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PREDICTING HOSPITAL ADMISSIONS OF SILVER CHAIN CLIENTS

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1 EXECUTIVE SUMMARY

This study builds on the work previously undertaken by Silver Chain in three separate studies investigating the hospital admissions of Silver Chain clients. This research was designed to update and extend the work already completed to not only provide up to date and accurate information on the rate of admission of community care clients to hospital but also, by looking at more than five years of data, allow us to determine how easily we could have predicted which clients would have frequent and/or particularly lengthy admissions.

1.1 Objectives

The study had three specific objectives, to:

- Identify those Silver Chain clients who were admitted to hospital during the five and a half year period 1 July 1999 through to 31 December 2004, and describe their admissions.
- Describe the demographic and clinical characteristics of the Silver Chain clients who experienced these hospital admissions.
- Determine whether any of the above characteristics could be use to predict in advance which community care clients were likely to have frequent and/or lengthy hospital stays.

1.2 The Data

The records of individuals who were Silver Chain clients at any time between 1July 1999 and 31 December 2004 were linked with hospital morbidity data obtained from the Data Linkage Unit (DOH). After data cleaning, the data set included the hospital admission records of 67,674 individuals who were Silver Chain clients at the time of their hospital admission. Clients were classified as current Silver Chain clients for the time period between their earliest start date and last end date. If they were admitted to and discharged from Silver Chain multiple times, this is not taken in to account. Therefore if a client was admitted and discharged from Silver Chain in 2002, 2003 and 2004, they would be considered current from 2002 to 2004.

1.3 Results

This report details the results of the analysis of hospital admissions of 67,674 individuals who were Silver Chain clients when they were hospitalised between 1 July 1999 and 31 December 2004. Approximately, 52,000 hospital admissions a year are attributed to Silver Chain clients throughout Western Australia.

During the time period analysed, clients were admitted to hospital a total of 286,185 times. On average, each client was admitted to hospital four times for an average length of stay (ALOS) of seven days. Half of all hospital admissions were to public hospitals in the metropolitan area. While two thirds of all admissions were elective, there were significantly more emergency admissions in rural hospitals (50%) compared to metropolitan hospitals (39%). In comparing public and private hospitals, as would be expected, private hospitals (23%) had significantly fewer emergency admissions than public hospitals (53%).

1.4 Clients' Characteristics

Just under 60% of clients admitted to hospital were female and their average age was 69 years. Only 1.6% of the clients admitted to hospital were Aboriginal or Torres Strait Islanders and just over 30% lived alone which is similar to Silver Chain's population as a whole.

On an individual basis, the mean Charlson Co-morbidity Index (CCI) score (highest score achieved by each client over all admissions; indicating increased risk of death in the next year) was 2.2. One third of all clients had a score of zero, indicating no increased risk of death, and 35% had a score of one or two.

Hospitalised male clients had a significantly higher mean CCI score than females (2.6 versus 1.9) indicating that as a group, they are significantly more at risk of dying within the following twelve months due to their co-morbid condition(s). In addition, aboriginal clients were significantly more at risk of dying within the following twelve months with their mean CCI score being higher than non-aboriginal clients (2.5 versus 2.2).

Clients admitted to hospital with a principal diagnosis from the Chapter Heading "Factors influencing health status and contact with health service" was the most frequently occurring principal diagnosis with 18% of all diagnoses attributed to this chapter heading. Diagnoses that were recorded under this included "Persons encountering health services for specific procedures and health care" which is not specifically a diagnosis, but included radiotherapy, chemotherapy, blood transfusions. The next most frequent was "Neoplasms"(13%) followed by "Diseases of the circulatory system" (10%).

1.5 Hospital Admission Characteristics

On an admission basis, the mean CCI score was 1.6 with almost half of all clients' admissions being scored as zero. A third of clients' admissions obtained a CCI score of one or two indicating increased risk of dying in the next year. The remaining 22% scored three or more, demonstrating higher relative risk of death within one year.

Clients who are admitted to hospital as an emergency admission had a significantly higher mean CCI score (2.3 versus 2.1; $F= 163.67$ (1, 67,672); $p < 0.001$).

Most referrals for admission were made by specialists or hospital based clinicians with only 12% of all referrals being from general practitioners.

1.6 Hospital Admissions LOS and Frequency of Admission

The ALOS for all admissions, including admissions of less than one day, was just under 8 days and, over the period of time analysed, on average, each client would be hospitalised four times. Therefore, during that time, each client would spend, on average 32 days in hospital.

When admissions of less than one day are removed from the analysis, the ALOS per admission increased to 13 days but the number of admissions over the analysis period decreased to just under three times. Without one day admissions, on average, clients spent 35 days in hospital during that time.

Analysis showed that as the CCI score increased from zero to five, the ALOS per admission increased 18 days. At a score of 6, the ALOS shortened. This reduction in the ALOS could be attributed to clients with advanced cancer receiving care from Silver Chain's Hospice Care Service who receive advanced nursing care in their homes rather than in hospital.

As the clients' CCI score increased from one to eight, so too did the number of admissions to hospital over the period analysed. The cumulative LOS over the period of analysis also increased as the clients' CCI score increased from zero to five. At a score of six, the cumulative LOS reduced as with the LOS of each admission.

Both ICD Chapter Headings "Mental and behavioural disorders" and "Injury, poisoning and other consequences of external causes" had, on average, LOS of more than two weeks which were the longest ALOS of all the Chapter Headings.

In total, Silver Chain clients' hospital admissions accounted for 1,085 hospital beds per day throughout Western Australia in both public and private hospitals. Without admissions of less than one day, they accounted for 1,021 hospital beds per day.

The majority of bed days (559 days) were in public hospitals in the metropolitan area. An additional 327 bed days were attributable to private hospitals in the metropolitan area. .

The principal diagnoses Chapter Headings that contributed to the most beds per day were "Injury, poisoning and other consequences of external causes" (153 beds per day), "Diseases of the circulatory system" (150 beds per day) and "Neoplasms" (143 beds per day).

1.7 Procedures

More than three quarters of hospital admissions were associated with a procedure. The most frequently occurring procedures were from the procedure Chapter "Non-invasive, cognitive and other interventions not elsewhere classified" (26%). Of this group of procedures, half were for "Generalised allied health interventions" including physiotherapy, occupational therapy and social work. The next most frequently occurring procedure chapter was that of "Chemotherapeutic and radiation oncology procedures".

"Procedures of the musculoskeletal system" were found to have the longest LOS of 15 days and also contributed the second most beds per day (137). The largest numbers of beds per day were used by clients who are recorded as having a procedure under the procedure chapter "Non-invasive, cognitive and other interventions not elsewhere classified" using 276 beds per day.

1.8 Prediction of High Hospital Usage

The most frequently admitted clients, clients with the longest hospital stays and clients with the longest cumulative hospital stays over the period analysed, were identified as the uppermost 10% of clients for each measure.

The impact of selected conditions and client characteristics on usage of hospitals was analysed to determine the odds of being in the top centiles for: number of admissions; LOS; and, cumulative LOS.

The following diagnoses were identified as being most frequently attributed to Silver Chain's clients:

- COPD
- Chronic Heart Disease
- Osteoporosis
- Diabetes
- Cerebral vascular disease
- Dementia
- Fracture

When considered individually, each of these conditions significantly increased the likelihood of a client being classified as a high hospital user, regardless of which definition was used.

1.8.1 Longest Hospital Admissions

Clients who had hospital admissions of 19 days or more were identified as clients with the longest admissions. This group of clients had an average LOS of 41 days. These long admissions made up 12% of all admissions but their combined LOS added to 53% of all the bed days equating to 571 beds per day.

Having one of the diagnoses listed above as being selected on the basis of being most common, was found to have a large impact on the likelihood of having had one of the longest hospital stays. The odds of being in the group with the longest hospital stays for a client with a diagnosis of diabetes is increased by 2 times while the odds for clients with dementia, osteoporosis and cerebral vascular disease are increased by 4 to 5 times. However, clients with a fracture were 8.5 times more likely to have had one of the longest hospital stays.

When client characteristics such as age, gender, being aboriginal, whether the client lives alone, Charlson Co-Morbidity Index and the number and type of chronic diseases a client has were adjusted for, the single best predictor of being in the group with the longest stays was having a diagnosis of fracture, the odds increasing almost eight times. The number of chronic disease diagnoses also had a large impact with the odds increasing up to 7 times if the client had three or more chronic diseases. Living alone also increased the odds of having the longest admissions.

1.8.2 Most Frequent Admissions

Clients who had been hospitalised nine or more times were identified as the most frequent users of hospitals. While being only 11% of the client sample this group of clients were admitted for 45% of all admissions and used 333 beds per day.

Clients with a diagnosis of any of the conditions identified as most common among our clients, apart from dementia, had increased odds of being a frequent user. The odds increased by 60% for clients with a fracture up to 2.8 times for clients with COPD.

When other contributing factors are adjusted for, the number of chronic diseases a person had doubled the odds of having had among the longest hospital stays, with the addition of each disease and for each point on the CCI, having increased the odds by 26%.

Specific diagnoses had different effects, with a diagnosis of fracture increasing the likelihood by 61% while diabetes, cerebral vascular disease or dementia reduced the chances of being among those with the most frequent admissions. The demographic characteristic most highly predictive of very frequent hospital admissions was living alone, while not having a carer increased the likelihood to a small extent.

1.8.3 Longest Cumulative Admissions

Clients with cumulative admissions adding up to a cumulative LOS of 81 days or more were considered to be the longest stayers. These individuals represent the top 10% of the total client group, in terms of cumulative LOS and on average spent 142 days in hospital over the period analysed. Their cumulative admissions added up to 45% of all bed days and equated to 477 beds per day.

Clients with one of the most common diagnoses were more likely to be among the longest stay group than clients with other diagnoses, with the odds of spending considerable time in hospital increasing 3 times if the client has dementia and more than 5 times if the client has a diagnosis of osteoporosis.

As with the longest hospital admissions, when all other factors are held constant, diagnoses of a fracture increases the odds significantly of having the longest cumulative hospital stays. The odds of spending a long period in hospital are increased three times for clients with a fracture and 1.5 times for clients with a diagnosis of osteoporosis and also a fracture. As with the longest hospital admissions and the most frequent admissions, the number of chronic diseases influences the odds of the longest cumulative hospital admissions with the odds increasing from almost three times with one chronic disease and up to more than eight times with three or more chronic diseases. Living alone increases the risk of having one of the longest cumulative hospital stays by 27% while other demographic characteristics have little influence. Diagnoses of dementia, COPD, chronic heart disease or diabetes reduce the odds of having the longest cumulative admissions by 15 to 37%.

1.8.4 Fractures

As a fracture increases the likelihood of very long and frequent hospital stays and cannot be predicted, the odds of having a fracture if the client also has a diagnosis of osteoporosis was examined. This analysis showed that individuals with a diagnosis of osteoporosis were 10.79 times more likely to have an admission associated with a diagnosis of a fracture than individuals without an osteoporosis diagnosis. Although it is not possible to know whether the fracture preceded the diagnosis of osteoporosis or vice versa, it underscores the significance of the association and the potential for early identification and treatment of osteoporosis to contribute to reductions in hospital use by reducing fracture rates.

1.9 Conclusions and Recommendations

Analysis of this data shows that a large number of Silver Chain clients are admitted to hospital each year. In 2003-2004 the total number of hospital beds available in WA was 7,976 (AIHW, 2005) and each day a Silver Chain client utilised 13.6% of all of the beds. Of the 4,955 beds in the public system, Silver Chain clients utilised 713 beds (14.4%). Silver Chain clients are admitted for a wide variety of reasons and many are in hospital frequently or for a very long time.

Regardless of the diagnosis for which clients were admitted to hospital, a large percentage were recorded as having had a procedure classified under the chapter of "non-invasive, cognitive and other interventions not classified elsewhere". Of these, half were for "generalised allied health interventions". This group of admissions used 276 hospital beds per day over the period analysed. The question arises as to why individuals are being admitted to hospital for this type of procedure when allied health services could be provided more cost effectively in arguably safer and more appropriate settings, their homes.

Recommendation 1: Investigate what type of services are provided in hospitals under the "generalised allied health interventions" procedures to determine whether they can be provided in a more cost effective manner in the community.

This data clearly shows that having a diagnosis of one or more of a select group of chronic conditions is predictive of having very long and very frequent hospital stays. This is demonstrated by this data both as a simple calculation of the number of chronic diseases a person has, and in terms of their score on the Charlson Co-morbidity Index. Currently, diagnostic information is not routinely collected by Silver Chain for all clients and where diagnosis data is routinely collected, for example post acute services and HATH, it is linked to the service episode and to the actual service being provided (eg wound care, cellulitis, bacterial infection). As a result clients with chronic diseases are unlikely to have that disease recorded on their client record unless the service provided by Silver Chain was directly related to, or could be influenced by, the disease. However, the vast majority of clients with any of the diseases analysed in this report would have been aware of having the disease since they were first diagnosed. Documenting this data on the client's record could be a simple as asking clients at referral or review if they had been diagnosed with any one of the diseases analysed.

Recommendation 2: Collection of diagnostic information about a selection of chronic diseases should be investigated as an indicator of being at risk of long and frequent hospital admissions. Targeted health management strategies can then be implemented to assist these clients to improve or better maintain their health and so avoid hospitalisation.

The link between osteoporosis and fractures is well established and this analysis shows that individuals with fractures have a hospital stay of more than three weeks on average and over the time period analysed, averaged 61 days in hospital. Additionally clients with a diagnosis of osteoporosis stay in hospital for just under three weeks for each admission and over time, spend on average, eleven weeks in hospital. Clearly this group of clients are at risk of spending a very long time in hospital and the analysis shows that individuals with a diagnosis of osteoporosis are more than ten times more likely to have an admission associated with a fracture. While we cannot predict when a client will fracture, the risk can be reduced by the treatment of osteoporosis and reduction of falls risks. Diet, exercise and medication have all been found to reduce the risk of fracture for individuals who have osteoporosis. Recent research undertaken in Silver Chain found that almost all of the clients surveyed had multiple risk factors for osteoporosis but only a third reported a diagnosis of osteoporosis and even fewer were receiving any treatment. This research also showed that even if a diagnosis of osteoporosis was made following a fracture, clients' GPs were not following the recommended guidelines for the treatment of osteoporosis and there was very little evidence that the condition was discussed with clients (Smith, Lewin et al, 2006).

Recommendation 3: Assist Silver Chain clients at risk of osteoporosis to assess their risk and provide information regarding osteoporosis and falls risk reduction.

2 BACKGROUND

Hospital admissions represent a significant cost to the Western Australian community. This study was developed to facilitate a better understanding of the characteristics of community care clients who have frequent and/or excessively lengthy hospitalisations and to determine whether it is possible to identify these persons in advance. Targeted health management strategies can then be implemented to assist these people to improve or better maintain their health and so avoid hospitalisation.

Most health care takes place in the community in which the patient lives. It is a commonly held belief that the critical bed shortage and limitations of services currently experienced by acute care facilities can be significantly reduced by harnessing and enhancing community capacity and building on those services already in the community. The Reid Report (2004) recommends avoiding unnecessary hospital admissions by providing better integrated primary care services, and community and home based care (Western Australian Department of Health, 2004). The objectives of this study relate directly to this initiative in terms of determining whether early identification of those community care clients who are likely to become hospital "frequent flyers" is possible.

This study builds on work previously undertaken by Silver Chain. The *Hospital Admissions Study* conducted by Silver Chain in 1998 identified several issues surrounding hospital admissions within the Silver Chain client population that were of concern, and that necessitated further inquiry. One of the key findings was that clients who were receiving care for an acute episode on top of an ongoing need for maintenance home care services were more than twice as likely to be admitted to hospital as those who were receiving maintenance support only.

Other findings were that falls, cardiovascular and respiratory disease accounted for the largest numbers of admissions. One of the project's recommendations was "to identify, develop and promote alternative service models (such as Hospital in the Home) for the delivery of community-based, acute care services..." (Calver et al 1998).

This work was further extended in a project completed by Silver Chain in 2003 which formed part of the *Continuing Care Linkage Study* and which examined inter-sectoral communication in client care with particular reference to hospital admissions among Silver Chain clients. This project which linked hospital morbidity data to Silver Chain client data, identified that there were gaps in communication between hospitals and Silver Chain and whilst it depended on the service being received, Silver Chain was overall only aware of 40% of its clients' admissions to hospital.

A third study was conducted in 2005, using only Silver Chain data, looked specifically at hospitalisations of clients with chronic disease between 1 April 2004 and March 31 2005. This study found that nearly one quarter of the 3,768 clients with a recorded diagnosis of congestive heart failure, diabetes or chronic obstructive pulmonary disease had a period of hospitalisation recorded on their client record during this period.

The present study was designed to update and extend the work already completed to not only provide up to date and accurate information on the rate of admission of community care clients to hospital but also, by looking at more than five years of data, allow us to determine how easily we could have predicted which clients would have frequent and/or particularly lengthy admissions.

3 OBJECTIVES

The study had three specific objectives, to:

- Identify those Silver Chain clients who were admitted to hospital during the 5 and a half year period 1 July 1999 through to 31 December 2004, and describe their admissions.
- Describe the demographic and clinical characteristics of the Silver Chain clients who experienced these hospital admissions.
- Determine whether any of the above characteristics could be use to predict in advance which community care clients were likely to have frequent and/or lengthy hospital stays.

4 ANALYSIS

Analysis was undertaken using STATA 9 and 10[1]. Descriptive statistics were used to describe the dataset and, depending on the measurement scale, chi squared analysis and analysis of variance were used to determine differences between groups. Logistic regression was then used to identify which of the demographic and clinical characteristics were significant predictors of hospital admission.

5 THE DATA

The records of individuals who were Silver Chain clients at any time between 1July 1999 and 31 December 2004 were linked with hospital morbidity data obtained from the Data Linkage Unit (DOH). After data cleaning, the data set included the hospital admission records of 67,674 individuals who were Silver Chain clients at the time of their hospital admission. Clients were classified as current Silver Chain clients for the time period between their earliest start date and last end date. If they were admitted to and discharged from Silver Chain multiple times, this is not taken in to account. Therefore if a client was admitted and discharged from Silver Chain in 2002, 2003 and 2004, they would be considered current from 2002 to 2004.

Admissions of less than one day were included in the analysis, unless the admission was for dialysis, and rounded up to one day.

Intra-hospital admissions and separations were included in the original data, but were deemed not useful for this analysis and were therefore removed from the dataset. The separation dates and separation destinations were adjusted to reflect the entire hospital admission from when the client was admitted to hospital from home to when they were discharged either to home, residential facility or deceased. The length of the admission was therefore for the entire length of time spent in hospital.

[1] Stata Corporation, 2005, College Station, TX

Diagnosis has been classified according to ICD-10[2]. Each hospital admission is associated with up to 21 diagnoses with the first diagnosis field being the primary diagnosis or the diagnosis for which the individual was hospitalised. When analysing the data to examine the diagnostic characteristics of the hospital frequent flyers, the diagnoses of interest could occur in any of the diagnostic fields. To identify those with the longest cumulative length of admission individual admissions were aggregated. To examine the association of chronic diseases with long and frequent admissions, whether or not the diagnosis was recorded against a particular admission, an identifier was added to all the admissions for each client.

6 RESULTS

6.1 Clients Admitted

As already described, 67,674 Silver Chain clients were admitted to hospital in the period 1 July 1999 to 31 December 2004. During this period, these clients had 286,185 admissions. Table 1 shows that the number of admissions each year have varied little since 2001 when there was a small jump up in the numbers compared to 2000.

Table 1: Number of Admissions Each Year of the Study Period

Admission Year	Number	Percentage
1999[3]	24,178	8.45
2000	48,148	16.82
2001	52,435	18.32
2002	54,030	18.88
2003	53,747	18.78
2004	53,646	18.75
Total	**286,184**	**100.00**

6.2 Hospital Admissions

6.2.1 Type

The majority of admissions were to metropolitan hospitals and there was a significant difference in the ratio of public to private hospital admissions in the metropolitan admissions as compared to rural hospital admissions. A larger proportion of admissions in the country were to public hospitals while more were to private hospitals in the metropolitan area ($\chi^2(1, N = 286{,}184) = 1{,}500$, $p > .05$). Overall 38% of admissions were to private hospitals (Table 2). Half of all admissions (48% n=138,751) were in public hospitals in the metropolitan area.

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[2] ICD-10 – International Classification of Disease
[3] Six months data only

Table 2: Rural and Metropolitan Hospitals by Public or Private

Hospital Type	Metropolitan	Rural	Total
Public	138,751	39,237	177,988
	60.42%	69.38%	62.19%
Private	90,880	17,317	108,197
	39.58%	30.62%	37.81%
Total	**229,631**	**56,554**	**286,185**
	100.00%	**100.00%**	**100.00%**

Nearly two thirds (59%) of admissions were elective (Table 3) and there was a difference in the proportion of emergency or elective admissions between metropolitan and rural hospitals ($\chi^2(1,\ N = 286{,}184) = 2{,}300,\ p > .05$). Whereas the proportions of elective and emergency admissions in rural hospitals were fairly equal the ratio of elective to emergency admissions in metropolitan hospitals was about 3:2. Not surprisingly, the type of admission was found to be related to the type of hospital a client was admitted to. Table 4 shows that just over half of public hospital admissions were emergency admissions whereas only one quarter of private hospital admissions were emergency. These differences in proportions were significantly different ($\chi^2(1,\ N = 286{,}184) = 25{,}000,\ p > .05$).

Table 3: Emergency Admissions

Type	Metropolitan	Rural	Total
Elective	139,732	28,201	167,933
	60.85%	49.87%	58.68%
Emergency	89,899	28,353	118,252
	39.15%	50.13%	41.32%
Total	**229,631**	**56,554**	**286,185**
	100.00%	**100.00%**	**100.00%**

Table 4: Private and Public Hospital Emergency Admissions

Type	Public	Private	Total
Elective	84,341	83,592	167,933
	47.39%	77.26%	58.68%
Emergency	93,647	24,605	118,252
	52.61%	22.74%	41.32%
Total	**177,988**	**108,197**	**286,185**
	100.00%	**100.00%**	**100.00%**

Almost all, 96.41%, of admissions were from the client's home and, as seen in Table 5, 38% of admissions were as a result of a referral from a private medical practice, 24% from the Emergency Department and a further 22% were from the hospital waiting list.

Table 5: Referral Source

Referral Source	Number	Percentage
Private medical practice (includes specialist)	52,599	37.92
Emergency department	33,651	24.26
Waiting list	30,539	22.02
Other/unknown	14,876	10.72
Outpatient department	4,736	3.41
Community Health Service	1,328	0.96
Inter-hospital transfer	773	0.56
Statistical admission/type change	98	0.07
Nursing Home	66	0.05
Psychiatric facility	53	0.04
Total	**138,719**[4]	**100.00**

Table 6 shows that 86% of referrals to hospital were made by specialists or hospital based clinicians. Only 11.53% of admissions were as a result of referrals from a GP.

Table 6: Medical Referral Type

Type Of Medical Referral	Number	Percentage
Specialist clinician	87,770	36.63
Emergency department clinician	70,829	29.56
Outpatient department clinician	30,499	12.73
GP	27,626	11.53
Hospital clinician (readmission)	16,970	7.08
Community health clinician	4,249	1.77
Other	1,618	0.68
Statistical admission/type change	71	0.03
Total	**239,632**	**100.00**

Table 7 shows that almost all of the admissions resulted in the client being discharged to their home. While 3.3 % of clients died in hospital, only 1.4% resulted in a transfer to a residential aged care facility.

[4] Please note that there was a lot of missing data for this table with only about 50% of admissions having this information.

Table 7: Discharge Destination of Admissions

Discharge Destination	Number	Percentage
Home/other	266,209	93.02
Deceased	9,478	3.31
Transfer to residential aged care service	3,928	1.37
Transfer to acute hospital	2,339	0.82
Transfer to other health care accommodation	1,353	0.47
Left against medical advice	1,024	0.36
Statistical discharge from leave	943	0.33
Statistical type change	800	0.28
Transfer to psychiatric hospital	111	0.04
Total	**286,185**	**100.00**

6.2.2 Admission Length and Frequency of Admissions

For all of the admissions the average length of stay (LOS) was 7.62 days with the median LOS being 2 days (Table 8). There is a large range in LOS from less than one day to 1,250 days (41.66 months or 3.5 years). When the LOS for each client's admissions are aggregated, the mean cumulative LOS is 32.23 days meaning that on average, each of the 67,674 clients spent 32 days in hospital during the period analysed. These 32 days were on average spread between 4.23 admissions to hospital during that time. Over the period analysed, Silver Chain clients occupied an average of 1,085 hospital beds per day (Table 9)[5].

When admissions of less than one day are removed, the average LOS is 13 days with the median LOS being 7. The mean cumulative LOS of admissions of more than one day is 35 days and, on average, each client had just under 3 admissions to hospital of more than one day over the period analysed (Table 8). As seen in table 9, the number of beds per day used by Silver Chain clients over the time period analysed reduced to 1,021 when admissions of less than one day were removed.

Table 8: Length of Admission and Number of Admissions

		LOS (per admission)	Cumulative LOS	Total Number of Admissions
All admissions	Mean	7.62	32.23	4.23
	Std Dev	16.93	49.27	6.20
	Median	2	15	2
	Min	1	1	1
	Max	1,250	1,425	247
	Sum	2,180,906	2,180,906	286,185
Admissions > 1 day	Mean	13	35.5	2.72
	Std Dev	21.4	50.8	2.97
	Median	7	18	2
	Min	2	2	1
	Max	1,250	1,424	132
	Sum	2,052,035	2,052,035	157,331

[5] The number of beds per day was calculated by totalling the LOS of each client and then dividing it by the total number of days analysed.

Table 9: Number of Beds Per Day

	Sum (Days)	Beds Per Day
Cumulative LOS (All admissions)	2,180,906	1,085.0
Cumulative LOS > 1 day	2,052,035	1,020.9

Tables 10 and 11 show the average number of beds occupied per day by Silver Chain clients in both metropolitan and rural public hospitals and private hospitals. Table 10 shows the number of beds for all admissions while table 11 shows the number of beds for admissions longer than one day.

Table 10: Number of Beds Per Day Public Hospitals

Area	Hospital Type	Mean LOS	Std Dev	Median LOS	Sum (days)	Beds Per Day
Metropolitan	Public	8.10	17.40	2	1,123,750	559.1
	Private	7.24	13.70	2	657,726	327.2
	Total	**7.76**	**16.10**	**2**	**1,781,476**	**886.3**
Rural	Public	7.94	23.20	3	311,351	154.9
	Private	5.09	9.07	1	88,061	43.8
	Total	**7.06**	**20.00**	**3**	**399,412**	**198.7**

Table 11: Number of Beds Per Day for LOS > 1 Day

Area	Hospital Type	Mean LOS	Std Dev	Median LOS	Sum (Days)	Beds Per Day
Metropolitan	Public	14.00	21.90	7	1,060,632	527.7
	Private	12.80	17.00	8	614,926	305.9
	Total	**13.50**	**20.20**	**8**	**1,675,558**	**833.6**
Rural	Public	11.60	28.10	6	297,716	148.1
	Private	9.82	11.70	6	78,761	39.2
	Total	**11.20**	**25.20**	**6**	**376,477**	**187.3**

6.3 Demographics

Table 12 shows that just under 60% of Silver Chain's clients who were hospitalised in the period, were female. This reflects the proportion of the Silver Chain client population who are female eg in 2006, 61% of our clients were female (Smith & Haslehurst, 2006).

Table 12: Gender of Hospitalised Clients

Gender	Number	Percentage
Male	27,835	41.13
Female	39,839	58.87
Total	**67,674**	**100.00**

The mean age of clients on admission was 69.37 years, ranging from less than a year old to more than 100 years (Table 13). Figure 1 below shows that the age at admission is skewed toward older clients and this is reflected in the median age of 74. The age profile of the clients admitted to hospital is similar to the age profile of all Silver Chain clients (Smith & Haslehurst, 2006).

Table 13: Age of Hospitalised Clients

	Age
Mean	69.37
Standard Deviation	17.84
Median	74
Min	0
Max	105

Figure 1: Distribution of Age

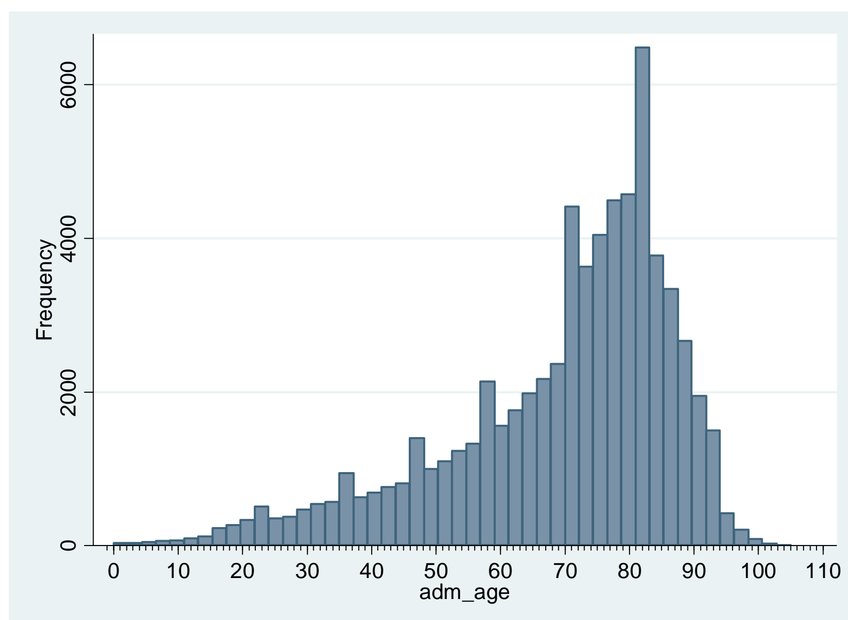


Table 14 shows that fewer than 2% of clients admitted to hospital were Aboriginal or Torres Strait Islanders which again is representative of Silver Chain's client population (Smith & Haslehurst, 2006).

Table 14: Aboriginal and Torres Strait Islanders

Aboriginal	Number	Percentage
Aboriginal	1,117	1.65
Non Aboriginal	66,557	98.35
Total	**67,674**	**100.00**

Table 15 shows that one third of the clients hospitalised lived alone. The percentage of clients who live alone is smaller in this client population than the general Silver Chain client population with 45% of clients reporting no carer (Smith & Haslehurst, 2006).

Table 15: Clients Who Live Alone

Live Alone	Number	Percentage
No	45,771	67.64
Yes	21,902	32.36
Total	**67,673**	**100.00**

6.4 Clinical Characteristics of Clients

6.4.1 Charlson Co-morbidity Index

The Charlson Co-morbidity Index (CCI) (Charlson, Pompei et al. 1987) is a weighted index which takes into account the number and seriousness of co-morbid diseases in order to predict the mortality of individuals within a year. A list of diagnoses were weighted according to their relative risk of death within one year and totalled for each client to compute an index score. A score of zero indicates that the individual has no risk of death attributable to a pre-existing co-morbid condition. As the CCI score increases, so too does the risk of mortality.

The CCI was calculated for each client's admission and also the highest CCI admission score was calculated for each client.

6.4.1.1 Charlson Co-morbidity Score for Each Admission

Table 16 shows the mean CCI per admission. The mean CCI per admission is 1.6 while the median CCI is 0.

Table 16: Charlson Co-morbidity Index for Each Admission

	Charlson Co-morbidity Index
Mean	1.62
STD DEV	2.14
Median	1
Min	0
Max	15

Figure 2 and Table 17 show the percentage of admissions for each CCI score. Almost half of all admissions have a CCI of 0 indicating that the individuals for these admissions have no risk of death in the following 12 months attributable to any of the co-morbid conditions. Thirty-two per cent of admissions have a CCI of one or two indicating an increased risk of mortality. The remaining 21% have a CCI of 3 or more.

The CCI data described in the Table 17 and figure 2 show a relatively large percentage of admissions with a score of six. This would mean that this group of clients would have a much increased risk of dying within the next twelve months. This large percentage can be explained by the inclusion of clients of Silver Chain's Hospice Care Service in this analysis, all of whom are terminally ill and the majority of whom are dying of cancer. A score of 6 on the CCI is given for individuals with a diagnosis of metastatic cancer.

Figure 2: Charlson Co-morbidity Index Score for Each Admission

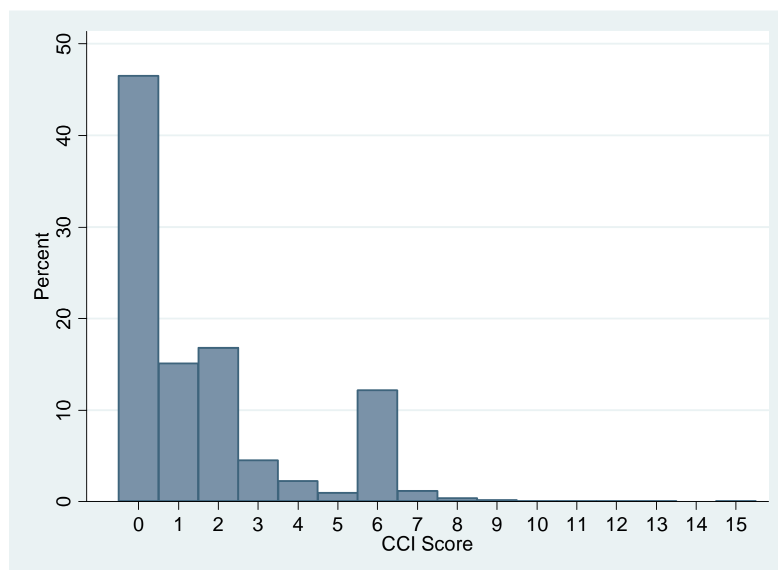
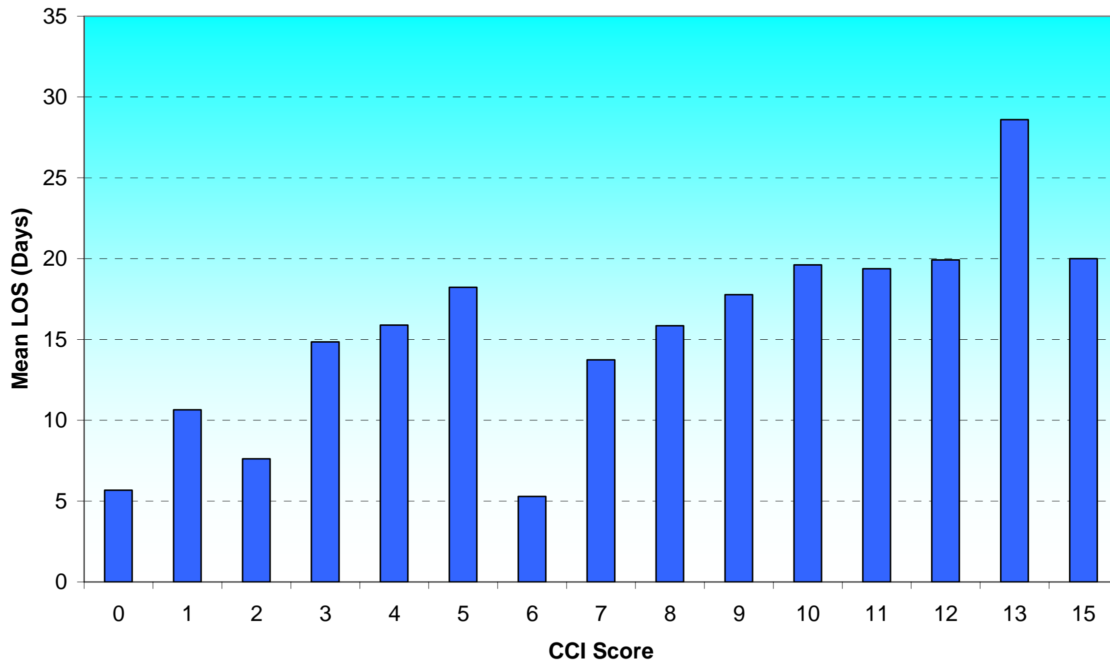


Table 17: Percentage of Admissions by Charlson Co-morbidity Score

Charlson Co-morbidity Index	Number	Percentage
0	133,117	46.51
1	43,184	15.09
2	48,068	16.80
3	12,931	4.52
4	6,354	2.22
5	2,676	0.94
6	34,773	12.15
7	3,272	1.14
8	1,146	0.40
9	437	0.15
10	156	0.05
11	52	0.02
12	13	0.00
13	5	0.00
15	1	0.00
Total	**286,185**	**100.00**

Figure 3 shows the mean LOS per admission by CCI for that admission. It can be seen that as the score on the Charlson index increases, so too does the LOS of each admission. This does not however apply to a score of 6 where the mean LOS is substantially shorter than for scores of 5 or 7. This is no doubt due to the availability of our home hospice service.

Figure 3: Mean Length of Stay per Admission by Charlson Co-morbidity Index Score



6.4.1.2 Charlson Co-morbidity Index for Each Client

Many of the clients admitted to hospital were admitted on multiple occasions. The CCI was calculated for each admission. To obtain a CCI score for each client, the highest admission CCI was used. For example a client may have had three admissions with CCI scores being 0, 2 and 6. In this case the score of 6 was used as the maximum CCI.

Table 18 below shows the average maximum CCI score for each client was 2.21 and the median was 2. Figure 4 and Table 19 show that a third of the clients had a CCI maximum of zero. Thirty five per cent had a CCI max score of two or three.

Table 18: Maximum Charlson Co-Morbidity Index Score

	Maximum Charlson Co-Morbidity Index
Mean	2.21
STD DEV	2.35
Median	2
Min	0
Max	15

Figure 4: Maximum Charlson Co-morbidity Index Score Distribution

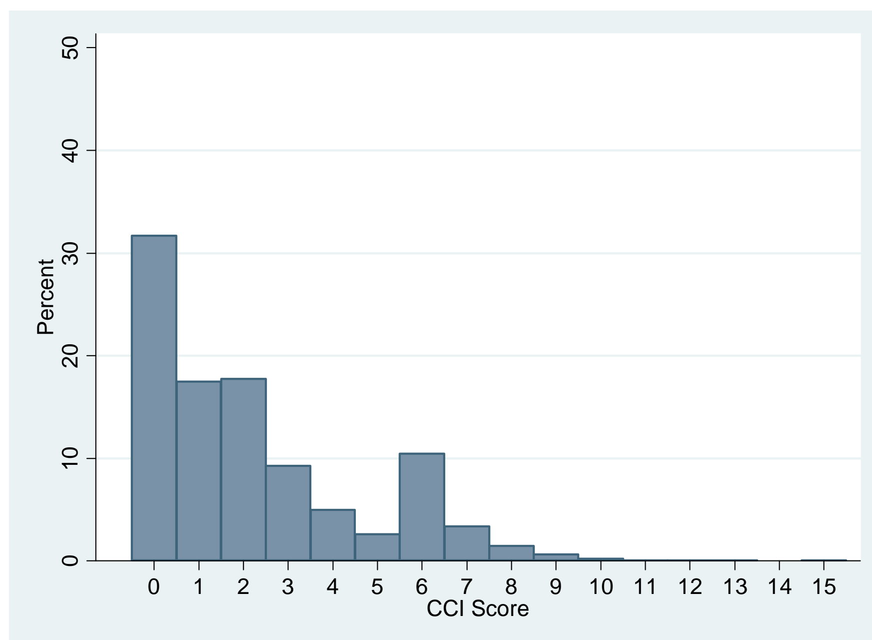


Table 19: Maximum Percentage of Charlson Co-morbidity Index Score

Maximum CCI	Number	Percentage
0	21,430	31.67
1	11,838	17.49
2	12,014	17.75
3	6,264	9.26
4	3,364	4.97
5	1,741	2.57
6	7,087	10.47
7	2,280	3.37
8	996	1.47
9	433	0.64
10	149	0.22
11	52	0.08
12	17	0.03
13	7	0.01
15	1	0.00
Total	**67,673**	**100.00**

Figure 5 below shows the mean number of hospital admissions per client by their CCI score. The figure clearly shows an increase in the mean number of admissions up to a CCI score of 8. After this score, the number of admissions remains relatively constant until a score of 14 is reached. The scores of 14 and 15 are attributed to only eight clients.

Figure 5: Mean Number of Admissions by Charlson Co-Morbidity Index

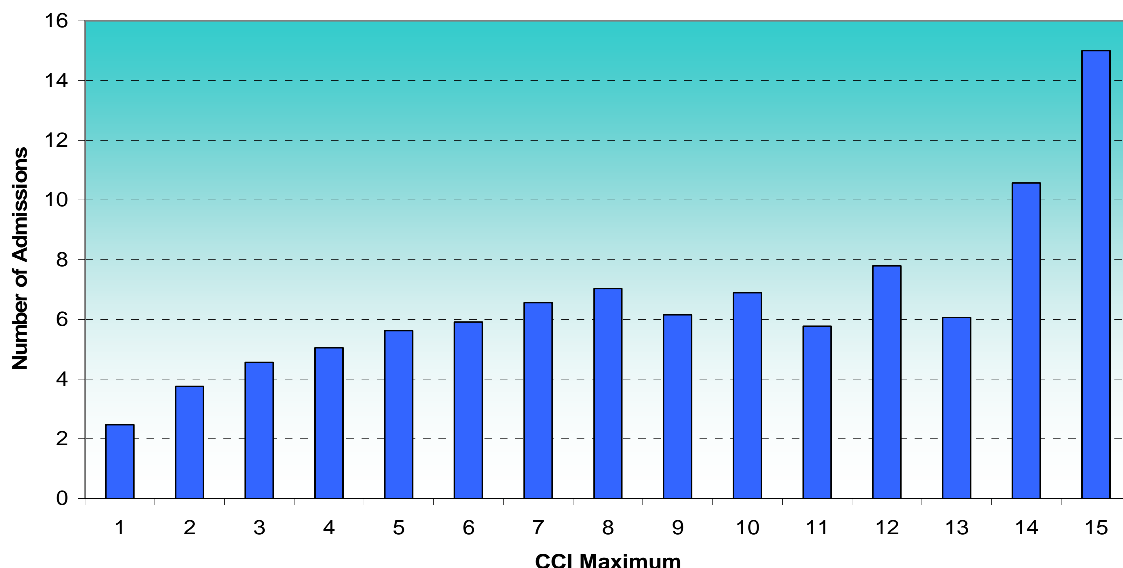
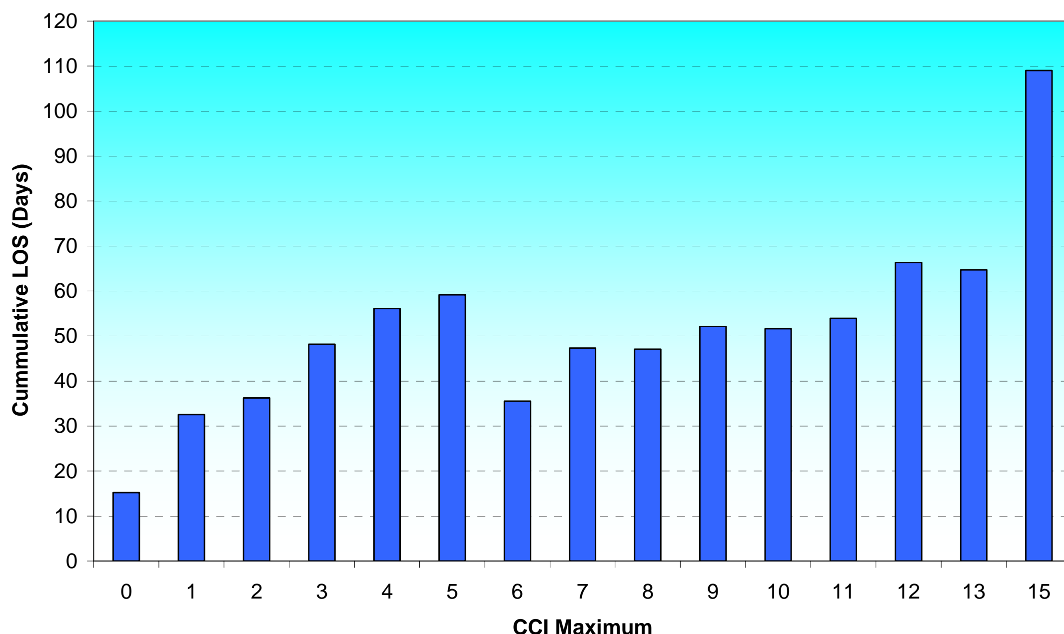


Figure 6 below shows the mean cumulative LOS for each of the CCI scores. It can be seen that there is a gradual increase in the total amount of time that clients spend in hospital as their CCI score increases up to 5.

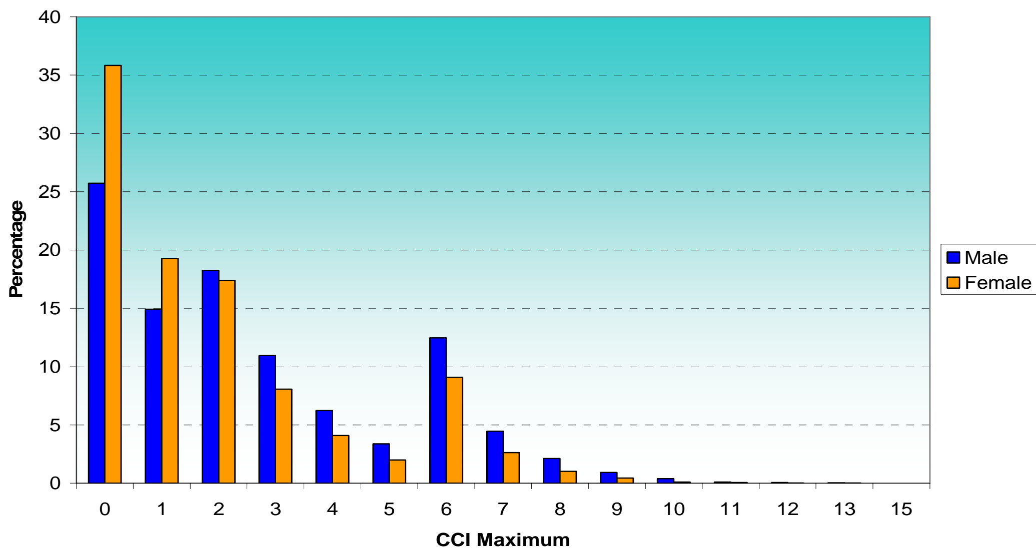
Figure 6: Mean Cumulative Length of Stay by Maximum CCI



6.4.2 Charlson Co-morbidity Index – Differences Associated with Client Demographics and Admission Types

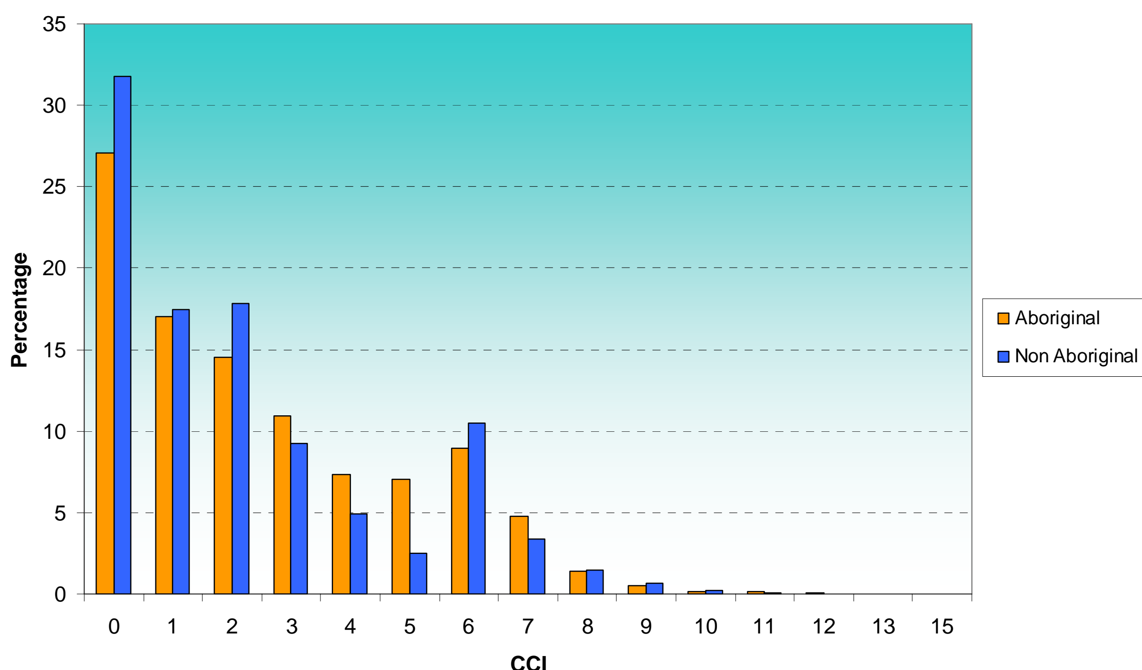
Figure 7 below shows that a larger percentage of female compared to male clients have a CCI of 0 and 1 and the difference in their mean scores is statistically significant. Analysis of variance shows that males have a significantly higher mean CCI than females (2.6 vs 1.9; F= 1,565.21 (1, 67,672); $p < 0.001$).

Figure 7: Percentage of CCI Score by Gender



Additionally, Aboriginal clients have a significantly higher CCI than non Aboriginal clients (2.5 versus 2.2; F= 19.25 (1, 67,672); $p < 0.001$). Figure 8 shows that a smaller proportion of Aboriginal clients have a CCI score of one to three than non-Aboriginal clients.

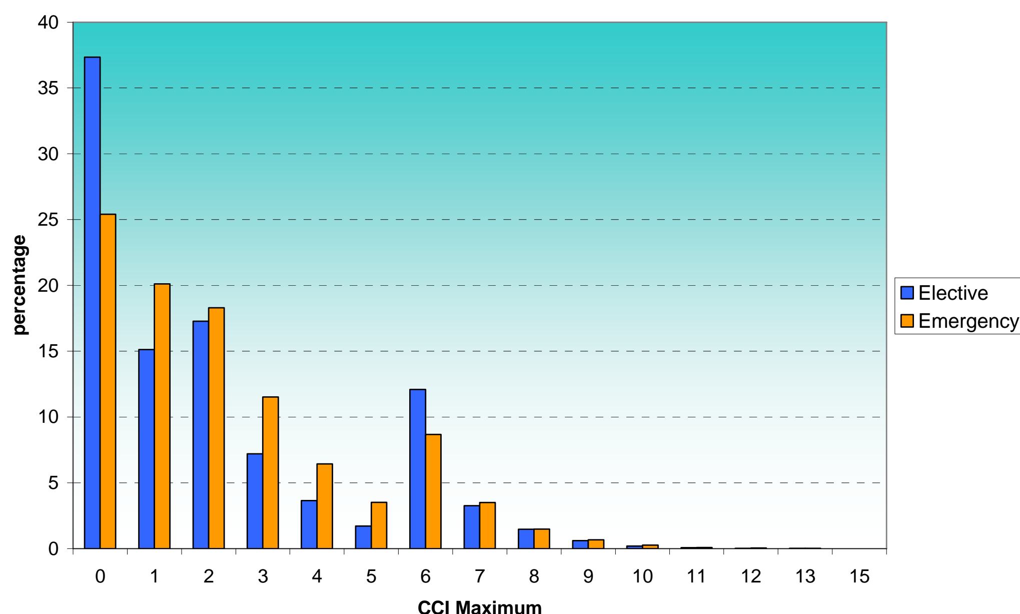
Figure 8: Charlson Co-morbidity Index Score by Aboriginality



When we examine CCI as a characteristic of an admission rather than of a client, we find that there is a greater likelihood that an admission was elective the lower the CCI score, or expressed the other way that emergency admissions have a significantly higher CCI score than elective admissions (2.3 versus 2.1; F= 163.67 (1, 67,672); $p < 0.001$).

Admissions with CCI scores of six however are again anomalous as they are more likely to be elective. This seeming anomaly is again due to a CCI of 6 being given to people with metastatic cancer who are cared for by our Hospice Care Service which aims to minimise emergency hospital admissions.

Figure 9: Charlson Co-morbidity Index Score by Admission Type



6.4.3 Diagnosis

The reason for admission to hospital is described and coded in ICD-10 using the principle diagnosis. ICD-10 has 22 chapters as described below. Each chapter has a number of related diagnoses. The data from the hospital morbidity data set did not include diagnoses from chapters 20 or 22. The following analysis is of the principal diagnoses for each client's admissions.

Chapter	Title
I	Certain infectious and parasitic diseases
II	Neoplasms
III	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
IV	Endocrine, nutritional and metabolic diseases
V	Mental and behavioural disorders
VI	Diseases of the nervous system
VII	Diseases of the eye and adnexa
VIII	Diseases of the ear and mastoid process
IX	Diseases of the circulatory system
X	Diseases of the respiratory system
XI	Diseases of the digestive system
XII	Diseases of the skin and subcutaneous tissue
XIII	Diseases of the musculoskeletal system and connective tissue
XIV	Diseases of the genitourinary system

XV	Pregnancy, childbirth and the puerperium
XVI	Certain conditions originating in the perinatal period
XVII	Congenital malformations, deformations and chromosomal abnormalities
XVIII	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified
XIX	Injury, poisoning and certain other consequences of external causes
XX	External causes of morbidity and mortality
XXI	Factors influencing health status and contact with health services
XXII	Codes for special purposes

Table 20 shows the number of admissions that had a principal diagnosis from each chapter heading. Chapter XXI (Factors influencing health status and contact with health services) had the greatest number of admissions mainly falling under the classification of "Persons encountering health services for specific procedures and health care". When this is broken down further, 66% were for other medical care. This is not specifically a diagnosis, but includes radiotherapy, chemotherapy, blood transfusions.

Chapter II Neoplasms was the second most frequently occurring admission diagnosis. The most commonly occurring diagnoses within this chapter were skin cancers and secondary neoplasms. The third most common chapter was IX, Diseases of the circulatory system, with the most common diagnosis being "other forms of heart disease" which includes heart failure, and ischemic heart disease.

Appendix I describes the chapters in detail both in terms of numbers of diagnoses across all diagnosis fields and the number of clients with each diagnosis.

Table 20: The Number of Admissions for Each Chapter Heading

Chapter	Number	Percentage
Chapter I	2,850	1.00
Chapter II	37,753	13.19
Chapter III	5,653	1.98
Chapter IV	10,045	3.51
Chapter V	6,458	2.26
Chapter VI	6,812	2.38
Chapter VII	10,610	3.71
Chapter VIII	791	0.28
Chapter IX	29,424	10.28
Chapter X	18,655	6.52
Chapter XI	24,960	8.72
Chapter XII	8,807	3.08
Chapter XIII	20,777	7.26
Chapter XIV	12,098	4.23
Chapter XV	888	0.31
Chapter XVI	8	0.00
Chapter XVII	232	0.08
Chapter XVIII	16,527	5.77
Chapter XIX	22,035	7.70
Chapter XXI	50,802	17.75
Total	**286,185**	**100.00**

Table 21 shows there is wide variability in the mean LOS depending on the principal diagnosis. Chapter VII (Diseases of the Eye) has the shortest LOS of just over one day whereas Chapters V (Mental and behavioural disorders) and XIX (Injury, poisoning and certain other consequences of external causes) have average LOS of more than two weeks. Chapter XVI "Certain conditions originating in the peri natal period" has a very long average LOS, but is based on 8 admissions only. Figure 10 illustrates this information graphically.

Table 21: Mean LOS Per Admission by ICD-10 Chapter Heading

Chapter	Mean LOS (Days)	Std Dev	Median	Min	Max
Chapter I	11.32	16.64	6.00	1.00	237.00
Chapter II	7.74	12.43	3.00	1.00	359.00
Chapter III	3.90	8.18	1.00	1.00	172.00
Chapter IV	9.65	20.57	3.00	1.00	644.00
Chapter V	16.97	36.49	7.00	1.00	1,250.00
Chapter VI	10.59	24.79	3.00	1.00	959.00
Chapter VII	1.40	2.50	1.00	1.00	80.00
Chapter VIII	4.94	12.29	2.00	1.00	192.00
Chapter IX	10.40	20.03	5.00	1.00	901.00
Chapter X	10.31	14.18	7.00	1.00	523.00
Chapter XI	5.99	12.65	2.00	1.00	731.00
Chapter XII	9.23	21.69	4.00	1.00	1,065.00
Chapter XIII	8.79	14.75	4.00	1.00	365.00
Chapter XIV	6.24	13.70	3.00	1.00	794.00
Chapter XV	5.06	5.03	4.00	1.00	52.00
Chapter XVI	71.25	79.67	39.50	1.00	190.00
Chapter XVII	6.84	10.87	2.00	1.00	78.00
Chapter XVIII	5.67	11.60	2.00	1.00	471.00
Chapter XIX	14.20	21.29	7.00	1.00	374.00
Chapter XXI	2.69	14.77	1.00	1.00	1,237.00
Total	7.62	16.94	2.00	1.00	1,250.00

Figure 10: Mean LOS by Chapter Heading[6]

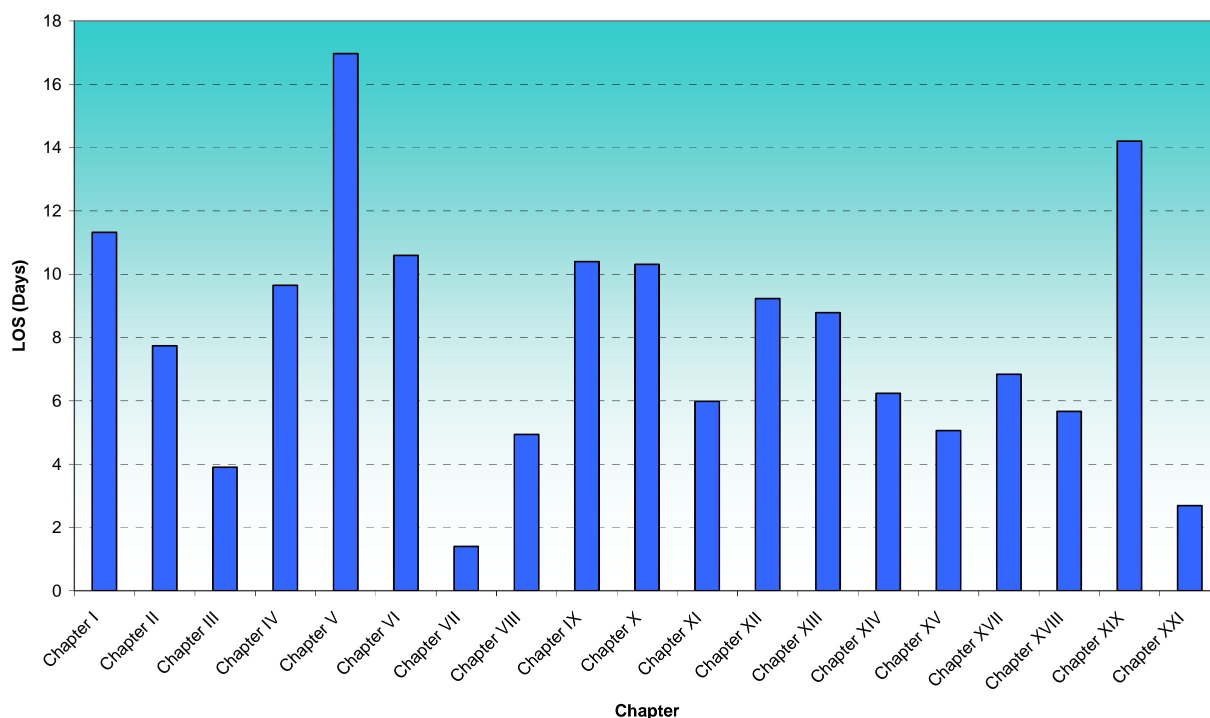


Table 22 below illustrates the total number of days that clients were in hospital over the time period analysed for each chapter heading. In addition, numbers of bed days were calculated. It can be seen that on average each day during the five and a half years examined 156 hospital beds were occupied by a Silver Chain client with a diagnosis from Chapter XIX (Injury, poisoning and certain other consequences of external causes); 150 beds occupied by a client with a diagnosis from Chapter IX (Diseases of the circulatory system) and 145 beds by a client with a diagnosis from Chapter II (Neoplasms).

[6] Chapter XVI was not included in this graph due to the small number of clients with this diagnosis.

Table 22: Total Number of Hospital Days by Chapter Heading

Chapter	Sum (Days)	Beds per day
Chapter I	32,251	16
Chapter II	292,290	145
Chapter III	22,027	11
Chapter IV	96,942	48
Chapter V	109,578	55
Chapter VI	72,147	36
Chapter VII	14,804	7
Chapter VIII	3,909	2
Chapter IX	306,041	152
Chapter X	192,324	96
Chapter XI	149,422	74
Chapter XII	81,276	40
Chapter XIII	182,546	91
Chapter XIV	75,494	38
Chapter XV	4,495	2
Chapter XVI	570	0
Chapter XVII	1,586	1
Chapter XVIII	93,733	47
Chapter XIX	312,977	156
Chapter XXI	136,494	68
Total	**2,180,906**	**1085**

6.4.3.1 Procedures

More than three quarters (79.99%, n=228,850) of the admissions during the time period analysed were associated with a procedure. Table 23 shows the procedure chapter associated with the procedures and the number of admissions during which those procedures were undertaken. The largest group of procedures undertaken were those in the category "Non-invasive, cognitive and other interventions". Just under half (49.95%) of these procedures were for "Generalised allied health interventions" including physiotherapy, occupational therapy, social work and so on. The second most frequent procedure category was "Chemotherapeutic and radiation oncology procedures", 96% of which was chemotherapy.

Table 23: Procedures Undertaken During Hospital Admissions

Procedure Chapter	Number	Percentage
Non-invasive, cognitive and other interventions not elsewhere classified	60,891	26.61
Chemotherapeutic and radiation oncology procedures	31,089	13.58
Procedures on digestive system	30,920	13.51
Procedures on musculoskeletal system	18,291	7.99
Imaging services	15,900	6.95
Dermatological and plastic procedures	13,422	5.86
Procedures on urinary system	12,638	5.52
Procedures on eye and adnexa	12,306	5.38
Procedures on cardiovascular system	10,408	4.55
Procedures on Nervous System	7,888	3.45
Procedures on respiratory system	5,098	2.23
Gynaecological Procedures	2,949	1.29
Procedures on breast	1,798	0.79
Procedures on blood and blood forming organs	1,505	0.66
Procedures on male genital organs	1,342	0.59
Procedures on nose, mouth and pharynx	1,066	0.47
Dental services	589	0.26
Obstetric procedures	527	0.23
Procedures on Endocrine System	223	0.10
Total	**228,850**	**100.00**

Table 24 shows the average length of admission for clients who had procedures in each of the procedure categories. "Procedures of the musculoskeletal system" had, on average clients with the longest hospital admissions of 15 days. This procedure category included as its two most frequently undertaken procedures: arthroplasty of hip and of the knee, and also included procedures relating to fractured femurs and other fractures.

The second longest LOS (14 days) was associated with the procedure category "Imaging services" which includes CT scans and also procedures on the respiratory system. Table 24 also shows the average number of beds occupied per day in a WA hospital in which a procedure is recorded against the admission. Clearly, those admissions associated with "Non-invasive, cognitive and other interventions" use the largest number of bed days.

SILVER CHAIN

Table 24: Mean Length of Admission of Each Procedure Category

Procedure	Mean LOS	Std Dev	Median LOS	Beds Per Day
Procedures on musculoskeletal system	15.30	22.40	8	139
Imaging services	14.40	24.10	8	114
Procedures on respiratory system	13.70	21.60	7	35
Procedures on cardiovascular system	9.28	17.90	3	48
Non-invasive, cognitive and other interventions	9.23	19.20	4	280
Procedures on blood and blood forming organs	8.82	14.30	3	7
Procedures on Endocrine System	7.03	17.40	4	1
Procedures on digestive system	6.95	14.20	1	107
Procedures on male genital organs	6.86	11.60	3	5
Dermatological and plastic procedures	6.76	14.80	1	45
Procedures on Nervous System	6.66	16.30	1	26
Obstetric procedures	5.88	4.60	5	2
Procedures on urinary system	5.74	13.60	1	36
Procedures on nose, mouth and pharynx	5.12	10.40	1	3
Gynaecological Procedures	4.91	7.25	3	7
Procedures on breast	3.51	4.76	2	3
Dental services	2.38	8.95	1	1
Radiation and oncology procedures	1.68	4.11	1	26
Procedures on eye and adnexa	1.4	3.42	1	9
Total	**7.9**	**17.00**	**2**	**891**

6.5 High Hospital Usage

6.5.1 Long Hospital Admissions

All clients who had a long admission were identified using the 90th percentile where all clients who had an admission of 19 or more days were considered to have had the longest admissions (Figure 11). The average LOS of all of the longest admissions was 40.72 days with a median of 30 days. There were 28,631 admissions (12.4% of admissions) of more than 19 days with a combined LOS of 1,165,873 days. This is 53.45% of all of the admission days and equates to 571 beds per day.

Figure 11: Identification of Clients with the Longest Admissions

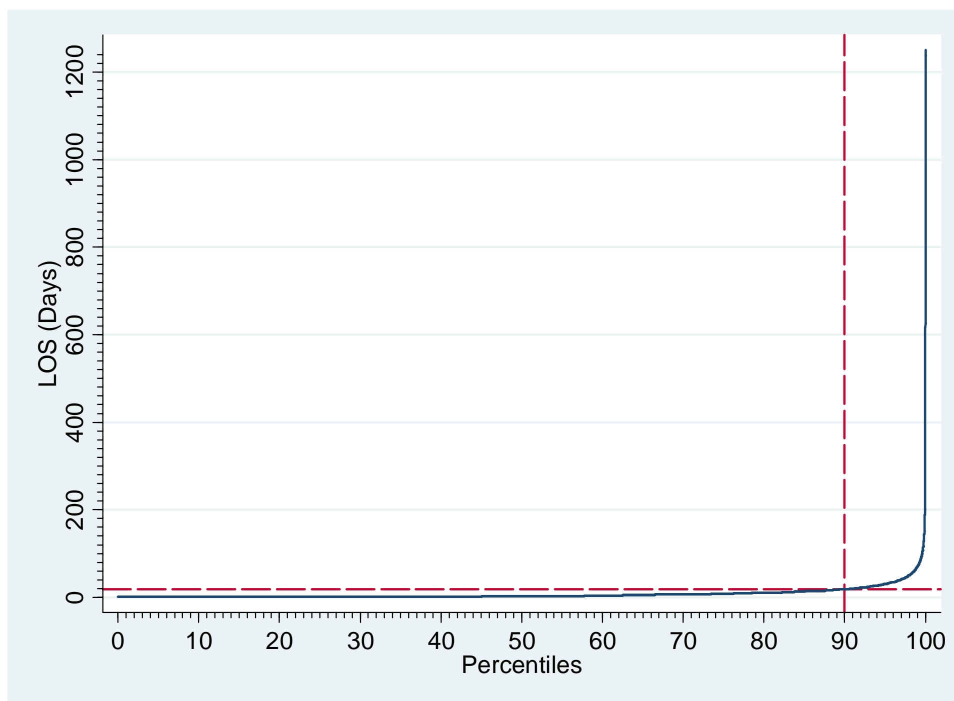


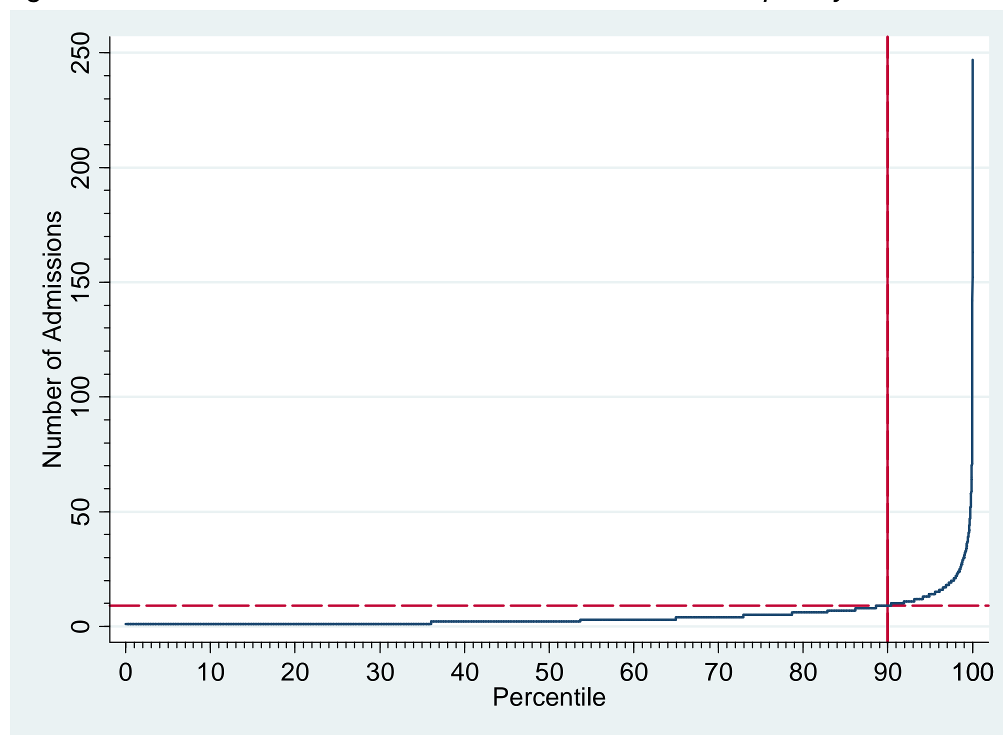
Table 25: Longest Admissions

Longest Admissions	Mean	Standard Deviation	Median	Min	Max	Total LOS	Number of Admissions
<19 Days	3.94	4.26	1	1	18	1,015,033	257,554
19+ Days	40.72	38.55	30	19	1,250	1,165,873	28,631
Total	**7.62**	**16.93**	**2**	**1**	**1,250**	**2,180,906**	**286,185**

6.5.2 Frequent Admissions

All clients who had been admitted most frequently were identified using the 90th percentile – therefore all clients who had been admitted to hospital nine or more times were identified as frequent users (Figure 12).

Figure 12: Identification of Clients Who Admitted Most Frequently



As seen in the table below, 7,725 clients have been hospitalised nine or more times. This is 11.4% of the client sample. The average number of admissions for this group of clients was 16.6 admissions. This group of clients were admitted in total 128,243 times. So 11.4% of the clients hospitalised contribute to 44.8% of all admissions.

Table 26: Clients Admitted Most Frequently

Frequent Admissions	Mean	Standard Deviation	Median	Min	Max	Total Number of Admissions	Number of Clients
< 9 Days	2.63	1.94	2	1	8	157,942	59,949
9+ Days	16.60	11.63	13	9	247	128,243	7,725
Total	**4.23**	**6.20**	**2**	**1**	**247**	**286,185**	**67,674**

For those clients who were the most frequently admitted to hospital, the sum of the duration of all of the admissions was 678,575 days. This is 31.11% of all of the hospital days used by all clients and equates to 333 beds per day. Each of the most frequently admitted client has a mean cumulative LOS during the period analysed of 87.84 days and a median cumulative LOS of 66 days (Table 27).

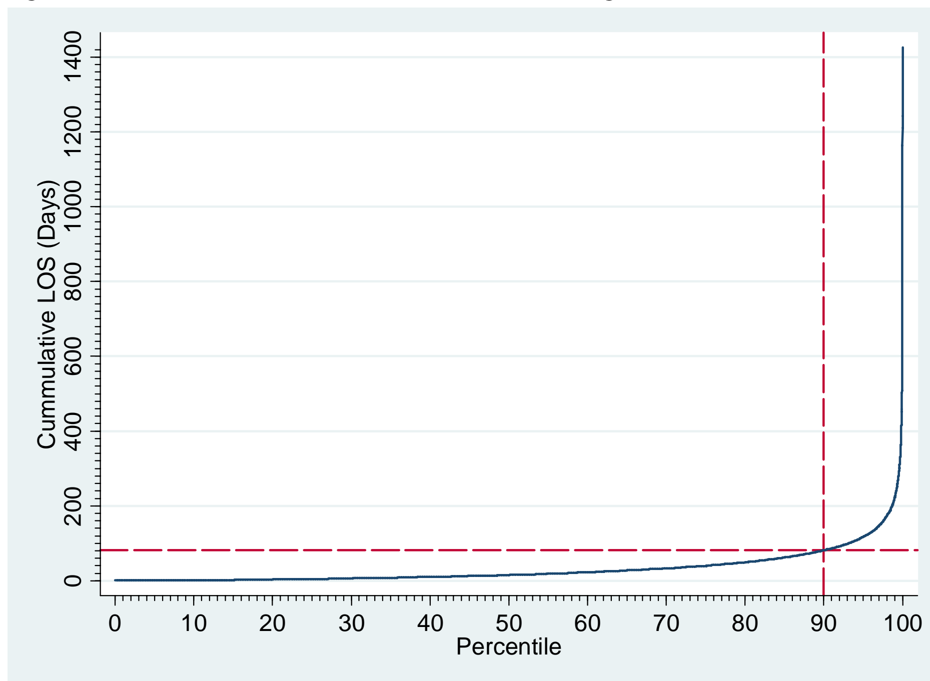
Table 27: Cumulative LOS of Frequent Admissions

	Mean	Standard Deviation	Median	Min	Max	Duration Total
Days	87.84	77.57	66	9	1,242	678,575

6.5.3 Longest Cumulative Admissions

Clients who had the longest cumulative duration of admissions during the period analysed were identified using the 90th percentile (figure 13). Therefore all clients who had a cumulative LOS of 81 or more days were considered the longest stayers. There were 6,879 (10.16%) clients who are considered the longest stayers in hospital and each of them have an average cumulative LOS of 141.59 days over the period of time analysed.

Figure 13: Identification of Clients with the Longest Cumulative Admissions



The total number of days that the longest stayers were in hospital was 974,032 days which is 44.66% of the total number of days clients spent in hospital over the time period. This equates to 477 beds per day (Table 28).

Table 28: Longest Cumulative Admission Durations

Longest Cumulative Stayers	Mean	Standard Deviation	Median	Min	Max	Total LOS	Number
< 81 Days	19.85	19.75	13	1	80	1,206,874	60,795
81+ Days	141.59	84.38	117	81	1,425	974,032	6,879
Total	**32.23**	**49.27**	**15**	**1**	**1,425**	**2,180,906**	**67,674**

6.6 Chronic Diseases and Other Diagnoses and Their Impact on Hospital Admissions

In total, 50.76% of clients had at least one of the following chronic diseases or conditions recorded as a diagnosis in at least one of their hospital admissions. These diagnoses were not necessarily the principal diagnosis for the admission, but were documented as a diagnosis in any of the 21 diagnosis fields. Table 29 shows that more than a quarter (27%) of Silver Chain's hospitalised clients had a diagnosis of diabetes and just under 20% had chronic heart disease.

Table 29: Selected Diagnoses

Chronic Disease	Number	Percentage
Diabetes	18,178	28.86%
Chronic Heart Disease[7]	13,075	19.32%
COPD	7,001	10.35%
Fracture	6,625	9.79%
Dementia	4,520	6.68%
Osteoporosis	3,411	5.04%
Cerebral Vascular Disease	2,958	4.37%

Table 30 shows the number of admissions where the client has any of the chronic diseases[8]. One third of admissions analysed were associated with at least one of the chronic diseases and 7.5% of admissions were associated with two or more.

Table 30: Number of Chronic Diseases

Number of Chronic Diseases	Number	Percentage
0	199,875	69.84%
1	65,255	22.80%
2	18,248	6.38%
3 or more	2,806	0.98%
Total	**286,184**	**100.00%**

6.7 Predicting Long or Frequent Hospital Admissions

6.7.1 Long Hospital Admissions

The average LOS per admission for individuals with one of the selected diagnoses in Table 29 is 12.61 days, which is substantially longer than a LOS of 7.62 days - the average across all admissions. When individuals with one of the selected diagnoses are removed the ALOS is 5.46 days. The difference between the ALOS for individuals with one of the selected diagnoses and those without one of these diagnoses is statistically significant ($F= 11,175.89$ $(1, 286,182)$; $p < 0.001$).

Further analysis[9] shows that clients with these selected conditions are at significantly greater risk of being classified as having had a long admission (defined earlier as upper centile of admission lengths). It can be seen in Table 31 that having any of these diagnoses at least doubles the risk of having a long admission; with CVD, osteoporosis and dementia increasing the likelihood by almost five times and a fracture more than eight and a half times. Almost half of all clients with a diagnosis of fracture had an admission of more than 19 days.

[7] Includes Chronic Ischemic heart disease
[8] Except fracture
[9] Using Mantel-Haenszel estimate

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Table 31: Percentage of Clients Having Long Admissions

Chronic Disease	Clients with Disease and Long LOS	Odds Ratio (Unadjusted)	Confidence Interval (95%)
Fracture	45.84%	8.56	8.17-8.97*
Cerebral Vascular Disease	34.63%	4.92	4.59-5.29*
Osteoporosis	34.13%	4.90	4.64-5.21*
Dementia	32.40%	4.65	4.43-4.87*
Chronic Heart Disease	18.95%	2.34	2.26-2.42*
COPD	18.40%	2.15	2.07-2.24*
Diabetes	16.21%	2.03	1.97-2.09*

* $P < 0.05$

Using logistic regression, the odds of having a long hospital stay were calculated when all other factors were taken into consideration (including the presence of another chronic condition(s), age, gender, CCI, number of diseases and living arrangement). Table 32 shows that when other contributing factors are adjusted for, having a fracture is the best predictor of having a long hospital admission. The odds of having a hospital stay of 19 days or more increases almost eight times for clients who have a fracture. Additionally, the number of chronic disease diagnoses increases the likelihood of a long hospital stay with the odds of having a long hospital stay more than doubling for each extra diagnosis. However when looked at individually it can be seen that COPD, diabetes and heart disease, are associated with a reduced likelihood of a long hospital stay. The only demographic characteristic which influences the odds of long hospital stays is whether the client lives alone or not. Those who do, have an increased risk of 18% of a long hospital admission.

Table 32: Predictors of Long Hospital Admissions

Factor	Odds Ratio (Adjusted)	95% Confidence Interval	Percentage Change
Fracture	7.97*	7.57 -8.38	696.6%
Number of Chronic diseases	2.35*	2.17 -2.55	134.9%
Osteoporosis*Fracture	1.94*	1.71 -2.20	93.8%
Cerebral Vascular Disease	1.67*	1.49 -1.86	66.7%
Dementia	1.39*	1.26 -1.53	39.1%
Lives Alone	1.18*	1.15 -1.21	17.7%
CCI	1.11*	1.11 -1.12	11.3%
Age	1.02*	1.02 -1.02	1.6%
Female	0.96*	0.94 -0.99	-3.6%
Aboriginal	0.85*	0.77 -0.95	-14.7%
COPD	0.73*	0.67 -0.80	-26.9%
Diabetes	0.71*	0.65 -0.78	-28.7%
Chronic Heart Disease	0.69*	0.63 -0.76	-30.9%

Note 1: Osteoporosis removed from model as not significant
*Note 2: * Significant to $p < 0.001$*

6.7.2 Frequent Admissions

The average number of admissions per client over the period analysed was 4.2. However the average number of admissions of clients without one of the selected diagnoses was 3.3 as compared to 5.3 for individuals with one of these diagnoses. This difference was statistically significant (F= 1,741.65 (1, 67,672); p < 0.001). The risk of being in the group with the most frequent admissions (9 or more over the time period, see page 25) increases significantly for those clients with one of the diagnoses identified, except for individuals with dementia. Almost a quarter of clients with a diagnosis of osteoporosis or COPD were classified as having the most frequent hospital admissions and clients with a diagnosis of COPD and Chronic Heart Disease had an increased risk of being in this group with odds ratios of 2.82 and 2.79 respectively (Table 33).

Table 33: Percentage of Clients Having Most Frequent Admissions

Chronic Disease	Clients with Disease and Frequent Admissions	Odds Ratio (Unadjusted)	Confidence Interval (95%)
Osteoporosis	23.86%	2.60	2.39-2.82*
COPD	23.83%	2.82	2.65-3.00*
Chronic Heart Disease	21.59%	2.79	2.65-2.94*
Cerebral Vascular Disease	19.27%	1.92	1.75-2.11*
Diabetes	18.31%	2.30	2.19-2.41*
Fracture	16.26%	1.58	1.48-1.70*
Dementia	10.97%	0.95	0.86-1.05

P <0.05

Table 34 shows that when all other contributing factors are held constant, the number of chronic diseases a person has significantly increases the odds of being in the group with the most frequent hospital admissions. If a client has one chronic disease, the odds are doubled compared to having no chronic disease and if they have three or more, the odds of being in this group increases six times. For each point on the CCI, the odds of having very frequent hospital admissions increase by 26%. Therefore a client with a score of four will have double the odds of being in the most frequent hospitalisation group compared to a client with a score of zero. Having a fracture increases the odds by 61% but having a diagnosis of diabetes, cerebral vascular disease or dementia decrease the odds of very frequent hospital admissions by 25%, 27% and 58% respectively. Demographic characteristics which influence the odds of being in the most frequently admitted group are living alone which increases the risk by 16%, and being female which has a small increased risk of 6%.

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Table 34: Predictors of Most Frequent Hospital Admissions

Factor	Odds Ratio (Adjusted)	95% Confidence Interval	Percentage Change
Number of Chronic diseases	1.99*	1.91-2.06	98.6%
Fracture	1.61*	1.49-1.74	61.4%
Osteoporosis*Fracture	1.43*	1.25-1.65	43.4%
CCI	1.26*	1.24- 1.27	25.7%
Lives Alone	1.16*	1.10-1.23	16.2%
Female	1.06**	1.01-1.12	6.1%
Age	0.98*	0.98- 0.98	-1.7%
Diabetes	0.75*	0.70-0.80	-24.9%
Cerebral Vascular Disease	0.73*	0.65-0.81	-27.1%
Dementia	0.42*	0.38-0.47	-58.0%

Note1: Chronic Heart Disease, COPD, Osteoporosis, aboriginal removed from model as not significant
*Note2: * p<0.001 and **p<0.05*

6.7.3 Longest Cumulative Admissions

The mean cumulative LOS for all clients over the period analysed (32.23 days) is shorter than the mean cumulative LOS of clients with one of the selected diagnoses. Clients with one of these diagnoses had, on average, a cumulative LOS in hospital over the period analysed of 47.26 days compared to 18.82 days for those without one of the chronic diseases. This difference is statistically significant ($F= 6,126.05$ (1, 67,672); $p < 0.001$).

Additionally, clients with one of the diagnoses of interest are at increased risk of being in the group identified (Page 26) as having the longest cumulative length of stay. This ranges from a minimum of 2.6 if the client has diabetes to 5.3 if the client has a diagnosis of osteoporosis (Table 35). One third of all clients diagnosed with osteoporosis and just over a quarter of those with a diagnosis of cerebral vascular disease were classified as being among those with the longest cumulative hospital stays.

Table 35: Percentage of Clients with Longest Cumulative LOS

Chronic Disease	Clients with Disease and Long Cumulative LOS	Odds Ratio (Unadjusted)	Confidence Interval (95%)
Osteoporosis	33.95%	5.26	4.87-5.67*
Cerebral Vascular Disease	27.89%	3.26	2.95-3.60*
Fracture	24.58%	3.55	3.42-3.79*
COPD	23.78%	3.32	3.11-3.53*
Dementia	23.54%	3.03	2.82-3.27*
Chronic Heart Disease	21.32%	3.34	3.17-3.53*
Diabetes	17.33%	2.57	2.45-2.71*

* P <0.05

As with very long hospital admissions, diagnosis of a fracture significantly increases the risk of being among those with the longest cumulative hospital stays (Table 36). The likelihood of having spent a long time in hospital was three times greater for clients with a fracture and 1.5 times greater for clients with a diagnosis of osteoporosis and also a fracture. As was the case when considering individuals with the longest and most frequent hospital admissions, the number of chronic diseases influences the likelihood of being in the group with the longest cumulative admissions, with the likelihood increasing from almost three times with one chronic disease and up to more than eight times with three or more chronic diseases. However, having a single diagnosis of dementia, COPD, chronic heart disease or diabetes reduced the odds of having long cumulative admissions by 15 to 37%. Living alone increased the risk of having had a long cumulative length of stay by 27% while other demographic characteristics such as age and gender had little effect.

Table 36: Predictors of Longest Cumulative Hospital Admissions

Factor	Odds Ratio (Adjusted)	95% Confidence Interval	Percentage Change
Fracture	2.94*	2.74-3.16	193.8%
Number of Chronic diseases	2.78*	2.58-2.99	177.9%
Osteoporosis* Fracture	1.50*	1.31-1.73	50.2%
Lives alone	1.27*	1.20-1.34	26.7%
CCI	1.15*	1.14-1.17	15.2%
Age	1.00*	0.99-1.00	-0.5%
Female	0.92**	0.87-0.97	-8.0%
Dementia	0.85**	0.76-0.95	-15.2%
COPD	0.77*	0.69-0.85	-23.4%
Chronic Heart Disease	0.72*	0.65-0.79	-28.3%
Diabetes	0.63*	0.57-0.69	-37.1%

Note1: cerebral vascular disease, osteoporosis, aboriginal removed from model as not significant
*Note2: * $p<0.001$ and ** $p<0.05$*

As seen above, clients who sustain a fracture have an increased likelihood of being in the group with the longest cumulative lengths of stay. While the other conditions analysed are chronic and their presence may, as suggested by this study's findings, be used to predict (prior to admission) an increased risk of long and frequent hospital stays, fractures are acute and the risk of the long associated hospital stay cannot be predicted until the fracture occurs. However, fractures in older people are often due to osteoporosis which can be diagnosed and treated and the risk factors of osteoporosis are readily identifiable. The data was analysed in order to determine the likelihood that someone admitted with a fracture also had a diagnosis of osteoporosis. Not unexpectedly it was found that there was a strong significant association between the two and that individuals with a diagnosis of osteoporosis were 10.79 times more likely to have a fracture diagnosis than individuals without osteoporosis. It is not however possible to know whether the osteoporosis had been identified prior to the fracture or contributed to the differential diagnosis. Nevertheless it indicates that the presence of osteoporosis is a significant risk factor for a fracture related hospital admission.

7 SUMMARY OF FINDINGS

This report details the results of the analysis of hospital admissions of 67,674 individuals who were Silver Chain clients when they were hospitalised between 1 July 1999 and 31 December 2004. Approximately, 52,000 hospital admissions a year are attributed to Silver Chain clients throughout Western Australia.

During the time period analysed, clients were admitted to hospital a total of 286,185 times. On average, each client was admitted to hospital four times for ALOS of seven days. Half of all hospital admissions were to public hospitals in the metropolitan area. While two thirds of all admissions were elective, there were significantly more emergency admissions in rural hospitals (50%) compared to metropolitan hospitals (39%). In comparing public and private hospitals, as would be expected, private hospitals (23%) had significantly fewer emergency admissions than public hospitals (53%).

7.1 Clients' Characteristics

Just under 60% of clients admitted to hospital were female and their average age was 69 years. Only 1.6% of the clients admitted to hospital were Aboriginal or Torres Strait Islanders and just over 30% lived alone which is similar to Silver Chain's population as a whole.

On an individual basis, the mean Charlson Co-morbidity Index (CCI) score (highest score achieved by each client over all admissions) was 2.2. One third of all clients had a score of zero, indicating no increased risk of death, and 35% had a score of one or two.

Hospitalised male clients had a significantly higher mean CCI score than females (2.6 versus 1.9) indicating that as a group, they are significantly more at risk of dying within the following twelve months due to their co-morbid condition(s). In addition, aboriginal clients were significantly more at risk of dying within the following twelve months with their mean CCI score being higher than non-aboriginal clients (2.5 versus 2.2).

Clients admitted to hospital with a principal diagnosis from the Chapter Heading "Factors influencing health status and contact with health service" was the most frequently occurring principal diagnosis with 18% of all diagnoses attributed to this chapter heading. Diagnoses that were recorded under this included "Persons encountering health services for specific procedures and health care" which is not specifically a diagnosis, but included radiotherapy, chemotherapy, blood transfusions. The next most frequent was "Neoplasms"(13%) followed by "Diseases of the circulatory system" (10%).

7.2 Hospital Admission Characteristics

On an admission basis, the mean CCI score was 1.6 with almost half of all clients' admissions being scored as zero. A third of clients' admissions obtained a CCI score of one or two indicating increased risk of dying in the next year. The remaining 22% scored three or more, demonstrating higher relative risk of death within one year.

Clients who are admitted to hospital as an emergency admission compared to an elective admission had a significantly higher mean CCI score (2.3 versus 2.1; $F= 163.67$ (1, 67,672); $p < 0.001$).

Most referrals for admission were made by specialists or hospital based clinicians with only 12% of all referrals being from general practitioners.

7.3 Hospital Admissions LOS and Frequency of Admission

The ALOS for all admissions, including admissions of less than one day, was just under 8 days and, over the period of time analysed, on average, each client would be hospitalised four times. Therefore, during that time, each client would spend, on average 32 days in hospital.

When admissions of less than one day are removed from the analysis, the ALOS per admission increased to 13 days but the number of admissions over the analysis period decreased to just under three times. Without one day admissions, on average, clients spent 35 days in hospital during that time.

Analysis showed that as the CCI score increased from zero to five, the ALOS per admission increased 18 days. At a score of 6, the ALOS shortened. This reduction in the ALOS could be attributed to clients with advanced cancer receiving care from Silver Chain's Hospice Care Service who receive advanced nursing care in their homes rather than in hospital.

As the clients' CCI score increased from one to eight, so too did the number of admissions to hospital over the period analysed. The cumulative LOS over the period of analysis also increased as the clients' CCI score increased from zero to five. At a score of six, the cumulative LOS reduced as with the LOS of each admission.

Both ICD-10 Chapter Headings "Mental and behavioural disorders" and "Injury, poisoning and other consequences of external causes" had, on average, LOS of more than two weeks which were the longest ALOS of all the Chapter Headings.

In total, Silver Chain clients' hospital admissions accounted for 1,085 hospital beds per day throughout Western Australia in both public and private hospitals. Without admissions of less than one day, they accounted for 1,021 hospital beds per day.

The majority of bed days (559 days) were in public hospitals in the metropolitan area. An additional 327 bed days were attributable to private hospitals in the metropolitan area.

The principal diagnoses Chapter Headings that contributed to the most beds per day were "Injury, poisoning and other consequences of external causes" (153 beds per day), "Diseases of the circulatory system" (150 beds per day) and "Neoplasms" (143 beds per day).

7.4 Procedures

More than three quarters of hospital admissions were associated with a procedure. The most frequently occurring procedures were from the procedure Chapter "Non-invasive, cognitive and other interventions not elsewhere classified" (26%). Of this group of procedures, half were for "Generalised allied health interventions" including physiotherapy, occupational therapy and social work. The next most frequently occurring procedure chapter was that of "Chemotherapeutic and radiation oncology procedures".

"Procedures of the musculoskeletal system" were found to have the longest LOS of 15 days and also contributed the second most beds per day (137). The largest numbers of beds per day were used by clients who are recorded as having a procedure under the procedure chapter "Non-invasive, cognitive and other interventions not elsewhere classified" using 276 beds per day.

7.5 Prediction of High Hospital Usage

The most frequently admitted clients, clients with the longest hospital stays and clients with the longest cumulative hospital stays over the period analysed, were identified as the uppermost 10% of clients for each measure.

The impact of selected conditions and client characteristics on usage of hospitals was analysed to determine the odds of being in the top centiles for: number of admissions; LOS; and, cumulative LOS. The following diagnoses were identified as being most frequently attributed to Silver Chain's clients:

- COPD
- Chronic Heart Disease
- Osteoporosis
- Diabetes
- Cerebral vascular disease
- Dementia
- Fracture

When considered individually, each of these conditions significantly increased the likelihood of a client being classified as a high hospital user, regardless of which definition was used.

7.5.1 Longest Hospital Admissions

Clients who had hospital admissions of 19 days or more were identified as clients with the longest admissions. This group of clients had an average LOS of 41 days. These long admissions made up 12% of all admissions but their combined LOS added to 53% of all the bed days equating to 571 beds per day.

Having one of the diagnoses listed above as being selected on the basis of being most common, was found to have a large impact on the likelihood of having had one of the longest hospital stays. The odds of being in the group with the longest hospital stays for a client with a diagnosis of diabetes is increased by 2 times while the odds for clients with dementia, osteoporosis and cerebral vascular disease are increased by 4 to 5 times. However, clients with a fracture were 8.5 times more likely to have had one of the longest hospital stays.

When client characteristics such as age, gender, being aboriginal, whether the client lives alone, Charlson Co-Morbidity Index and the number and type of chronic diseases a client has were adjusted for, the single best predictor of being in the group with the longest stays was having a diagnosis of fracture, the odds increasing almost eight times. The number of chronic disease diagnoses also had a large impact with the odds increasing up to 7 times if the client had three or more chronic diseases. Living alone also increased the odds of having the longest admissions.

7.5.2 Most Frequent Admissions

Clients who had been hospitalised nine or more times were identified as the most frequent users of hospitals. While being only 11% of the client sample this group of clients were admitted for 45% of all admissions and used 333 beds per day.

Clients with a diagnosis of any of the conditions identified as most common among our clients, apart from dementia, had increased odds of being a frequent user. The odds increased by 60% for clients with a fracture up to 2.8 times for clients with COPD.
When other contributing factors are adjusted for, the number of chronic diseases a person had doubled the odds of having had among the longest hospital stays, with the addition of each disease and for each point on the CCI, having increased the odds by 26%. Specific diagnoses had different effects, with a diagnosis of fracture increasing the likelihood by 61% while diabetes, cerebral vascular disease or dementia reduced the chances of being among those with the most frequent admissions. The demographic characteristic most highly predictive of very frequent hospital admissions was living alone, while not having a carer increased the likelihood to a small extent.

7.5.3 Longest Cumulative Admissions

Clients with cumulative admissions adding up to a cumulative LOS of 81 days or more were considered to be the longest stayers. These individuals represent the top 10% of the total client group, in terms of cumulative LOS and on average spent 142 days in hospital over the period analysed. Their cumulative admissions added up to 45% of all bed days and equated to 477 beds per day.

Clients with one of the most common diagnoses were more likely to be among the longest stay group than clients with other diagnoses, with the odds of spending considerable time in hospital increasing 3 times if the client has dementia and more than 5 times if the client has a diagnosis of osteoporosis.

As with the longest hospital admissions, when all other factors are held constant, diagnoses of a fracture increases the odds significantly of having the longest cumulative hospital stays. The odds of spending a long period in hospital are increased three times for clients with a fracture and 1.5 times for clients with a diagnosis of osteoporosis and also a fracture. As with the longest hospital admissions and the most frequent admissions, the number of chronic diseases influences the odds of the longest cumulative hospital admissions with the odds increasing from almost three times with one chronic disease and up to more than eight times with three or more chronic diseases. Living alone increases the risk of having one of the longest cumulative hospital stays by 27% while other demographic characteristics have little influence. Diagnoses of dementia, COPD, chronic heart disease or diabetes reduce the odds of having the longest cumulative admissions by 15 to 37%.

7.5.4 Fractures

As a fracture increases the likelihood of very long and frequent hospital stays and cannot be predicted, the odds of having a fracture if the client also has a diagnosis of osteoporosis was examined. This analysis showed that individuals with a diagnosis of osteoporosis were 10.79 times more likely to have an admission associated with a diagnosis of a fracture than individuals without an osteoporosis diagnosis. Although it is not possible to know whether the fracture preceded the diagnosis of osteoporosis or vice versa, it underscores the significance of the association and the potential for early identification and treatment of osteoporosis to contribute to reductions in hospital use by reducing fracture rates.

8 CONCLUSIONS AND RECOMMENDATIONS

Analysis of this data shows that a large number of Silver Chain clients are admitted to hospital each year. In 2003-2004 the total number of hospital beds available in WA was 7,976 (AIHW, 2005) and each day a Silver Chain client utilised 13.6% of all of the beds. Of the 4,955 beds in the public system, Silver Chain clients utilised 713 beds (14.4%). Silver Chain clients are admitted for a wide variety of reasons and many are in hospital frequently or for a very long time.

Regardless of the diagnosis for which clients were admitted to hospital, a large percentage were recorded as having had a procedure classified under the chapter of "non-invasive, cognitive and other interventions not classified elsewhere". Of these, half were for "generalised allied health interventions". This group of admissions used 276 hospital beds per day over the period analysed. The question arises as to why individuals are being admitted to hospital for this type of procedure when allied health services could be provided more cost effectively in arguably safer and more appropriate settings, their homes.

Recommendation 1: Investigate what type of services are provided in hospitals under the "generalised allied health interventions" procedures to determine whether they can be provided in a more cost effective manner in the community.

This data clearly shows that having a diagnosis of one or more of a select group of chronic conditions is predictive of having very long and very frequent hospital stays. This is demonstrated by this data both as a simple calculation of the number of chronic diseases a person has, and in terms of their score on the Charlson Co-morbidity Index. Currently, diagnostic information is not routinely collected by Silver Chain for all clients and where diagnosis data is routinely collected, for example post acute services and HATH, it is linked to the service episode and to the actual service being provided (eg wound care, cellulitis, bacterial infection). As a result clients with chronic diseases are unlikely to have that disease recorded on their client record unless the service provided by Silver Chain was directly related to, or could be influenced by, the disease. However, the vast majority of clients with any of the diseases analysed in this report would have been aware of having the disease since they were first diagnosed. Documenting this data on the client's record could be a simple as asking clients at referral or review if they had been diagnosed with any one of the diseases analysed.

Recommendation 2: Collection of diagnostic information about a selection of chronic diseases should be investigated as an indicator of being at risk of long and frequent hospital admissions. Targeted health management strategies can then be implemented to assist these clients to improve or better maintain their health and so avoid hospitalisation.

The link between osteoporosis and fractures is well established and this analysis shows that individuals with fractures have a hospital stay of more than three weeks on average and over the time period analysed, averaged 61 days in hospital. Additionally clients with a diagnosis of osteoporosis stay in hospital for just under three weeks for each admission and over time, spend on average, eleven weeks in hospital. Clearly this group of clients are at risk of spending a very long time in hospital and the analysis shows that individuals with a diagnosis of osteoporosis are more than ten times more likely to have an admission associated with a fracture. While we cannot predict when a client will fracture, the risk can be reduced by the treatment of osteoporosis and reduction of falls risks.

Diet, exercise and medication have all been found to reduce the risk of fracture for individuals who have osteoporosis. Recent research undertaken in Silver Chain found that almost all of the clients surveyed had multiple risk factors for osteoporosis but only a third reported a diagnosis of osteoporosis and even fewer were receiving any treatment. This research also showed that even if a diagnosis of osteoporosis was made following a fracture, clients' GPs were not following the recommended guidelines for the treatment of osteoporosis and there was very little evidence that the condition was discussed with clients (Smith, Lewin et al, 2006).

Recommendation 3: Assist Silver Chain clients at risk of osteoporosis to assess their risk and provide information regarding osteoporosis and falls risk reduction.

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10 APPENDIX I: DETAILS OF EACH CHAPTER HEADING

Chapter I: Infectious and Parasitic Diseases

Table 37 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients[10], 40,209 were classified under Chapter I. The most frequently occurring diagnosis across the admissions was for Bacterial, viral and other infectious agents. This group of diagnoses contributed to 71% of all of the diagnoses documented for this chapter and was 3.6% of all diagnoses documented. A total of 1,902 (0.66%) admissions contained a documented diagnosis for Bacterial, viral and other infectious agents.

Table 37: Chapter I Diagnoses

Diagnosis Description	Frequency	Percentage
Bacterial, viral and other infectious agents	28,392	70.61
Mycoses	3,727	9.27
Other bacterial diseases	3,372	8.39
Intestinal infectious diseases	1,120	2.78
Viral infections characterised by skin and mucous membrane lesions	912	2.27
Viral hepatitis	665	1.66
Human immunodeficiency virus [HIV] disease	635	1.58
Other viral diseases	607	1.51
Sequelae of infectious and parasitic diseases	259	0.64
Pediculosis, acariasis and other infestations	204	0.51
Infections with a predominantly sexual mode of transmission	112	0.28
Tuberculosis	54	0.13
Protozoal diseases	53	0.13
Other infectious diseases	24	0.06
Helminthiases	24	0.06
Certain zoonotic bacterial diseases	23	0.06
Viral infections of the central nervous system	22	0.05
Other spirochaetal diseases	2	0.00
Other diseases caused by chlamydiae	2	0.00
Total	**40,209**	**100.00**

Table 38 shows that the procedure block non-invasive, cognitive and other interventions contributed to 45% of all of the procedures for clients with a primary diagnosis of infectious and parasitic diseases.

[10] Clients can have up to 21 diagnoses for each hospital admission

Table 38: Procedures Undertaken for Principal Diagnosis of Chapter I

Procedure	Number	Percentage
Non-invasive, cognitive and other interventions	828	44.90
Imaging services	247	13.39
Procedures on digestive system	237	12.85
Procedures on urinary system	110	5.97
Procedures on cardiovascular system	109	5.91
Procedures on respiratory system	103	5.59
Procedures on Nervous System	71	3.85
Dermatological and plastic procedures	58	3.15
Procedures on musculoskeletal system	39	2.11
Radiation and oncology procedures	12	0.65
Procedures on eye and adnexa	10	0.54
Procedures on blood and blood forming organs	9	0.49
Procedures on nose, mouth and pharynx	5	0.27
Procedures on male genital organs	4	0.22
Dental services	1	0.05
Procedures on Endocrine System	1	0.05
Total	**1,844**	**100.00**

Chapter II: Neoplasms

Table 39 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 151,874 were classified under Chapter II. The most frequently occurring diagnoses across the admissions was for Malignant neoplasms of ill-defined, secondary and unspecified sites, Malignant neoplasms of digestive organs and breast cancer. This group of diagnoses contributed to 63%% of all of the diagnoses documented for this chapter and was 8.6% of all diagnoses documented. A total of 55,192 (19.28%) admissions contained a documented diagnosis for either of the most frequent diagnoses in this chapter.

Table 39: Chapter II Diagnoses

Diagnosis Description	Frequency	Percentage
Malignant neoplasms of ill-defined, secondary and unspecified sites	60,507	39.84
Malignant neoplasms of digestive organs	23,769	15.65
Breast	11,825	7.79
Malignant neoplasms of lymphoid, haematopoietic and related tissue	10,629	7.00
Melanoma and other malignant neoplasms of skin	9,341	6.15
Malignant neoplasms of respiratory and intrathoracic organs	8,827	5.81
Benign neoplasms	7,970	5.25
Malignant neoplasms of urinary tract	3,993	2.63
Malignant neoplasms of female genital organs	3,929	2.59
Malignant neoplasms of male genital organs	3,622	2.38
Neoplasms of uncertain or unknown behaviour	3,437	2.26
Malignant neoplasms of mesothelial and soft tissue	1,447	0.95
Malignant neoplasms of eye, brain and other parts of central nervous system	1,002	0.66
Malignant neoplasms of lip, oral cavity and pharynx	989	0.65
Malignant neoplasms of thyroid and other endocrine glands	337	0.22
Malignant neoplasms of bone and articular cartilage	211	0.14
In situ neoplasms	39	0.03
Total	**151,874**	**100.00**

Table 40: Procedures Undertaken for Principal Diagnosis of Chapter II

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	8,454	26.45
Dermatological and plastic procedures	5,898	18.45
Procedures on digestive system	5,318	16.64
Radiation and oncology procedures	2,601	8.14
Procedures on urinary system	1,936	6.06
Procedures on respiratory system	1,692	5.29
Imaging services	1,600	5.01
Procedures on breast	1,162	3.63
Procedures on blood and blood forming organs	1,028	3.22
Procedures on cardiovascular system	538	1.68
Procedures on Nervous System	501	1.57
Procedures on musculoskeletal system	432	1.35
Procedures on male genital organs	389	1.22
Procedures on nose, mouth and pharynx	249	0.78
Procedures on Endocrine System	115	0.36
Procedures on eye and adnexa	44	0.14
Dental services	10	0.03
Total	**31,967**	**100.00**

Chapter III: Diseases of the Blood

Table 41 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 26,381 were classified under Chapter III. The most frequently occurring diagnoses across the admissions was for Aplastic and other anaemias and Nutritional anaemias. This group of diagnoses contributed to 75% of all of the diagnoses documented for this chapter and was 1.8% of all diagnoses documented. A total of 23,317 (8.15%) admissions contained a documented diagnosis for either of the most frequent diagnoses in this chapter.

Table 41: Chapter III Diagnoses

Diagnosis Description	Frequency	Percentage
Aplastic and other anaemias	14,563	55.20
Nutritional anaemias	5,186	19.66
Coagulation defects, purpura and other haemorrhagic conditions	3,651	13.84
Other diseases of blood and blood-forming organs	1,511	5.73
Certain disorders involving the immune mechanism	1,076	4.08
Haemolytic anaemias	394	1.49
Total	**26,381**	**100**

Table 42: Procedures Undertaken for Principal Diagnosis of Chapter III

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	3,703	69.34
Procedures on digestive system	1,158	21.69
Procedures on blood and blood forming organs	228	4.27
Imaging services	75	1.40
Procedures on cardiovascular system	47	0.88
Radiation and oncology procedures	29	0.54
Procedures on nose, mouth and pharynx	27	0.51
Procedures on respiratory system	19	0.36
Procedures on urinary system	19	0.36
Procedures on musculoskeletal system	17	0.32
Dermatological and plastic procedures	13	0.24
Procedures on Nervous System	3	0.06
Procedures on breast	1	0.02
Procedures on male genital organs	1	0.02
Total	**5,340**	**100.00**

Chapter IV: Endocrine

Table 43 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 85,060 were classified under Chapter IV. The most frequently occurring diagnoses across the admissions was for Impaired glucose regulation and diabetes mellitus and Metabolic disorders. This group of diagnoses contributed to 89% of all of the diagnoses documented for this chapter and was 6.8% of all diagnoses documented. A total of 59,756 (20.88%) admissions contained a documented diagnosis for either of the most frequent diagnoses in this chapter.

Table 43: Diagnoses for Chapter IV

Diagnosis Description	Frequency	Percentage
Impaired glucose regulation and diabetes mellitus	52,030	61.17
Metabolic disorders	24,034	28.26
Obesity and other hyperalimentation	4,557	5.36
Disorders of thyroid gland	1,481	1.74
Other nutritional deficiencies	1,193	1.40
Disorders of other endocrine glands	1,080	1.27
Other disorders of glucose regulation and pancreatic internal secretion	345	0.41
Malnutrition	340	0.40
Total	**85,060**	**100.00**

Table 44 shows the procedure blocks associated with a principal diagnosis of Chapter IV. A third of procedures for this chapter heading were for **Non-invasive, cognitive and other interventions** and a further 25% were **procedures on eye and adnexa** which were mainly for the extraction of a crystalline lens.

Table 44: Procedures Undertaken for Principal Diagnosis of Chapter IV

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	2,203	28.93
Procedures on eye and adnexa	1,940	25.47
Procedures on musculoskeletal system	802	10.53
Procedures on cardiovascular system	740	9.72
Imaging services	651	8.55
Dermatological and plastic procedures	374	4.91
Procedures on digestive system	306	4.02
Procedures on urinary system	290	3.81
Procedures on Nervous System	121	1.59
Procedures on Endocrine System	78	1.02
Procedures on respiratory system	65	0.85
Procedures on blood and blood forming organs	18	0.24
Radiation and oncology procedures	13	0.17
Procedures on male genital organs	9	0.12
Dental services	2	0.03
Procedures on breast	2	0.03
Procedures on nose, mouth and pharynx	2	0.03
Total	**7,616**	**100.00**

Chapter V: Mental and Behavioural Disorders

Table 45 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 32,515 were classified under Chapter V. The most frequently occurring diagnoses across the admissions was for Organic, including symptomatic, mental disorders, mental and behavioural disorders due to psychoactive substance use and mood [affective] disorders. This group of diagnoses contributed to 75% of all of the diagnoses documented for this chapter and was 2.2% of all diagnoses documented. A total of 24,263 (8.48%) admissions contained a documented diagnosis for either of the most frequent diagnoses in this chapter.

Table 45: Diagnoses of Chapter V

Diagnosis Description	Frequency	Percentage
Organic, including symptomatic, mental disorders	9,780	30.08
Mental and behavioural disorders due to psychoactive substance use	8,096	24.90
Mood [affective] disorders	6,507	20.01
Neurotic, stress-related and somatoform disorders	4,867	14.97
Schizophrenia, schizotypal and delusional disorders	1,196	3.68
Disorders of adult personality and behaviour	1,073	3.30
Mental retardation	560	1.72
Disorders of psychological development	189	0.58
Behavioural syndromes associated with physiological disturbances and physical factors	180	0.55
Behavioural and emotional disorders with onset usually occurring in childhood and adolescence	67	0.21
Total	**32,515**	**100.00**

Table 46: Procedures Undertaken for Principal Diagnosis of Chapter V

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	2,332	74.55
Imaging services	526	16.82
Procedures on digestive system	69	2.21
Dermatological and plastic procedures	54	1.73
Procedures on urinary system	43	1.37
Procedures on musculoskeletal system	33	1.05
Procedures on Nervous System	24	0.77
Procedures on respiratory system	13	0.42
Procedures on cardiovascular system	11	0.35
Procedures on male genital organs	6	0.19
Radiation and oncology procedures	5	0.16
Dental services	4	0.13
Procedures on blood and blood forming organs	3	0.10
Procedures on nose, mouth and pharynx	3	0.10
Procedures on breast	1	0.03
Procedures on eye and adnexa	1	0.03
Total	**3,128**	**100.00**

Chapter VI: Diseases of the Nervous System

Table 47 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 34,168 were classified under Chapter VI. The most frequently occurring diagnosis across the admissions was for Cerebral palsy and other paralytic syndromes. This group of diagnoses contributed to 25% of all of the diagnoses documented for this chapter and was 0.8% of all diagnoses documented. A total of 11,353 (3.97 %) admissions contained a documented diagnosis for either of the most frequent diagnoses in this chapter.

Table 47: Diagnoses for Chapter VI

Diagnosis Description	Frequency	Percentage
Cerebral palsy and other paralytic syndromes	8,703	25.47
Episodic and paroxysmal disorders	6,098	17.85
Polyneuropathies and other disorders of the peripheral nervous system	3,704	10.84
Nerve, nerve root and plexus disorders	3,554	10.40
Extrapyramidal and movement disorders	3,327	9.74
Other degenerative diseases of the nervous system	2,643	7.74
Other disorders of the nervous system	2,500	7.32
Demyelinating diseases of the central nervous system	1,828	5.35
Systemic atrophies primarily affecting the central nervous system	889	2.60
Diseases of myoneural junction and muscle	682	2.00
Inflammatory diseases of the central nervous system	240	0.70
Total	**34,168**	**100.00**

Table 48: Procedures Undertaken for Principal Diagnosis of Chapter VI

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	2,239	44.35
Procedures on Nervous System	1,273	25.21
Imaging services	1,009	19.98
Procedures on digestive system	123	2.44
Procedures on urinary system	110	2.18
Procedures on musculoskeletal system	92	1.82
Procedures on respiratory system	92	1.82
Dermatological and plastic procedures	42	0.83
Procedures on cardiovascular system	22	0.44
Radiation and oncology procedures	16	0.32
Procedures on nose, mouth and pharynx	13	0.26
Procedures on eye and adnexa	12	0.24
Procedures on blood and blood forming organs	3	0.06
Dental services	1	0.02
Procedures on Endocrine System	1	0.02
Procedures on breast	1	0.02
Total	**5,049**	**100.00**

Chapter VII: Diseases of the Eye

Table 49 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 21,296 were classified under Chapter VII. The most frequently occurring diagnosis across the admissions was for disorder of the lens. This group of diagnoses contributed to 53% of all of the diagnoses documented for this chapter and was 0.1% of all diagnoses documented. A total of 13,068 (4.57%) admissions contained a documented diagnosis for this diagnosis in this chapter.

Table 49: Diagnoses of Chapter VII

Diagnosis Description	Frequency	Percentage
Disorders of lens	11,218	52.68
Disorders of choroid and retina	2,949	13.85
Visual disturbances and blindness	1,948	9.15
Other disorders of e	1,233	5.79
Disorders of eyelid, lacrimal system and orbit	1,166	5.48
Glaucoma	782	3.67
Disorders of conjunctiva	711	3.34
Disorders of sclera, cornea, iris and ciliary body	399	1.87
Other disorders of eye and adnexa	327	1.54
Disorders of vitreous body and globe	262	1.23
Disorders of ocular muscles, binocular movement, accommodation and refraction	227	1.07
Disorders of optic nerve and visual pathways	74	0.35
Total	**21,296**	**100.00**

Table 50: Procedures Undertaken for Principal Diagnosis of Chapter VII

Procedures	Number	Percentage
Procedures on eye and adnexa	10,094	96.53
Dermatological and plastic procedures	236	2.26
Non-invasive, cognitive and other interventions	54	0.52
Imaging services	46	0.44
Procedures on Nervous System	11	0.11
Procedures on cardiovascular system	9	0.09
Procedures on digestive system	2	0.02
Procedures on urinary system	2	0.02
Procedures on nose, mouth and pharynx	1	0.01
Procedures on respiratory system	1	0.01
Radiation and oncology procedures	1	0.01
Total	**10,457**	**100.00**

Chapter VIII: Diseases of the Ear

Table 51 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, a small number, 1,455 were classified under Chapter VIII.

Table 51: Diagnoses of Chapter VIII

Diagnosis description	Frequency	Percentage
Diseases of inner ear	572	39.31
Diseases of external ear	455	31.27
Diseases of middle ear and mastoid	428	29.42
Total	**1,455**	**100.00**

Table 52: Procedures Undertaken for Principal Diagnosis of Chapter VIII

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	146	45.48
Imaging services	93	28.97
Dermatological and plastic procedures	58	18.07
Procedures on cardiovascular system	6	1.87
Procedures on digestive system	4	1.25
Procedures on nose, mouth and pharynx	4	1.25
Procedures on urinary system	3	0.93
Procedures on Nervous System	2	0.62
Procedures on musculoskeletal system	2	0.62
Procedures on eye and adnexa	1	0.31
Procedures on respiratory system	1	0.31
Radiation and oncology procedures	1	0.31
Total	**321**	**100.00**

Chapter IX: Circulatory System

Table 53 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 134,602 were classified under Chapter IX. The most frequently occurring diagnoses across the admissions was for other forms of heart disease, Ischemic heart diseases and hypertensive diseases. This group of diagnoses contributed to 70% of all of the diagnoses documented for this chapter and was 8.4% of all diagnoses documented. A total of 66,899 (23.38%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 53: Diagnoses of Chapter IX

Diagnosis Description	Frequency	Percentage
Other forms of heart disease	40,457	30.06
Ischaemic heart diseases	28,499	21.17
Hypertensive diseases	25,183	18.71
Diseases of arteries, arterioles and capillaries	11,533	8.57
Cerebrovascular diseases	9,552	7.10
Other and unspecified disorders of the circulatory system	7818	5.81
Diseases of veins, lymphatic vessels and lymph nodes, not elsewhere classified	7,514	5.58
Pulmonary heart disease and diseases of pulmonary circulation	2720	2.02
Chronic rheumatic heart diseases	1,319	0.98
Acute rheumatic fever	7	0.01
Total	**134,602**	**100.00**

Table 54: Procedures Undertaken for Principal Diagnosis of Chapter IX

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	6,857	34.75
Procedures on cardiovascular system	5,758	29.18
Imaging services	4,032	20.44
Procedures on digestive system	1,019	5.16
Procedures on respiratory system	469	2.38
Procedures on urinary system	413	2.09
Procedures on Nervous System	382	1.94
Procedures on musculoskeletal system	372	1.89
Dermatological and plastic procedures	298	1.51
Procedures on blood and blood forming organs	56	0.28
Radiation and oncology procedures	27	0.14
Procedures on nose, mouth and pharynx	16	0.08
Procedures on male genital organs	14	0.07
Procedures on eye and adnexa	10	0.05
Procedures on breast	4	0.02
Dental services	2	0.01
Procedures on Endocrine System	1	0.01
Total	**19,730**	**100.00**

Chapter X: Respiratory System

Table 55 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 48,606 were classified under Chapter X. The most frequently occurring diagnoses across the admissions were for Chronic lower respiratory diseases and influenza and pneumonia. This group of diagnoses contributed to 59% of all of the diagnoses documented for this chapter and was 2.6% of all diagnoses documented. A total of 31,625 (11.05%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 55: Diagnoses for Chapter X

Diagnosis Description	Frequency	Percentage
Chronic lower respiratory diseases	20,746	42.68
Influenza and pneumonia	8,001	16.46
Other diseases of the respiratory system	5,963	12.27
Other acute lower respiratory infections	4,163	8.56
Other diseases of pleura	3,320	6.83
Other respiratory diseases principally affecting the interstitium	2,127	4.38
Lung diseases due to external agents	1,465	3.01
Other diseases of upper respiratory tract	1,368	2.81
Acute upper respiratory infections	1,247	2.56
Suppurative and necrotic conditions of lower respiratory tract	206	0.42
Total	**48,606**	**100**

Table 56: Procedures Undertaken for Principal Diagnosis of Chapter X

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	7,851	62.78
Procedures on respiratory system	1,908	15.26
Imaging services	1,368	10.94
Procedures on nose, mouth and pharynx	303	2.42
Procedures on digestive system	293	2.34
Procedures on cardiovascular system	276	2.21
Procedures on urinary system	232	1.86
Dermatological and plastic procedures	107	0.86
Procedures on musculoskeletal system	56	0.45
Procedures on Nervous System	34	0.27
Radiation and oncology procedures	34	0.27
Procedures on blood and blood forming organs	23	0.18
Procedures on eye and adnexa	9	0.07
Procedures on male genital organs	7	0.06
Procedures on breast	3	0.02
Dental services	1	0.01
Total	**12,505**	**100.00**

Chapter XI: Digestive System

Table 57 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 70,979 were classified under Chapter XI. The most frequently occurring diagnoses across the admissions were for Other diseases of the intestines and diseases if the oesophagus, stomach and duodenum. This group of diagnoses contributed to 58% of all of the diagnoses documented for this chapter and was 3.7% of all diagnoses documented. A total of 36,590 (12.79%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 57: Diagnoses of Chapter XI

Diagnosis Description	Frequency	Percentage
Other diseases of intestines	24,616	34.68
Diseases of oesophagus, stomach and duodenum	16,717	23.55
Non-infective enteritis and colitis	6,086	8.57
Other diseases of the digestive system	5,577	7.86
Hernia	5,195	7.32
Disorders of gallbladder, biliary tract and pancreas	4,687	6.60
Diseases of liver	3,465	4.88
Diseases of oral cavity, salivary glands and jaws	2,384	3.36
Diseases of peritoneum	2,040	2.87
Diseases of appendix	212	0.30
Total	**70,979**	**100.00**

Table 58: Procedures Undertaken for Principal Diagnosis of Chapter XI

Procedures	Number	Percentage
Procedures on digestive system	15,754	77.69
Non-invasive, cognitive and other interventions	2,503	12.34
Imaging services	876	4.32
Dental services	535	2.64
Procedures on urinary system	149	0.73
Procedures on nose, mouth and pharynx	122	0.60
Dermatological and plastic procedures	99	0.49
Procedures on cardiovascular system	77	0.38
Procedures on musculoskeletal system	64	0.32
Procedures on respiratory system	48	0.24
Radiation and oncology procedures	23	0.11
Procedures on Nervous System	17	0.08
Procedures on blood and blood forming organs	5	0.02
Procedures on eye and adnexa	2	0.01
Procedures on male genital organs	2	0.01
Procedures on Endocrine System	1	0.00
Total	**20,277**	**100.00**

Chapter XII: Skin

Table 59 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 26,482 were classified under Chapter XII. The most frequently occurring diagnoses across the admissions were for other disorders of the skin and subcutaneous tissue and infections of the skin and subcutaneous tissue. This group of diagnoses contributed to 81% of all of the diagnoses documented for this chapter and was 1.9% of all diagnoses documented. A total of 20,926 (7.31%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 59: Diagnoses of Chapter XII

Diagnosis Description	Frequency	Percentage
Other disorders of the skin and subcutaneous tissue	11,318	42.74
Infections of the skin and subcutaneous tissue	10,126	38.24
Radiation-related disorders of the skin and subcutaneous tissue	1,611	6.08
Dermatitis and eczema	1,546	5.84
Disorders of skin appendages	1,067	4.03
Papulosquamous disorders	473	1.79
Urticaria and erythema	242	0.91
Bullous disorders	99	0.37
Total	**26,482**	**100.00**

Table 60: Procedures Undertaken for Principal Diagnosis of Chapter XII

Procedures	Number	Percentage
Dermatological and plastic procedures	3,432	51.63
Non-invasive, cognitive and other interventions	2,122	31.92
Procedures on musculoskeletal system	392	5.90
Imaging services	255	3.84
Procedures on cardiovascular system	183	2.75
Procedures on digestive system	97	1.46
Procedures on urinary system	54	0.81
Procedures on Nervous System	28	0.42
Procedures on respiratory system	23	0.35
Procedures on blood and blood forming organs	15	0.23
Radiation and oncology procedures	13	0.20
Procedures on breast	9	0.14
Procedures on eye and adnexa	8	0.12
Procedures on nose, mouth and pharynx	7	0.11
Procedures on male genital organs	5	0.08
Dental services	2	0.03
Procedures on Endocrine System	2	0.03
Total	**6,647**	**100.00**

Chapter XIII: Musculoskeletal and Connective Tissue

Table 61 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 50,950 were classified under Chapter XIII. The most frequently occurring diagnoses across the admissions were for Arthrosis, Other dorsopathies, disorders of bone density and structure and spondylopathies. This group of diagnoses contributed to 58% of all of the diagnoses documented for this chapter and was 2.6% of all diagnoses documented. A total of 31,039 (10.85%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 61: Diagnoses of Chapter XIII

Diagnosis Description	Frequency	Percentage
Arthrosis	8,837	17.34
Other dorsopathies	7,299	14.32
Disorders of bone density and structure	6,655	13.06
Spondylopathies	6,639	13.03
Inflammatory polyarthropathies	4,979	9.77
Other joint disorders	4,697	9.22
Other soft tissue disorders	4,628	9.08
Other osteopathies	2,528	4.96
Systemic connective tissue disorders	1,528	2.99
Deforming dorsopathies	983	1.93
Disorders of synovium and tendon	826	1.62
Disorders of muscles	551	1.08
Infectious arthropathies	436	0.85
Other disorders of the musculoskeletal system and connective tissue	247	0.48
Chondropathies	117	0.23
Total	**50,950**	**100**

Table 62: Procedures Undertaken for Principal Diagnosis of Chapter XIII

Procedures	Number	Percentage
Procedures on musculoskeletal system	8,592	46.65
Procedures on Nervous System	4,791	26.01
Non-invasive, cognitive and other interventions	3,230	17.54
Imaging services	1,103	5.99
Dermatological and plastic procedures	153	0.83
Procedures on cardiovascular system	149	0.81
Radiation and oncology procedures	135	0.73
Procedures on digestive system	113	0.61
Procedures on urinary system	93	0.50
Procedures on respiratory system	24	0.13
Procedures on blood and blood forming organs	18	0.10
Procedures on nose, mouth and pharynx	8	0.04
Dental services	5	0.03
Procedures on male genital organs	2	0.01
Procedures on breast	1	0.01
Procedures on eye and adnexa	1	0.01
Total	**18,418**	**100.00**

Chapter XIV: Genitourinary System

Table 63 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 51,677 were classified under Chapter XIV. The most frequently occurring diagnoses across the admissions were Other diseases of urinary system and renal failure. This group of diagnoses contributed to 67% of all of the diagnoses documented for this chapter and was 3.3% of all diagnoses documented. A total of 33,214 (11.61%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 63: Diagnoses of Chapter XIV

Diagnosis Description	Frequency	Percentage
Other diseases of urinary system	20,855	40.36
Renal failure	14,047	27.18
Non-inflammatory disorders of female genital tract	4,784	9.26
Diseases of male genital organs	3,208	6.21
Renal tubulo-interstitial diseases	1,866	3.61
Other disorders of kidney and urethra	1,569	3.04
Other disorders of genitourinary tract	1,549	3.00
Inflammatory diseases of female pelvic organs	1,113	2.15
Glomerular diseases	1,106	2.14
Urolithiasis	895	1.73
Disorders of breast	685	1.33
Total	**51,677**	**100.00**

Table 64: Procedures Undertaken for Principal Diagnosis of Chapter XIV

Procedures	Number	Percentage
Procedures on urinary system	4,119	51.80
Non-invasive, cognitive and other interventions	1,702	21.41
Procedures on male genital organs	821	10.33
Imaging services	565	7.11
Procedures on breast	287	3.61
Procedures on digestive system	197	2.48
Procedures on cardiovascular system	115	1.45
Dermatological and plastic procedures	48	0.60
Procedures on musculoskeletal system	28	0.35
Procedures on respiratory system	23	0.29
Procedures on Endocrine System	16	0.20
Procedures on Nervous System	11	0.14
Procedures on blood and blood forming organs	11	0.14
Radiation and oncology procedures	7	0.09
Procedures on nose, mouth and pharynx	1	0.01
Total	**7,951**	**100.00**

Chapter XV: Pregnancy, Childbirth, Etc

Table 65: Diagnoses of Chapter XV

Diagnosis Description	Frequency	Percentage
Complications of labour and delivery	505	21.77
Maternal care related to the foetus and amniotic cavity and possible delivery problems	475	20.47
Other maternal disorders predominantly related to pregnancy	457	19.70
Other obstetric conditions, not elsewhere classified	311	13.41
Complications predominantly related to the puerperium	185	7.97
Duration of pregnancy	154	6.64
Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium	149	6.42
Pregnancy with abortive outcome	56	2.41
Delivery	28	1.21
Total	**2,320**	**100.00**

Table 66: Procedures Undertaken for Principal Diagnosis of Chapter XV

Procedures	Number	Percentage
Obstetric procedures	526	85.95
Non-invasive, cognitive and other interventions	56	9.15
Procedures on breast	10	1.63
Dermatological and plastic procedures	8	1.31
Procedures on cardiovascular system	3	0.49
Procedures on digestive system	3	0.49
Procedures on musculoskeletal system	3	0.49
Procedures on Nervous System	2	0.33
Procedures on urinary system	1	0.16
Total	**612**	**100.00**

Chapter XVI: Perinatal Period

This diagnosis chapter heading had very few admissions for this client group

Chapter XVII: Congenital Malformations

This diagnosis chapter heading had very few admissions for this client group

Chapter XVIII: Abnormal Findings Not Classified Elsewhere

Table 67 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 68,571 were classified under Chapter XVIII. The most frequently occurring diagnoses across the admissions were Symptoms and signs involving the digestive system and abdomen, General symptoms and signs and Symptoms and signs involving the urinary system. This group of diagnoses contributed to 58% of all of the diagnoses documented for this chapter and was 3.5% of all diagnoses documented. A total of 43,322 (15.14%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 67: Diagnoses of Chapter XVIII

Diagnosis Description	Frequency	Percentage
Symptoms and signs involving the digestive system and abdomen	15,637	22.80
General symptoms and signs	12,298	17.93
Symptoms and signs involving the urinary system	11,686	17.04
Symptoms and signs involving the circulatory and respiratory systems	9,991	14.57
Symptoms and signs involving cognition, perception, emotional state and behaviour	7,074	10.32
Symptoms and signs involving the nervous and musculoskeletal systems	5,111	7.45
Symptoms and signs involving speech and voice	2,355	3.43
Abnormal findings on diagnostic imaging and in function studies, without diagnosis	1,744	2.54
Symptoms and signs involving the skin and subcutaneous tissue	1,716	2.50
Abnormal findings on examination of blood, without diagnosis	761	1.11
Abnormal findings on examination of urine, without diagnosis	137	0.20
Abnormal findings on examination of other body fluids, substances and tissues, without diagnosis	61	0.09
Total	**68,571**	**100.00**

Table 68: Procedures Undertaken for Principal Diagnosis of Chapter XVIII

Procedures	Number	Percentage
Non-invasive, cognitive and other interventions	2,806	27.98
Procedures on digestive system	2,434	24.27
Imaging services	1,800	17.95
Procedures on urinary system	1,498	14.94
Procedures on cardiovascular system	508	5.07
Procedures on respiratory system	294	2.93
Procedures on nose, mouth and pharynx	204	2.03
Procedures on Nervous System	184	1.83
Dermatological and plastic procedures	92	0.92
Procedures on musculoskeletal system	67	0.67
Radiation and oncology procedures	50	0.50
Procedures on blood and blood forming organs	46	0.46
Procedures on male genital organs	30	0.30
Procedures on eye and adnexa	7	0.07
Procedures on breast	6	0.06
Procedures on Endocrine System	2	0.02
Dental services	1	0.01
Total	**10,029**	**100.00**

Chapter XIX: Injury, Poisoning

Table 69 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 26,091 were classified under Chapter XIX. The most frequently occurring diagnoses across the admissions were Injuries to the head, Injuries to the hip and thigh and Injuries to the knee and lower leg. This group of diagnoses contributed to 51% of all of the diagnoses documented for this chapter and was 1.2% of all diagnoses documented. A total of 14,331 (5.01%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 69: Diagnoses of Chapter XIX

Diagnosis Description	Frequency	Percentage
Injuries to the head	4,619	17.70
Injuries to the hip and thigh	4,431	16.98
Injuries to the knee and lower leg	4,157	15.93
Injuries to the elbow and forearm	2,877	11.03
Injuries to the abdomen, lower back, lumbar spine and pelvis	2,520	9.66
Injuries to the shoulder and upper arm	2,365	9.06
Injuries to the thorax	1,799	6.90
Injuries to the wrist and hand	1,735	6.65
Injuries to the ankle and foot	1,223	4.69
Injuries to the neck	365	1.40
Total	**26,091**	**100.00**

Table 70: Procedures Undertaken for Principal Diagnosis of Chapter XIX

Procedures	Number	Percentage
Procedures on musculoskeletal system	6,655	38.18
Non-invasive, cognitive and other interventions	4,021	23.07
Dermatological and plastic procedures	2,153	12.35
Imaging services	1,315	7.54
Procedures on cardiovascular system	911	5.23
Procedures on digestive system	779	4.47
Procedures on urinary system	735	4.22
Procedures on Nervous System	278	1.60
Procedures on respiratory system	198	1.14
Procedures on eye and adnexa	144	0.83
Procedures on breast	100	0.57
Procedures on nose, mouth and pharynx	58	0.33
Procedures on male genital organs	28	0.16
Dental services	19	0.11
Radiation and oncology procedures	18	0.10
Procedures on blood and blood forming organs	16	0.09
Procedures on Endocrine System	1	0.01
Total	**17,429**	**100.00**

Chapter XXI: Factors Influencing Health Status

Table 71 shows that out of the 1,115,936 diagnoses documented for the 67,674 clients, 240,625 were classified under Chapter XXI. The most frequently occurring diagnoses across the admissions were Persons with potential health hazards related to family and personal history and certain conditions influencing health status and Persons encountering health services for specific procedures and health care. This group of diagnoses contributed to 66% of all of the diagnoses documented for this chapter and was 14.2% of all diagnoses documented. A total of 139,110 (48.61%) admissions contained documented diagnoses for either of the most frequent diagnoses in this chapter.

Table 71: Diagnoses of Chapter XXI

Diagnosis Description	Frequency	Percentage
Persons with potential health hazards related to family and personal history and certain conditions influencing health status	102,484	42.59
Persons encountering health services for specific procedures and health care	56,494	23.48
Persons encountering health services in other circumstances	30,113	12.51
Complications of surgical and medical care, not elsewhere classified	19,468	8.09
Persons with potential health hazards related to socioeconomic and psychosocial circumstances	12,984	5.40
Persons encountering health services for examination and investigation	8,989	3.74
Sequelae of injuries, of poisoning and of other consequences of external causes	2,030	0.84
Poisoning by drugs, medicaments and biological substances	1,826	0.76
Persons with potential health hazards related to communicable diseases	1,818	0.76
Burns	904	0.38
Other complications of trauma not elsewhere classified	888	0.37
Persons encountering health services in circumstances related to reproduction	868	0.36
Certain early complications of trauma	451	0.19
Other and unspecified effects of external causes	394	0.16
Injuries to unspecified part of trunk, limb or body region	378	0.16
Effects of foreign body entering through natural orifice	251	0.10
Toxic effects of substances chiefly non-medicinal as to source	228	0.09
Injuries involving multiple body regions	57	0.02
Total	**240,625**	**100.00**

Table 72: Procedures Undertaken for Principal Diagnosis of Chapter XXI

Procedures	Number	Percentage
Radiation and oncology procedures	27,599	60.16
Non-invasive, cognitive and other interventions	9,743	21.24
Procedures on digestive system	2,991	6.52
Procedures on urinary system	2,819	6.15
Procedures on cardiovascular system	925	2.02
Procedures on musculoskeletal system	622	1.36
Imaging services	315	0.69
Dermatological and plastic procedures	283	0.62
Procedures on breast	209	0.46
Procedures on Nervous System	139	0.30
Procedures on respiratory system	121	0.26
Procedures on nose, mouth and pharynx	31	0.07
Procedures on blood and blood forming organs	26	0.06
Procedures on eye and adnexa	23	0.05
Procedures on male genital organs	20	0.04
Dental services	6	0.01
Obstetric procedures	1	0.00
Total	**45,873**	**100.00**