are bad for their health, contraception is not required the first week following menstruation and that it is the male role to provide a prophylactic (Goodyear-Smith & Arroll, 2003). Of note is the growth expected in the Asian population. In 2006, the Asian population represented 6% of the total New Zealand population and this is expected to double to 12% by 2021 (New Zealand Ministry of Health, 2006d). This could provide an area of further study to assist with identifying ways to improve access for this group to engage in health promotion activities such as cervical screening and obtaining relevant sexual health information.

Two studies examined, one New Zealand and the other an American study which were related to cervical screening, cervical abnormalities and cervical cancer confirmed that embarrassment and the links to sexual activity were significant factors for ethnic minorities (Jameson et al., 1999; Kimlin et al., 2004). Further barriers identified were cultural insensitivity, lack of time and poor communication (Kimlin et al., 2004). From the American study a significant finding was that poverty and socio-economic status were the main contributors to the development of cervical cancer. This information might be supported in

New Zealand where ethnic minorities and low incomes were two factors contributed to the development of cervical cancer (Sadler et al., 2004).

European women accounted for 84.6% of women who attended the colposcopy department. The NSCP report approximately 80% of European women are enrolled in cervical screening and have a target of 75% for all to be engaged in regular cervical screening (New Zealand Ministry of Health, 2007c). The researcher's results demonstrate that European women were well represented at the colposcopy department.

5.12 ETHNICITY AND CIGARETTE SMOKING

Maori women in New Zealand have the highest population of cigarette smoking and in 2001 reported a prevalence of 52.5% of the total Maori women smokers (New Zealand Ministry of Women's Affairs, 2004). Of on-going concern is the current figure of 60% for young Maori girls who are reported as smoking (New Zealand Ministry of Health, 2007a). The researcher's study confirms the high rates of smoking that were present in the Maori women who attended the colposcopy clinic in 2001 with 20 of 28 (71.4%) in this group reporting current smoking. These results show that Maori women were over three times more likely to report as smoking cigarettes when compared to all other women.

The combination of very high numbers of Maori women smoking and their incidence and mortality from cervical cancer identifies this group as a priority group. Delivery of services to reduce these inequalities requires consultation and collaboration with Maori to best reduce inequalities.

5.13 SMOKING CESSATION

It can be seen that the potential for positive effects of becoming smoke free exists for women and having a smoking cessation clinic on site at the colposcopy clinic may provide a useful opportunity for women to consider this option. Many women who require a referral for treatment of an abnormal smear undergo a significant amount of fear, confusion and anxiety (Gray et al., 2006; Rogstad, 2002). Women who are young, smoke and have children have been found to experience the greatest levels of fear in relation to having an abnormal cervical

smear test result (Gray et al., 2006). It is thought that some nurses may think that giving smoking cessation advice could have a negative impact and have the potential to deter women from attending for cervical screening (Hall et al., 2007). A study which examined the attitude of practice nurses giving this advice in this context found that they were more likely to give advice around more traditional areas of health such as cardiovascular and diabetic care (Hall & Marteau, 2007). Potential barriers were identified as being time allocated to the appointment and training for the nurses to give this advice effectively (Hall & Marteau, 2007). While this is believed to be the first study undertaken on this subject, possible limitations related to the modest sample size and relying on self reporting from nurses giving the smoking cessation advice (Hall & Marteau, 2007).

Many women are not aware of the link between the cervix and smoking and when informed that smoking cessation can reduce this risk it can present information that has been demonstrated to increase the intention of women who smoke to become smoke free (Marteau, Rana, & Kubba, 2002). An English study which examined the motivating impact of informing women who smoked about the link between cervical cancer and smoking found that women who were given a simple explanation via leaflet explaining the link, demonstrated a greater intention to become smoke free than those women who did not know about the link (Hall, Weinman, & Marteau, 2004). A further study examining the appropriateness of brief smoking cessation advice from practice nurses during cervical smear tests appointments was found to be acceptable to the patients and the nurses, who were required to spend approximately an extra five minutes with each woman (Hall et al., 2007).

Because Maori women have a higher rate of smoking than non-Maori women, it is essential to have Maori involved at every level of planning through to delivery (New Zealand Ministry of Health, 2003a). A success story in relation to this was the Aukati Kai Paipa smoking cessation trial which worked with Maori women and their whanau. This programme demonstrated a 29% success rate (New Zealand Ministry of Health, 2003a). The service was taken to communities and worked with Maori women in a way that was felt to be more culturally appropriate than programmes designed and undertaken by non-Maori (New Zealand Ministry of Health, 2003a).

The 2007 survey undertaken throughout New Zealand on nurses knowledge relating to tobacco and smoking cessation demonstrated that over 90% of the participants agreed that it was part of their nursing responsibility to advise their patients to stop smoking and 87%

believed that if they could effectively intervene that they would be happy to spend a further five minutes with each patient who reported smoking (Wong et al., 2007). Less than half of the respondents stated they had received some type of training in relation to smoking cessation. A high level of knowledge existed amongst the respondents that nicotine was the main reason for dependence but over half believed that nicotine was the main cancer causing agent in tobacco (Wong et al., 2007). So while nurses may be appropriately placed to provide smoking cessation advice, this must be undertaken with appropriate education and evidence based practice to support training, which may enable them to offer the most appropriate means of delivering smoking cessation advice.

In 2004 a smoking cessation clinic was instigated for approximately two hours per week by this researcher. This involved discussing at the time of an appointment the link between the cervix and cigarette smoking and offering the women the opportunity to be supported in their smoke free attempt. This has involved approximately 300 women to date and has involved prescribing of nicotine replacement therapy, follow up phone calls for as long as required or referral to other agencies. Other referral agencies include Smokechange for pregnant women or Aukati Kaipapa (a free smoking cessation service for Maori women and their Whanau), Quit line or general practitioner services.

The researcher believes the high rate of women attending for colposcopy who smoked would support the maintenance of the smoking cessation clinic to assist with the reduction of women smoking who attend for colposcopy appointments. The Canterbury District Health Boards 2001 strategic Plan (Canterbury District Health Board, 2001) stated that the smoking rates of 10% in the Canterbury DHB should be achievable by 2012. Tobacco control staff felt that at that time a 10% smoking prevalence was too ambitious and that a target of 15% would be more realistic (Canterbury District Health Board, 2001). It is considered reasonable to identify a link with a modifiable health risk such as cigarette smoking and the persistence and recurrence of CIN (Marteau et al., 2002). A short reasonable explanation regarding this link can be offered appropriately and then support or referral offered to become smoke free. While a concern may exist that offering smoking cessation could pose a barrier for the women who smoke and attend colposcopy, two recent studies which examined this connection in relation to cervical smear taking, found this not to be a barrier for attending for appointments (Hall & Marteau, 2007; Hall et al., 2007).

5.14 LIMITATIONS AND STRENGTHS

5.14.1 LIMITATIONS

During the course of this research a number of limitations were identified in relation to the project that may have impacted on the outcomes. Patients who chose to go privately after an initial consultation with their own doctor or smear taker, which identified the need for colposcopy, did not have their data available to be included in this research and therefore this omission has the potential to bias the results. The number of women who chose to use private services is unknown and therefore how this has impacted on the results is indeterminable. Two women from the researcher's study who were initially seen in the colposcopy clinic chose to have private follow up treatment.

Secondly, some patients had an initial colposcopy examination but then failed to attend follow up appointments. As a result the data related to ongoing visits in relation to persistence and recurrence of cervical abnormalities is incomplete.

This study was retrospective, therefore the ability to clarify information recorded in 2001 was not available. While the smoking status of women was identified in all of the records used in the study, information relating to the length of time smoking and the number of cigarettes smoked could have been helpful when interpreting the results. It would be useful in a future study to have a prospective design and ask further questions related to the intensity and duration of their cigarette smoking habit.

In addition, data related to patient's religion could have provided useful data when interpreting the results. Religion was recorded for only a very small number of women. This information was included in the data collection as a variable due to the practice of certain religious groups of performing male circumcision. The International Agency for Research on Cancer (Munoz et al., 2006) found that HPV prevalence in circumcised men was approximately three times less than uncircumcised men. However some smaller studies reviewed demonstrated no protective element in circumcision (Partridge & Koutsky, 2006) This could be a useful question to be asked in a prospective national or international study.

In relation to the recording of ethnicity, it is possible that some of the entries recorded in the patient's hospital records may have been inaccurate. An audit undertaken for women in New Zealand with cervical cancer found that for Maori women, the recording of their ethnicity was

inaccurate for around 20% of these women on the NCSP-Register and National Cancer Register between 2000 and 2002 (Sadler et al., 2004).

A further variable in the data collection was the weight and height of women to record their BMI to see if any relationship existed with cervical abnormalities. This information was not recorded and is not routinely obtained unless the women require a general anaesthetic for a surgical procedure. The lack of consistent information in relation to this factor may have impacted on the outcomes.

Two further risk factors related to cervical cancer are age of first sexual intercourse and menarche (Koushik & Franco, 2006). These factors are not routinely collected when a women presents for colposcopy and therefore were not available during the data collection stage. This information may have been of interest when analysing the data in relation to cigarette smoking and cervical cancer.

Finally, time and financial constraints limited this study to the six-year period and it could have been useful to observe the women in this study for a longer period of time in relation to re-referrals, on going follow up visits and treatments to the cervix.

5.14.2 STRENGTHS

During the course of the research three strengths were identified. Firstly, the retrospective method used ensured this study was able to be undertaken in a timely and cost effective manner (Polit & Beck, 2004). Secondly, this method was suitable for examining data from the previous six years to determine if cigarette smoking and other variables such as the COCP were possibly antecedent factors that had an effect on CIN for the women who attended as new patients in 2001 (Polit & Beck, 2004). A final advantage of this method was that the population was unselected and random in nature (Polit & Beck, 2004).

CHAPTER 6

CONCLUSION

This study has shown that smoking cigarettes can adversely affect the health of the cervix. Women who smoke are at greater risk of requiring more referrals to colposcopy, more follow up visits and treatments to their cervix than women who do not smoke. The risk of cervical abnormalities for women who become smoke free is less than women who continue to smoke. Therefore, smoking cessation has the potential benefit of reducing the need for women to have ongoing follow up, treatments and referrals, and reduces the risk of cervical cancer (International Collaboration of Epidemiological Studies of Cervical Cancer et al., 2006; Richardson et al., 2005). While it is widely known in the medical profession that cigarette smoking is a risk factor for SCC, this link is not so widely known in the general population. Dissemination of this information to women and health professionals should reduce the number of interventions for smokers attending for colposcopy as well as producing benefits for the colposcopy service in terms of time and expense.

There is clearly a strong need to continue with the smoking cessation programme in colposcopy and promote other smoking cessation clinics on site throughout New Zealand health care settings. The CWH colposcopy smoking cessation clinic has already provided the model for the respiratory department at Christchurch Hospital.

It is a priority to have this information disseminated to health professionals throughout New Zealand and internationally to women who smoke and who are exposed to HPV. A number of other studies examined support the message of women with cervical abnormalities who smoke being included in smoking cessation programmes (Richardson et al., 2005; Vaccarella et al., 2008). A recommendation from this study is to ensure that nurses in New Zealand receive training on the effects of cigarette smoking and the benefits for people in becoming smoke free (Wong et al., 2007).

Because Maori women experience the highest rates of smoking and cervical cancer in New Zealand, it is a priority to address both these issues. The findings from this study have prompted a further study to explore the issue of improving access to colposcopy services for

Maori women. This new research may provide improved health outcomes for Maori women. An application for a future study has been submitted and has involved consultation with Maori health workers, who have agreed to contact Maori women identified as having not attended for colposcopy appointments. The question to be asked is, “Why do women with abnormal smears not present for colposcopy?” The establishment of Maori women’s colposcopy clinics is underway at CWH where Maori women will be identified before presenting, and invited to attend the Maori women’s colposcopy clinic.

By offering more culturally appropriate colposcopy clinics it is hoped that more Maori women will attend initially and feel more comfortable in returning for future appointments. More research into specific areas on how to improve attendance for Maori women is recommended and areas that could be examined to include appointment information, access to the colposcopy clinic, the colposcopy clinic offering the best environment for the patient and family and delivery of the service.

Further research in relation to improving Pacific Island women’s use of the colposcopy service is recommended. The researcher intends to have discussions with members of the Pacific Island community about how women can be encouraged to attend appointments. Having a clinic for women at the weekends is a possibility where work commitments may not interfere with the appointment times. Discussions are also taking place about the possibility of eventually having a mobile colposcopy service where colposcopy could be taken to the community to improve access for groups who are identified as having a lower representation and higher DNA rates.

While Asian women were well represented in this pilot study, there are many Asian women immigrating to New Zealand, and Asian women now have the lowest engagement in cervical screening in New Zealand (New Zealand Ministry of Health, 2008b). These low figures could possibly lead to an increase in the incidence of SCC within New Zealand. It is essential to have people who can interpret for all groups who have English as a second language and to ensure that the reading material that is given to women uses appropriate wording that is understandable and meaningful.

The identification of significantly higher rates of smoking and cervical cancer amongst Maori, Pacific and socially disadvantaged women demonstrate that the information currently provided in encouraging people to become smoke free and engage in regular screening is not

impacting as quickly as would be desired. The success of the Aukati Kai Paipa programme, when delivered by Maori, demonstrates the need for continuation of greater service delivery by Maori for Maori. The New Zealand government supports smoking cessation and policies are in place to support this process (New Zealand Ministry of Health, 2007d). To ensure appropriate health promotion at an individual level, health providers need to assist in changing the health behaviour of their patients (JanBen & Pfaff, 2005).

Work undertaken by health providers must demonstrate a commitment to the Treaty of Waitangi. Action must be undertaken by health providers in the future to consider ways that information is communicated in a culturally appropriate manner. All health groups should be involved in consultation and delivery of health services. Recognition of the Treaty of Waitangi by health providers is essential to impact on the levels of health inequalities among Maori that exist in New Zealand.

The results of this research support the continuation and development of the smoking cessation programme at the CWH colposcopy clinic. The results are to be disseminated at the World Colposcopy conference in October 2008 and the NZNO Women's Health Conference in 2009, and plans have been made to discuss these results with staff from Cervical Screening, Aukati Kai Paipa and the Southern Cancer Network later in 2008 to ensure health professionals benefit fully from the information obtained.

The researcher is also keen to extend this current research project on a nationwide scale, and potentially internationally, to determine whether rates for women who smoke and who attend colposcopy are as high elsewhere. If so the need for smoking cessation interventions to target women who smoke is highlighted. Length of time and number of cigarettes smoked could be asked in a prospective study, and the ability to identify different HPV types could be considered.

The results of this study confirm that the research questions have provided good evidence that women who smoked and presented at the CWH colposcopy clinic with CIN required more follow up and treatment than women who did not smoke. Maori and Pacific Island women were represented disproportionately at the CWH colposcopy clinic in 2001. The information obtained, while providing evidence-based practice to inform health professionals and women who attend colposcopy, may also generate further research to assist in reducing inequalities that exist within a specific area of the New Zealand Health care sector.

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APPENDIX A

SEARCH STRATEGY

A systematic method of literature searching was employed in the preparation of this thesis. An example of two of the search strategies used to find information relation to “The Effect of Cigarette Smoking on the Frequency of Colposcopy Visits, Treatments and Re-referrals”. From the key articles identified a citation search was carried out for subsequent citations to each reference.

Main search terms:

Carcinoma in situ, smoking, smoking cessation, tobacco use cessation, uterine cervical neoplasm’s, cervical intraepithelial neoplasia, sexually transmitted diseases, papillomavirus infections, uterine cervical neoplasm’s, colposcopy precancerous conditions carcinoma, squamous cell, health promotion.

Bibliographic databases:

Ovid Medline, Wiley Interscience: Cochrane Search, Ovid Embase, CINAHL.

Other sources:

Search engines - Google, Google Scholar, to locate relevant New Zealand and International information in relation to Government rerecords in relation to health promotion, cultural statistics, cervical cancer, smoking, cervical screening and HPV vaccines.

Search Strategies:

Example 1: Search Strategy - Ovid CINAHL 1982 to July Week 1 2007

1. Colposcopy (354)
2. Cervix neoplasm/ (2549)
3. Nursing literature, or cervix neoplasm, or Cervical intraepithelial neoplasia/ or Serial Publications/ (19402)
4. Nicotine replacement therapy/ for smoking cessation or adolescence or smoking/ or smoking intervention .mp. or smoking cessation programs/ (96190)

5. Cervix Neoplasm/ (2549)
6. 1 and 2 and 4 ((35)
7. from 7 keep 1 (1)
8. 2 and 5 and 4 (328)

Example 2: OVID MEDLINE 1996 to June Week 4 2007

1. Smoking/ (37641)
2. "tobacco use cessation" / or smoking cessation/ (9014)
3. (smok\$ or tobacco or nicotine).tw. (80480)
4. 1 or 2 or 3(88530)
5. Cervical intraepithelial neoplasia (3513)
6. (intraepithelial adj3 cervical).tw. (2105)
7. 5 or 6 (3980)
8. 4 and 7 (167)
9. sexual behaviour (12003)
10. 4 and 9 (445)
11. limit 10 to English language (418)

APPENDIX B
ETHICS APPROVAL

18 June 2007

Ms Jill Lamb
Canterbury DHB
Colposcopy
Christchurch Womens' Hospital
Private Bag 4711
Christchurch

Dear Ms Lamb

**Comparing the persistence and recurrence rate of cervical intraepithelial neoplasia (CIN) in smoking and non-smoking women who attended Christchurch Womens' Hospital (CWH) colposcopy clinic.
Investigator: Ms Jill Lamb**

Ethics Ref: URB/07/12/EXP

The above study has been given ethical approval by the Chairperson of Upper South B Regional Ethics Committee under delegated authority, as per the expedited review process for observational studies.

Certification

The Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is being carried out.

Accreditation

The Committee involved in the approval of this study is accredited by the Health Research Council and is constituted and operates in accordance with the Operational Standard for Ethics Committees, April 2006.

Progress Reports

The study is approved until 31 July 2009. The Committee will review the approved application annually and notify the Principal Investigator if it withdraws approval. It is the Principal Investigator's responsibility to forward a progress report covering all sites prior to ethical review of the project in **30 June 2008**. The report form is available on <http://www.newhealth.govt.nz/ethicscommittees>. Please note that failure to provide a progress report may result in the withdrawal of ethical approval. A final report is also required at the conclusion of the study.

Amendments

All amendments to the study must be advised to the Committee prior to their implementation, except in the case where immediate implementation is required for reasons of safety. In such cases the Committee must be notified as soon as possible of the change.

Please quote the above ethics committee reference number in all correspondence.

The Principal Investigator is responsible for advising any other study sites of approvals and all other correspondence with the Ethics Committee.

It should be noted that Ethics Committee approval does not imply any resource commitment or administrative facilitation by any healthcare provider within whose facility the research is to be carried out. Where applicable, authority for this must be obtained separately from the appropriate manager within the organisation.

Yours sincerely



Di Rutledge
Upper South B Regional Ethics Committee Administrator
Email: di_rutledge@moh.govt.nz

GLOSSARY

- Acetic Acid.....The acid most commonly associated with vinegar
- Adenocarcinoma.....A form of cancer that involves cells from the linings of the walls of many different organs of the body
- ASCUSNot usual, abnormal
- CytologyThe study of cells
- CytologistOne who specialises in cytology
- HistologyThe study of cells and tissue on the microscopic level
- NeoplasiaNew growth
- SpeculumAn instrument for dilating certain passages of the body, e.g. anc instrument used to open the vagina so the cervix can be visualised
- Oestrogen.....the female sex hormone
- Pathologist.....a person who examines changes caused by disease in body tissues including cells and organs
- Punch biopsyprocedure that involves obtaining a tissue specimen for macroscopic analysis to establish precise diagnosis

Definitions included from The On-line Medical Dictionary (<http://cancerweb.ncl.ac.uk.omd/>), January 2003.