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Predicting Hospital Admissions of Silver Chain Clients

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Background



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- Hospital admissions represent significant cost to the WA community
- Understand the characteristics of clients who have frequent/lengthy hospital stays
- Study built on previous research by Silver Chain

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I'm not telling you anything new in saying that hospital admissions are expensive and represent a significant cost to the WA community. In the recently released "State of our Public Hospitals" report, the cost of each hospital admission was reported as being almost \$4000. This adds up to a great deal of money considering the 7.6 million admissions to Australia's hospitals in 2006-2007.

We know from previous research that Silver Chain's clients are frequently hospitalised, and as providers of community care services to these individuals, organisations such as Silver Chain are ideally placed to reduce the risk of hospitalisation by providing targeted health strategies in the community rather than in hospitals.

So this research, was undertaken to understand the characteristics of clients who are the hospital "frequent flyers" and see if there was any way that we could identify them as being different to other clients so that we can target health strategies to reduce their risk of hospitalisation.

Objectives



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- Identify Silver Chain clients who were hospitalised
- Describe their clinical and demographic characteristics
- Predict which clients would have long and /or frequent hospital stays

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So the objectives of this research were to....

Identify clients who were admitted to hospital during the 5 ½ year period 1 July 1999 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 if any characteristics could be use to predict which community care clients were likely to have frequent and/or lengthy hospital stays

How did we do it?      SILVER CHAIN

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- Linked data
- Data set included hospital records of 67,674 individuals who were Silver Chain clients at the time of their hospitalisation
- Included 286,185 admissions



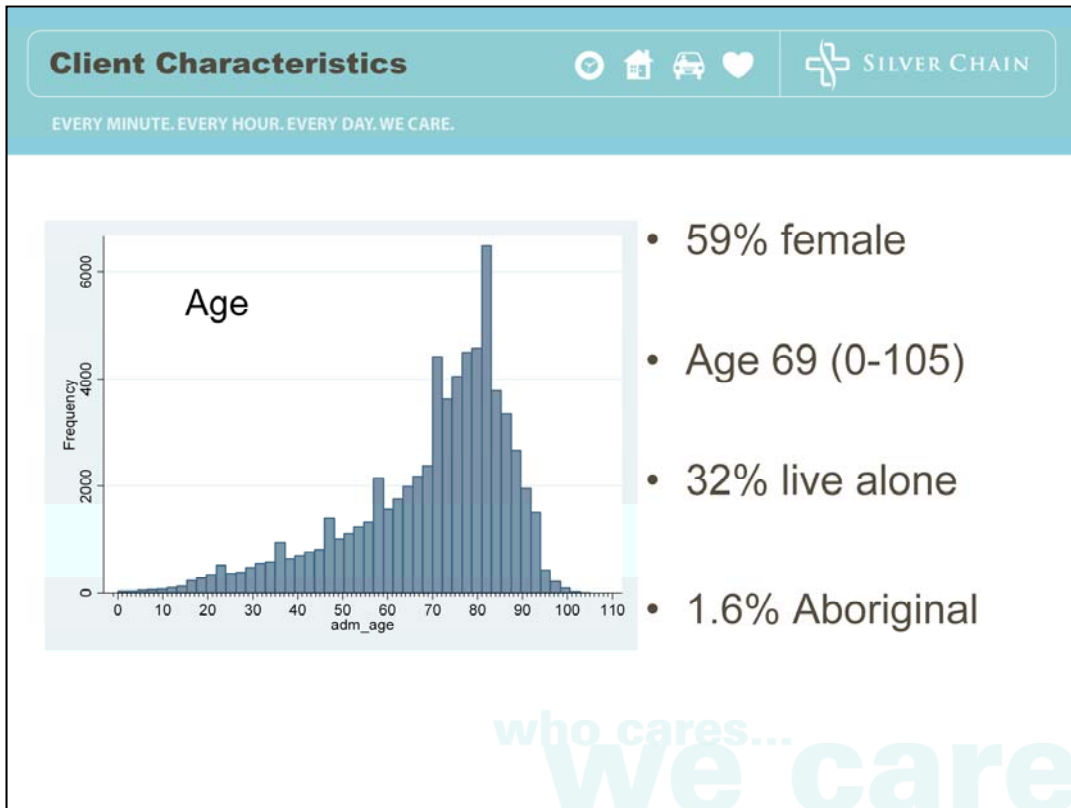
So, how did we do all this?

Silver Chain is part of the Western Australian Data Linkage System so there are links between Silver Chain client records and all of the other population health data systems including the one that was used in this research – the Hospital morbidity data set.

By linking Silver Chain's clients' data to this, we were able to identify which clients had been hospitalised during the 5 and ½ years, why they were hospitalised, any procedures that were done to them while there, how long they were in hospital and where they went when they were discharged.

The resulting data containing both Silver Chain and HMDS data included the hospital records of 67,674 clients who were Silver Chain clients at the time of their hospital admission.

This final data set included 286,185 admissions.

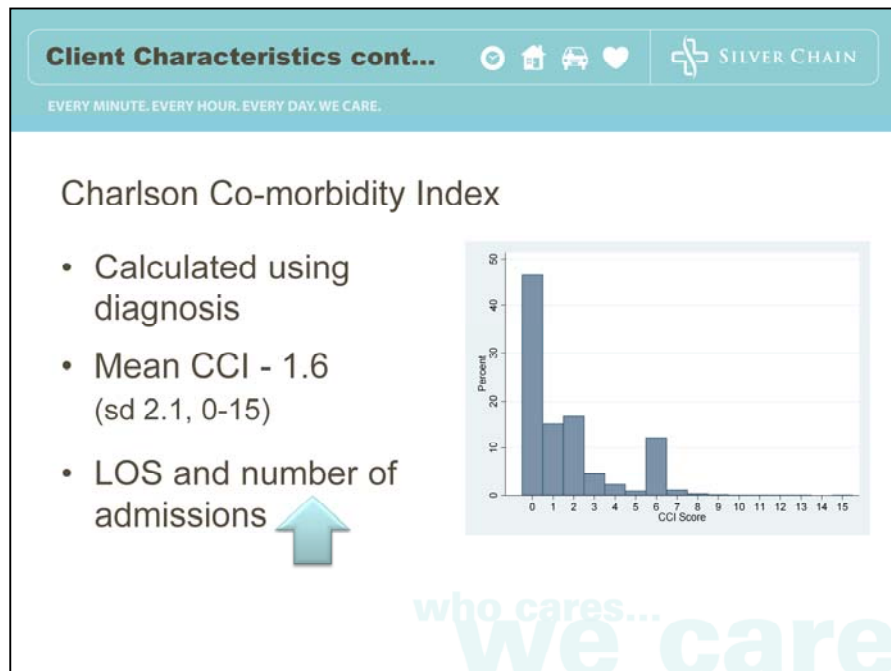


Silver Chain pop – female = 61%

Median age = 74

Percentage who live alone is smaller than the Silver Chain population (45%)

Silver Chain has very few aboriginal clients and less than 2% of clients is representative of the Silver Chain population



•The Charlson Co-morbidity Index 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.

•We calculated the index based on all of the diagnoses data for each hospital admission – each admission can have up to 21 diagnoses

•As seen in the graph, almost 50% of the admissions were associated with a CCI of 0 indicating no risk of death.

•The graph also shows a spike at a score of 6. 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.

•Generally, looking at the CCI scores for these clients, as the score increases so too does the LOS for admissions as well as the frequency of admissions.

Client Characteristics cont...



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Chronic Disease	Number	Percentage
Diabetes	18,178	28.86%
Chronic Heart Disease	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%



51% of clients had a diagnosis of at least one chronic disease

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Silver Chain clients were admitted to hospital having a huge variety of diagnoses. To make some sense of the data, I looked at those most commonly occurring, and those that Silver Chain was likely to be able to have an influence in some way in targeting health strategies or services.

Admissions



SILVER CHAIN

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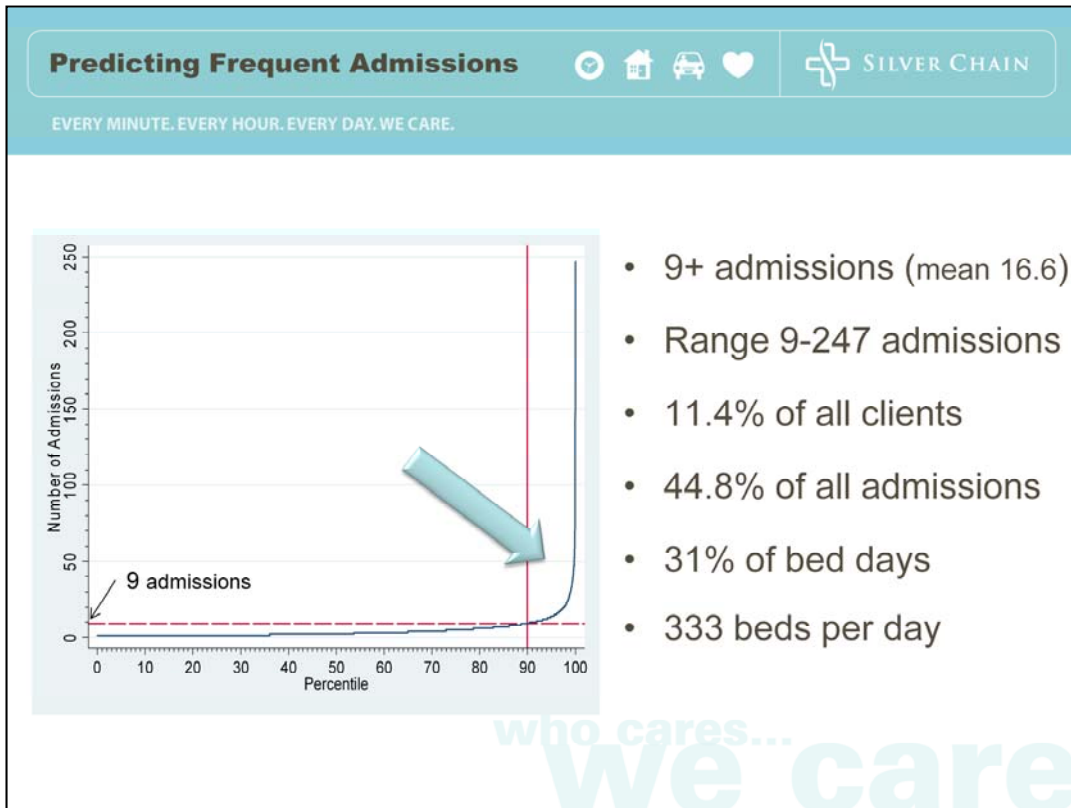
- LOS - 7.6 days (sd 16.93; <1-1,250)
- Admissions - 4.2 (sd 6.2, 1-247)
- Total time spent in hospital 32.2 days (sd 49.3, 1-1,425)
- Bed days – 1,085
 - 886 metropolitan, 198 rural
 - 714 public, 371 private
- Discharged:
 - 93% discharged home
 - 3% died in hospital
 - 1% discharged to RACF



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Bed days – the number of beds occupied by a Silver Chain client each and every day of the 5 ½ years

1250 days =3.4 years



As I just mentioned, on average these clients were admitted to hospital 4 times over the time period analysed. In order to identify whether or not someone was admitted an unusual number of times and be classified as a “Frequent Flyer”, we identified the clients whose number of admissions was above the 90th percentile.

As you can see from the graph here, the number of admissions to hospital above the 90th percentile (those to the right of the red line) was 9 or more admissions and ranged up to 247 admissions. 11.4% of the clients hospitalised or 7,725 individuals were identified in this way as being a “frequent flyer”.

This 11% of clients were responsible for 45% of all of the admissions during the time period

Also, for each day of the 5 ½ years, these clients using 333 hospital beds throughout the state.

**Predicting Frequent Admissions
cont...**



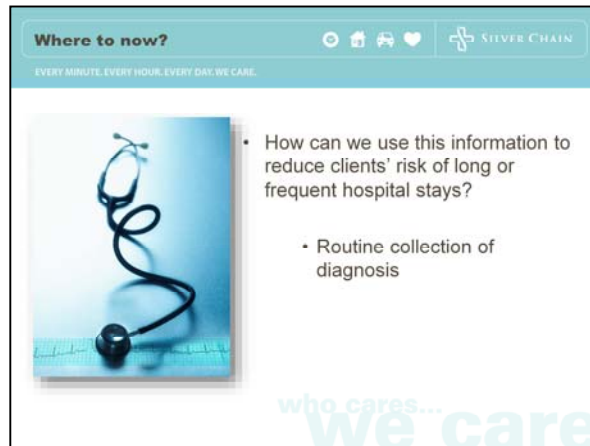
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Factor	Odds Ratio (Adjusted)	95% Confidence Interval	Percentage Change
Number of Chronic diseases	1.99*	1.91-2.06	98.6%
Fracture	1.61*	1.49-1.74	61.4%
Osteoporosis*Fracture	1.43*	1.25-1.65	43.4%
CCI	1.26*	1.24- 1.27	25.7%
Lives Alone	1.16*	1.10-1.23	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%

Using logistic regression, the odds of being a “frequent flyer” were calculated with all other factors taken into consideration (including the presence of another chronic condition(s), age, gender, CCI, number of diseases and living arrangement).

The number of chronic diseases a person has significantly increases the odds of being classified as a frequent flyer. If a person 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 classified a frequent flyer increases six times.

Having a fracture or a diagnosis of osteoporosis and having a fracture increases the odds of being a frequent flyer by up to 61%.



The results clearly show that diagnosis of any or more of these selected conditions are predictive of frequent hospital admissions. But diagnosis is not something that is routinely collected by Silver Chain for all clients and is therefore not necessarily recorded on their client record. But it needs to be. This could be as simple as asking the client on referral or review whether they had any of the selected conditions. Targeted health management strategies could then be implemented to assist these clients to improve or better maintain their health and so avoid hospitalisation.

One health management strategy that Silver Chain has begun to investigate is the use of telehealth monitoring of clients with chronic diseases which was described earlier by Kristen.

This presentation has been of only a small part of the Hospital Admission report. If you are interested in the complete report, it can be found on our website.

Or if you have any questions

Further Information



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