

SNAPSHOT OF INTEGRATED CARE IN CENTRAL AND EASTERN SYDNEY: GENERAL PRACTICE ATTENDANCE FOLLOWING HOSPITAL ADMISSION

A PRELIMINARY ANALYSIS



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EXECUTIVE SUMMARY

Rationale: Integration and co-ordination of health care are key performance indicators for Local Health Districts and for Primary Health Care Networks. Ensuring seamless care at the transition from hospital to community care and vice versa are integral to improving co-ordination and sharing of information. One measure of transition is return to general practice for follow-up of care after a hospital admission.

Project aims: The aim of this project was to understand the occurrence of and the factors associated with the rate of and time to return to general practitioners (GPs) for follow-up by a community dwelling population of residents who participated in the '45 and Up Study' and were admitted to hospital in the year following recruitment.

Methods: A cross sectional analysis using the '45 and Up' survey data linked to the administrative datasets was performed. These administrative datasets included Medicare Benefits Schedule data, NSW Admitted Patient Data Collection and the Registry of Births, Deaths, and Marriages. The participants were 31,173 '45 and Up' Study participants who resided within the common catchments of Sydney (SLHD) and South East Sydney (SESLHD) Local Health Districts and Central and Eastern Sydney Primary Health Network (CESPHN). Participants with at least one hospital admission in the twelve months following recruitment were included.

The primary outcome measure was return to GP following admission. The association of return to GP and demographic, socioeconomic, lifestyle, wellbeing, and health services factors were explored.

Results: 84.1% of the 7,235 participants residing in Central and Eastern Sydney catchment area with a hospital admission within 12 months of recruitment to the 45 and Up Study returned to general practice within 12 months of discharge. The mean time to follow-up was 34.6 days (SD: 46.1 days).

39.2% of participants had a record of a claim for GP consultation within 2 weeks of discharge. There was no difference in follow-up for males or females. Participants aged 75 years or more were significantly more likely to have a claim for GP consultation than younger participants. Participants with low socioeconomic status as indicated by low education attainment or household income were nearly twice as likely to have a GP claim within two weeks of discharge as participants with a university education or higher income. Participants who reported poorer health were significantly more likely to have a GP claim than participants who did not report any health conditions. This trend was also observed for participants who reported severe level of physical limitation according to SF36 or severe anxiety according to K10 score.

Participants were admitted for a wide range of principal reasons coded using ICD10AM. The percent who returned to GP follow-up within 2 weeks varied by ICD 10 chapter from 31% to 62%. Return was low for patients who were admitted for neoplastic conditions and highest for patients who were admitted for respiratory conditions and circulatory conditions. Participants who were admitted with

an ambulatory care sensitive condition was more likely to return to general practice within 2 weeks than their counterparts. Further exploration of the variability in rates of return is required.

Relatively high rates of re-admission were observed; 34.8% (n=2,516) were readmitted within 4 weeks. GP follow-up was associated with readmission; of participants who were readmitted, 44.4% had a claim for GP care within 2 weeks compared to 36.5% who were not readmitted.

Implications for health services: Generally, there are low rates of return to general practice following a hospital admission. This said, participants who may be at risk of poorer outcomes including those with low socioeconomic status, poor overall health status, and physical limitations or high levels of psychological distress were more likely to attend the GP within 2 weeks of discharge. Further investigation of the reasons for variability by diagnostic codes is required. These results have implications for discharge communication and handover during transition from hospital to community care, particularly for those with complex care needs.

Further research opportunities: The analysis based on the primary reason for admission (ICD10) used only the chapter headings. These may have been broad groups that missed potential information. Further we did not distinguish those admissions that were day only admissions, procedural, or avoidable/unplanned. Further analysis of these factors is warranted.

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BACKGROUND

Integration of health care and referral back to general practice are key goals of health care services and aim to reduce the impact of unplanned hospital admissions on the health system and on patients and their families. This is increasingly so due to an ageing population and increasing numbers of patients with chronic and complex health care needs place challenges on health care provision. One aspect of improving integration and co-ordination of services is discharge planning. Discharge planning aims to ensure a seamless transition of care from the hospital to community setting.

The Australian Medical Association has published a position statement on discharge planning that states: *“Patients are relying more than ever on their general practitioner (GP) to co-ordinate their care needs, particularly around the time of hospital admission and discharge. To this end, patients quite rightly expect that important relevant information is communicated expeditiously between the medical professionals caring for them. Appropriate and effective transfer of care arrangements are not an issue solely for patients with chronic disease; they are important for any patient who receives care both from their GP and in a hospital”*[1].

Discharge planning and transfer of care from hospital to general practice through discharge arrangements have substantial benefits for patients and the health system. When appropriate and effective plans are put in place and followed, not only are hospital readmissions reduced and adverse events minimised, overall the patient, their families, the doctors and other health practitioners involved in providing care have a much more satisfactory and positive experience[1].

Discharge planning involves preparation of a separation summary that is frequently given to patients with an instruction to see their GP within 7 days of discharge. Research has shown that there are high rates of completion within the hospital system but variability in the mode of delivery and frequent delays in their delivery[2]. A recent audit of discharge planning in Victoria showed that when discharge summaries were prepared and sent to the GP, they were received for 92% of 49 identified admissions; 73% were received within three days and 55% before the first post-discharge visit to the general practitioner (GP)[2]. Administrative information and clinical content, including diagnosis, treatment and follow-up plans, were well reported. However, information regarding tests, referrals and discharge medication was often missing; 57% of summaries were entirely typed and 13% had legibility issues. Thus there are several issues with discharge planning including the ideal return time to general practice for patients, robustness in the preparation of the discharge plan, the best way of delivering the discharge plan to GPs and whether patients understand the purpose of the discharge plan and the processes involved in return to general practice and organisation of follow-up care and referral.

In the Central and Sydney Catchment area, little is known about the effectiveness of discharge plans that are given to patients on discharge. Some work undertaken by the author in Western Sydney indicated that patients frequently do not understand the purpose of the discharge plan or its content and frequently do not understand the need for GP follow-up (Comino, personal communication, 2015). In particular, this may mean that recommended referrals and prescribed medications are not adhered to.

An important first step in delivery and implementation of the discharge plan is patient return to GP. Whether the discharge plan is given to patients to deliver or posted, there is little information on how long it takes for patients to see their GP following discharge or anything about the factors that are associated with return to GP. However arbitrarily it has been assumed that patients will return within 7 days. One of the incentives to ensure return is the need to attend to obtain follow-up prescriptions for any medications that were organised while in hospital. While there is little information on the processes, it is possible using a linked data that includes information on primary care and hospital admission, as well as participant characteristics, to explore the factors that are associated with the duration of time to return to general practice, following discharge.

PROJECT AIMS

This preliminary study describes the rate of and time to return to GPs for follow-up by a community dwelling population of residents who participated in the 45 and Up Study and were admitted to hospital in the year following recruitment. The study explored the participant demographic characteristics, socio economic status, lifestyle and health and wellbeing and their association with return to general practice. The study examined the impact of diagnostic reason for admission on return to general practice and explores the factors that are associated with variability in return. It also investigated the impact of return to general practice within 2 weeks of admission on outcomes including readmission.

The specific research questions that were addressed:

1. What is the average time from discharge from acute care to follow-up by a general practitioner?
2. What proportion of adults attends general practice within 2 weeks of discharge from acute care?
3. What are the patient, system and health status factors that are associated with attendance with general practice within 2 weeks of discharge from acute care?
4. Does attendance for GP follow-up vary by principal diagnosis of the index admission?
5. Does attendance for GP and specialist follow-up prevent readmission to hospital?
6. Does attendance for GP and/or specialist follow-up lead to preparation of GPMP/TCA?

METHODS

This is a record linkage study employing cross-sectional analysis of baseline data from the 45 and Up Study linked to Medicare Benefits Schedule data and NSW Admitted Patient Data Collection. This dataset was also linked to the Registry of Births, Deaths, and Marriages to exclude participants who had died during the study period.

STUDY DATA

THE 45 AND UP STUDY

The Sax Institute's 45 and Up Study comprises more than 250,000 residents of NSW, Australia. Details of the recruitment of this cohort have been described previously (3). Potential study participants aged 45 years or older in NSW were randomly sampled from the the Medicare enrolment database. They were sent an invitation to participate, a description of the Study, a self-administered questionnaire, and a consent form. Participants joined the Study by completing the baseline questionnaire and providing consent for long-term follow up, including linkage of their questionnaire data to health records being collected by public health authorities. Recruitment occurred between 2006 and 2009, with 70% of the sample being recruited in 2008. The response rate was 18%. The baseline questionnaire collected information on a range of participant characteristics (available at <https://www.saxinstitute.org.au/our-work/45-up-study/>). PBS and MBS data were supplied by the Australian Government Department of Human Services and deterministically linked to the 45 and Up Study baseline data. The remaining datasets were probabilistically linked by the NSW Centre for Health Record Linkage, with quality audits showing fewer than 0.5% false positive links.

DEPARTMENT OF HUMAN SERVICES DATA

Department of Human Services is the administering body for Australia's universal health insurance system: the Medical Benefits Schedule (MBS). MBS data includes all claims for subsidised medical, diagnostic and some allied health services provided to Australians by registered medical and other eligible health care practitioners(4). We extracted the following information for the purposes of this study: date of the service, the 'Item Number' for the service, and provider practice postcode.

NSW REGISTRY OF BIRTHS, DEATH AND MARRIAGES

The NSW Registry of Births, Death and Marriages is a record of all deaths that have been certified as to cause and date by a registered medical practitioner or a coroner. Information from it was used to identify and exclude study participants who died within 12 months of recruitment.

NSW MINISTRY OF HEALTH: ADMITTED PATIENT DATA COLLECTION

The NSW Ministry of Health has responsibility for all inpatient services and collates data on admissions into the NSW Admitted Patient Data Collection (APDC). Data were available for 2000-2009. The APDC collates inpatient admissions (discharges, transfers and deaths) from all public, private, and repatriation hospitals, private day procedure centres and public nursing homes in NSW. These data include limited demographic characteristics, diagnoses, date of admission and discharge, and length of stay for individual episodes of hospitalisation. The diagnoses were coded using International Classification of Disease 10th revision-Australian Modification (ICD-10-AM) codes. APDC data were available for this study for 2000-2009. For these analyses, APDC records were extracted for the 12 months following recruitment for each participant.

STUDY POPULATION

45 and Up Study participants who were resident in Sydney Local Health District (SLHD) or South East Sydney Local Health District (SESLHD) were eligible for the study and were identified for this study using residential postcode at recruitment. These LHDs combined formed the catchment for Central and Eastern Sydney Primary Health Network (CESPHN). The study population was restricted to those who had an hospital admission within 12 months of recruitment to the 45 and Up Study

MAIN OUTCOME MEASURES

The primary outcome measure was return to GP following hospital admission. This was ascertained calculating the time between discharge date for the index admission and date of claim for subsequent GP consultation. This was measured in days. We investigated categorising follow-up to follow-up at <2 weeks, follow-up at 2 weeks to less than 4 weeks and follow-up at 4 weeks or more. Since 39% of patients returned to general practice within 2 weeks the data were dichotomised and follow-up within 2 weeks investigated;

The other two outcome measures included

- Proportion of participants with an index admission who were readmitted to hospital within defined time (4 weeks of discharge)
- Proportion of participants with a claim for preparation of or review of GPMP/TCA in 12 months following admission

STUDY FACTORS

Individual factors were derived from participant responses recorded in the baseline questionnaire and health service use from the administrative datasets. These included four broad categories: demographic, socioeconomic factors, wellbeing and health service use.

Demographic characteristics

- age (*categorised as 45-59, 60-74 and 75 or more years*)
- gender (*male or female*)
- country of birth (*Australia or overseas*)

Socio-economic status

- Highest educational qualification (*University, Trade/diploma, School Certificate, less than Year 10*)
- Annual household income (*>=\$70,000, \$40,000-\$69,000, \$20,000-\$39,000, <\$20,000*)

Wellbeing

- Number of health conditions (*The number of chronic conditions was identified from participants' responses to the questions "Has a doctor ever told you that you have . . ." or "In the last month have you been treated for -?" and listed a number of chronic health conditions including cancer, heart disease, high blood pressure, stroke, anxiety, and depression. Participant responses were summed and classified as none, 1, 2, and 3 or more.*)
- Psychological distress (*measured using the Kessler-10 score and categorised as low (score of 10-15), moderate (16-21), high (22-29), and very high (30+)*[3, 4].)
- Functional capacity (*measured using the Medical Outcomes Study, Short Form 36 Physical Functioning Scale (SF36-PF) and was classified as no limitation (score of 100), minor (90-99), moderate (60-89), and severe (0-59) limitation*[5, 6].)

Health Service Use

- Index hospitalisation (*the first hospitalisation event following recruitment to the 45 and Up Study during the 12 months following recruitment. A Participant who was not admitted in the 12 months following admission was classified as a non-admission*)
- Readmission (*a hospital admission that occurred within 4 weeks of discharge from Index Hospital admission*)
- Preparation of GP Management Plan/Team Care Arrangements (*evidence of a claim for preparation of a GPMP/TCA in 12 months following Index Admission*)
- Review of GPMP/TCA (*evidence of a claim for preparation of a GPMP/TCA in 12 months following Index Admission*)

DATA ANALYSIS

Descriptive and multivariate methods were undertaken to assess the return to GP post hospital admission. Contingency tables were created to describe the association between study factors and the main outcome variable, GP follow up within 2 weeks.

Logistic regression models were used to estimate the probability of a person following up with a GP within 2 weeks on the basis of their demographic, socio economic, and well being indicators. The odds ratio and 95 % confidence interval were calculated. All analyses were carried out in SAS version 9.3 (SAS Institute Inc., Cary, NC, USA). All the tests were two-sided and a p-value of less than or equal to 0.05 was considered statistically significant.

RESULTS

The linked dataset included 31,115 participants in the 45 and Up Study who were resident in the combined study regions (12,551 in SLHD and 18,564 in SESLHD) and were successfully linked to the MBS and APDC data.

There were 7,235 participants (2,589 in SLHD and 4,646 in SESLHD) residing in Central and Eastern Sydney with a hospital admission within 12 months of recruitment to the 45 and Up Study. Of these 6,083 (84.1%) returned to general practice (as indicated by the presence of a claim for GP care in MBS data) in the 12 months following the admission. The mean time to follow-up was 34.6 days (SD: 46.1 days). 2,839(39.2%) returned to the GP within 2 weeks of discharge from the Index admission; 1,091(42.1%) and 1,748(37.6% within SLHD and SESLHD respectively).

TABLE 1: DURATION OF TIME FROM HOSPITAL DISCHARGE TO CLAIM FOR GP CONSULTATION DURING 12 MONTHS FOLLOWING HOSPITALISATION AMONG PARTICIPANTS IN CENTRAL SYDNEY (N=7,235)

Measure	SLHD	SESLHD	CES
Number of participants with Index separation	2,589	4,646	7,235
Number with claim for GP consultation within 12 months of discharge (n, (%))	2,195 (84.8)	3,888 (83.7)	6,083 (84.1)
Number with no claim for GP consultation within 12 months	394 (15.2)	758 (16.3)	1,152 (15.9)
Summary of number of days from discharge to claim for GP consultation for those with GP attendance			
Number of GP claims (N)*	2,195	3,888	6,083
Mean days to GP claim(SD)	31.4(43.2)	36.3(47.6)	34.6(46.1)
Median days	15.0	18.0	17.0
Mode	1.0	1.0	1.0
Duration of days to GP claim			
<2 weeks	1091(42.1)	1,748(37.6)	2,839(39.2)
2 - <4 weeks	346(13.4)	619(13.3)	965(13.3)
4+ weeks	1152(44.5)	2279(49.1)	3,431(47.4)
Summary of number of days from discharge to claim for Specialist consultation for those with Specialist attendance			
Number of Specialist claims (N)**	1,908	3,569	5,477
Mean (SD)	33.7(50.0)	32.6(53.7)	33.0(52.4)
Median	15.0	11.0	12.0
Mode	0.0	0.0	0.0
Duration of days to Specialist claim			
<2 weeks	949(36.7)	1,942(41.8)	2,891(40.0)
2 - <4 weeks	256(9.9)	435(9.4)	691(9.6)
4+ weeks	1,384(53.5)	2,269(48.8)	3,653(50.5)

*Excludes participants who did not return to general practice in the 12 months following discharge (N=1,152)

**Excludes participants who did not return to specialist consultation in the 12 months following discharge (N=1,758)

Table 2 summarises the proportions of participants who returned to general practice within two weeks of discharge by their demographic characteristics, socioeconomic status, lifestyle, health and wellbeing.

Overall 39.2% of participants who were admitted to hospital in the 12 months following recruitment had a record of a claim for GP consultation within 2 weeks of discharge. There was no difference in follow-up for males or females. Participants aged 75 years or more were significantly more likely to have a claim for GP consultation than younger participants. Participants with low socioeconomic status as indicated by low education attainment or household income were nearly twice as likely to have a claim for GP consultation within two weeks of discharge than participants with a university education or higher income. Similarly participants with three or more health conditions were also significantly more likely to have a claim for GP consultation than participants who did not report any health conditions. This trend was also observed for participants who reported severe level of physical limitation according to SF36 or severe anxiety according to K10 score.

TABLE 2: FREQUENCY OF GP FOLLOW-UP WITHIN 2 WEEKS STRATIFIED BY DEMOGRAPHIC, SOCIOECONOMIC, LIFESTYLE, AND HEALTH AND WELLBEING CHARACTERISTICS OF PARTICIPANTS (N=7,235).

Participant Characteristics	Follow-up < 2 weeks		Odds ratio
	n =2,839	%	OR* (95% CI)
Gender			
Male	1,434	38.7	1
Female	1,405	39.8	0.98(0.89-1.08)
Age group (years)			
45-59	712	29.9	1
60-74	997	39.2	1.19(1.05-1.35)
≥75	1,130	49.0	1.49(1.30-1.70)
Education			
University	643	29.8	1
Trade/Certificate/Diploma	816	39.9	1.22(1.06-1.39)
School certificate	948	43.3	1.28(1.12-1.47)
Less than Year 10	363	53.2	1.62(1.34-1.96)
Household Income			
≥\$70,000	523	25.4	1
\$40,000-\$69,999	406	37.4	1.52(1.29-1.79)
\$20,000-\$39,999	420	42.6	1.68(1.41-2.00)
<\$20,000	730	52.8	2.34(1.98-2.77)
Health status			
Number of health conditions			
None	1,124	34.4	1
1	939	40.5	1.20(1.07-1.34)
2	505	45.1	1.36(1.18-1.57)
≥3	271	51.1	1.64(1.35-1.98)

Participant Characteristics	Follow-up < 2 weeks		Odds ratio
	n =2,839	%	OR* (95% CI)
SF-36(level of physical limitation)			
No (100)	482	28.1	1
Minor (90-99)	559	34.0	1.20(1.04-1.40)
Moderate (60-89)	745	42.0	1.43(1.23-1.66)
Severe (0-59)	743	52.9	1.87(1.58-2.20)
K-10(level of psychological distress)			
Low (10-15)	1,747	36.3	1
Moderate (11-21)	402	40.4	1.15(1.00-1.33)
High (22-29)	149	44.4	1.23(1.00-1.55)
Very high (30-50)	85	53.5	1.64(1.18-2.27)
Specialist visit in 2 weeks§			
No	1,661	38.2	1
Yes	1,178	40.8	1.20(1.09-1.32)
Readmission			
No	1,721	36.5	1
Yes	1,118	44.4	1.21(1.09-1.34)

Note: *Adjusted with gender, age, education and household income.

§ MBS Specialist items were based on first claim of the items: 104, 105, 110, 116, 119, 122, 128, 131, 132, 133;

Note: Percentages do not consistently total to 100% due to missing values

MAJOR REASON FOR ADMISSION

The major reasons for admission are given in Table 3. Participants were admitted for a wide range of principal reasons. Five sub-categories were chosen for further exploration; these were cardiovascular conditions (endocrine and circulatory), neoplasms, respiratory, musculoskeletal, and genitourinary conditions. The reasons for admission were also categorised as ambulatory care sensitive (14.1% of admissions) and non-ambulatory care sensitive conditions.

TABLE 3: FREQUENCY OF GP FOLLOW-UP WITHIN 2 WEEKS STRATIFIED BY PRINCIPAL REASON FOR ADMISSION (MAJOR DISEASE CATEGORY CATEGORISED BY ICD10 CHAPTER (CHAP)) (N = 7,235)

ICD 10 Chapter	Frequency within chapter		Frequency of GP follow-up < 2 weeks	
	n	%	n	%
Chap1 (A00-B99):Certain infectious and parasitic diseases	79	1.09	39	49.4
Chap2 (C00-D48): Neoplasms	847	11.71	296	35.0
Chap3 (D50-D89):Blood, blood-forming organs and immune mechanism*	74	1.02	33	44.6
Chap4 (E00-E89):Endocrine, nutritional and metabolic diseases	121	1.67	53	43.8
Chap5 (F00-F99):Mental and behavioural disorders	71	0.98	30	42.3
Chap6 (G00-G99):Diseases of the nervous system	218	3.01	87	39.9
Chap7 (H00-H59):Diseases of the eye and adnexa	570	7.88	156	27.4
Chap8 (H60-H95):Diseases of the Ear and mastoid process	42	0.58	17	40.5
Chap9 (I00-I99):Diseases of the circulatory system	631	8.72	372	59.0
Chap10 (J00-J99):Diseases of the respiratory system	225	3.11	141	62.7
Chap11 (K00-K93):Diseases of the digestive system	1194	16.5	404	33.8
Chap12 (L00-L99):Diseases of the skin and subcutaneous tissue	113	1.56	42	37.2
Chap13 (M00-M99):Diseases of the musculoskeletal system and connective tissue	707	9.77	219	31.0
Chap14 (N00-N99):Diseases of the genitourinary system	530	7.33	190	35.9
Chap15 (O00-O99):Pregnancy, childbirth and the puerperium	2	0.03	0	0.0
Chap17 (Q00-Q99):Congenital and chromosomal abnormalities	10	0.14	4	40.0
Chap18 (R00-R99):Abnormal clinical and laboratory findings	676	9.34	343	50.7
Chap19 (S00-T98):Injury, poisoning and other external causes	389	5.38	190	48.8
Chap21 (Z00-Z99):Factors influencing health status and health services	736	10.17	223	30.3
Sub-category by disease chapters				
Chap 4 & 9: Endocrine and circulatory	752	10.4	425	56.5
Chap 2: Neoplasms	847	11.7	296	35.0
Chap 10: Respiratory	225	3.1	141	62.7
Chap 13: Musculoskeletal	707	9.8	219	31.0
Chap 14: Genitourinary	530	7.3	170	35.9
Others	4,174	57.7	1,568	37.6
Category by ambulatory care sensitive condition				
ACSE principal diagnosis	1021	14.11	444	43.5
Non-ACSE principal diagnosis	6214	85.89	2,395	38.5

ASSOCIATION BETWEEN REASON FOR HOSPITALISATION (ICD-10 CHAPTER) AND GP FOLLOW-UP

Table 3 also summarises the differences in the proportions of participants who returned to GP within 2 weeks of discharge by IDC10 chapter. The percent who returned to general practice for follow-up within 2 weeks varied by chapter from 31% to 62%. Return was low for patients who were admitted for a neoplastic conditions (Chapter 2) and highest for patients who were admitted with respiratory conditions (62.7%; Chapter 10) and circulatory condition (59.0%; Chapter 9). Participants who were admitted with an ambulatory care sensitive condition were more likely to return to GP within 2 weeks than the remainder.

For conditions that are likely to be managed primarily in GP such as respiratory conditions, diseases of the circulatory system or musculoskeletal system there was variable follow-up following hospital. For example, of the 631 participants admitted with a circulatory condition, 372 (59.0%) returned to general practice within 2 weeks of discharge.

Similar rates of return to GP were observed for diseases of the respiratory system.

For diseases of the musculoskeletal system and connective tissue which are chronic conditions likely to require ongoing care in GP, only 219 (31.0%) returned to general practice within 2 weeks.

Among the 790 participants who were admitted with diseases of the digestive condition, only 404 (33.8%) returned to GP within 2 weeks and the majority 503 (56.5%) did not return within 4 weeks making follow-up of the reason for admission difficult.

For conditions likely to be managed in tertiary care services such as neoplasms there was poor return to GP within 2 weeks even though primary care might have a role in overall care. For patients admitted for neoplasm 35.0% returned to general practice within 2 weeks.

ASSOCIATION BETWEEN GP FOLLOW-UP, READMISSION WITHIN 4 WEEKS AND SPECIALIST CARE

Readmission was used as one possible outcome measure of the impact of GP care. Using a general definition of readmission as a readmission within 4 weeks (28 days) of discharge from the index admission, the study revealed that 34.8% (n=2,516) of participants were readmitted within 4 weeks (Table 4). GP follow-up was associated with readmission; of participants who were readmitted 44.4% were seen by their GP within 2 weeks compared to participants who were not readmitted of whom 36.5% were not seen within 2 weeks.

A specialist consultation within 2 weeks was observed for 40% (n=2,891) of participants. Participants who had a specialist consultation were more likely to have also had a GP follow-up.

Table 4: prevalence of re-admission and claim for specialist care within two weeks among participants with an index admission (n=7,235)

	frequency		GP Follow-up < 2 weeks	
	n	%	n	%
Re-admission within 4 weeks				
Yes	2,516	34.8	1,118	44.4
No	4,719	65.2	1,721	36.5
Specialist visit in 2 weeks				
Yes	2,891	40.0	1,178	40.8
No	4,344	60.0	1,661	38.2

ASSOCIATION OF PARTICIPANT CHARACTERISTICS WITH RETURN TO GP:

Further analysis was undertaken to compare impact of participant characteristics on return to GP within selected ICD10 Chapters. These are summarised in Table 5a – 5e.

Sub-group analysis by ICD10 chapters:

- Endocrine & circulatory systems (N=752)

Of participants with an admission related to an endocrine or circulatory condition, 57% had a claim for timely return to GP. Most demographic and socioeconomic factors were not associated with return to GP for patients with endocrine or circulatory diagnoses (Table 5a). Participants with low income were 2.6 time more likely to return to GP within 2 weeks. However an association between GP return and specialist consultation in the 2 weeks following admission was observed (OR:1.49).

- Neoplasm systems (N=847)

Where the primary diagnosis was a neoplasm related condition 35% had a claim for GP care within 2 weeks of discharge. Age, gender, education were not significantly associated with timely return to GP. Low income (OR:2.6), multiple health conditions (OR:2.1), and were associated with timely return to GP. The number of specialist visit increased (Adj. OR: 1.29, 95%CI: 0.95-1.74, p=0.10) among the patients with neoplasm within two weeks of discharge compared to who did not visit specialist within two weeks. The GP follow-up increased with the number of health conditions within two weeks of follow-up (Adj. OR: 1.21, 95%CI, 0.86-1.69; 1.46, specialist care (OR:1.3),and psychological distress (OR:2.9) were associated with timely return to GP.

- Respiratory systems (N=225)

For participants who were admitted with a respiratory system condition, 63% had timely return to GP. Age, gender, education, health status, physical limitation, and psychological distress were not significantly associated with timely return (Table 5c). Participants who had a claim for specialist care were 3.4 times more likely to return to GP within 2 weeks.

- Musculoskeletal systems (N=707)

About a third of participants (31%) with an admission for a musculoskeletal condition had a claim for timely return to GP. Timely GP follow-up was associated with physical limitation (OR: 2.0) and with low income (Table 5d).

- Genitourinary systems (N=530)

- For participant with a primary diagnosis relating to a genitourinary condition 36% returned to GP within 2 weeks of discharge. Among the participant characteristics explored only low income (OR: 3.4) and physical limitation (OR:2.3) were significantly associated with timely return to GP (Table 5e).

Table 5a: GP follow-up within 2 weeks stratified by participant characteristics demographic, and health care for participants who were admitted with a primary diagnosis of endocrine and circulatory system disorders (N=752).

Characteristics	GP follow up <2 weeks		Odds ratio of GP follow up within 2 weeks
	n=425	%	OR (95%CI)
Gender			
Male	249	57.9	1
Female	176	54.7	0.82(0.60-1.13)
Age group (years)			
45-59	78	43.8	1
60-74	164	60.3	1.49(0.98-2.26)
≥75	183	60.6	1.35(0.88-2.09)
Education			
University	75	43.1	1
Trade/Certificate/Diploma	146	64.0	1.85(1.21-2.84)
Year 10 or higher	142	58.4	1.38(0.89-2.16)
Less than Year 10	50	57.5	1.15(0.64-2.05)
Household Income			
≥\$70,000	63	39.1	1
\$40,000-\$69,999	56	55.5	1.61(0.95-2.72)
\$20,000-\$39,999	66	60.6	1.89(1.09-3.28)
<\$20,000	117	63.9	2.24(1.34-3.74)
Number of health conditions			
None	142	54.6	1
1	162	57.9	1.02(0.71-1.45)
2	76	53.9	0.77(0.49-1.19)
≥3	45	63.4	1.18(0.67-2.06)
SF-36(level of limitation)			
No (100)	65	47.8	1
Minor (90-99)	71	47.7	0.91(0.56-1.47)
Moderate (60-89)	106	54.4	1.03(0.64-1.65)
Severe (0-59)	135	68.2	1.73(1.04-2.88)
K-10(level of psychological distress)			
Low (10-15)	263	54.9	1
Moderate (11-21)	56	55.5	1.01(0.64-1.59)
High (22-29)	20	66.7	1.48(0.66-3.30)
Very high (30-50)	11	52.4	0.84(0.34-2.09)
Visit Specialist in 2 weeks			
No	208	52.3	1
Yes	217	61.3	1.49(1.10-2.02)
Readmission			
No	240	55.6	1
Yes	185	57.8	0.98(0.72-1.33)

TABLE 5B: GP FOLLOW-UP WITHIN 2 WEEKS STRATIFIED BY PARTICIPANT CHARACTERISTICS DEMOGRAPHIC, AND HEALTH CARE FOR PARTICIPANTS WHO WERE ADMITTED WITH A PRIMARY DIAGNOSIS OF NEOPLASMS SYSTEM DISORDERS (N=847).

Characteristics	GP follow up <2 weeks		Odds ratio of GP follow up within 2 weeks
	n=296	%	OR (95%CI)
Gender			
Male	170	34.4	1
Female	126	35.7	1.00(0.74-1.36)
Age group (years)			
45-59	76	29.0	1
60-74	103	33.0	1.02(0.69-1.49)
≥75	117	42.9	1.28(0.85-1.94)
Education			
University	72	27.0	1
Trade/Certificate/Diploma	103	38.0	1.30(0.88-1.92)
At least year 10	90	38.3	1.23(0.82-1.86)
Less than Year 10	23	39.7	1.18(0.63-2.23)
Household Income			
≥\$70,000	59	23.8	1
\$40,000-\$69,999	49	34.8	1.59(0.99-2.55)
\$20,000-\$39,999	43	34.4	1.40(0.83-2.35)
<\$20,000	65	50.4	2.60(1.54-4.37)
Number of health conditions			
None	124	30.5	1
1	93	35.9	1.21(0.86-1.69)
2	47	40.2	1.46(0.94-2.26)
≥3	32	50.0	2.06(1.19-3.56)
SF-36(level of limitation)			
No (100)	64	28.3	1
Minor (90-99)	65	29.6	1.00(0.65-1.53)
Moderate (60-89)	89	40.5	1.46(0.96-2.24)
Severe (0-59)	54	45.4	1.50(0.90-2.49)
K-10(level of psychological distress)			
Low (10-15)	197	32.5	1
Moderate (11-21)	35	33.0	1.02(0.65-1.59)
High (22-29)	9	45.0	1.77(0.70-4.48)
Very high (30-50)	8	61.5	2.91(0.91-9.27)
Visit Specialist in 2 weeks			
No	175	32.8	1
Yes	121	38.5	1.29(0.95-1.74)
Readmission			
No	163	30.2	1
Yes	133	43.2	1.68(1.25-2.27)

TABLE 5C: GP FOLLOW-UP WITHIN 2 WEEKS STRATIFIED BY PARTICIPANT CHARACTERISTICS DEMOGRAPHIC, AND HEALTH CARE FOR PARTICIPANTS WHO WERE ADMITTED WITH A PRIMARY DIAGNOSIS OF RESPIRATORY SYSTEM DISORDERS (N=225).

Characteristics	GP follow up <2 weeks		Odds ratio of GP follow up within 2 weeks
	n=141	%	OR (95%CI)
Gender			
Male	71	58.7	1
Female	70	67.3	1.17(0.63-2.18)
Age group (years)			
45-59	24	46.2	1
60-74	42	65.6	1.36(0.57-3.21)
≥75	75	68.8	1.57(0.68-3.64)
Education			
University	25	51.0	1
Trade/Certificate/Diploma	37	55.2	0.69(0.29-1.61)
At least year 10	44	71.0	1.22(0.48-3.10)
Less than Year 10	28	77.8	1.33(0.43-4.10)
Household Income			
≥\$70,000	16	38.1	1
\$40,000-\$69,999	10	55.6	1.76(0.52-5.94)
\$20,000-\$39,999	19	57.6	1.81(0.62-5.24)
<\$20,000	57	79.2	4.49(1.54-13.14)
Number of health conditions			
None	35	50.0	1
1	54	66.7	1.66(0.81-3.40)
2	32	71.1	2.19(0.91-5.28)
≥3	20	69.0	1.60(0.60-4.30)
SF-36(level of limitation)			
No (100)	14	38.9	1
Minor (90-99)	15	51.7	1.92(0.65-5.65)
Moderate (60-89)	39	70.9	2.62(0.99-6.91)
Severe (0-59)	56	66.7	1.86(0.73-4.72)
K-10(level of psychological distress)			
Low (10-15)	77	61.6	1
Moderate (11-21)	22	64.7	1.20(0.50-2.88)
High (22-29)	5	50.0	0.39(0.09-1.76)
Very high (30-50)	7	77.8	1.31(0.24-7.21)
Visit Specialist in 2 weeks			
No	82	55.4	1
Yes	59	76.6	3.39(1.70-6.74)
Readmission			
No	86	62.3	1
Yes	55	63.2	0.87(0.47-1.60)

TABLE 5D: GP FOLLOW-UP WITHIN 2 WEEKS STRATIFIED BY PARTICIPANT CHARACTERISTICS DEMOGRAPHIC, AND HEALTH CARE FOR PARTICIPANTS WHO WERE ADMITTED WITH A PRIMARY DIAGNOSIS OF MUSCULOSKELETAL SYSTEM DISORDERS (N=707).

Characteristics	GP follow up <2 weeks		Odds ratio of GP follow up
	n=219	%	within 2 weeks OR (95%CI)
Gender			
Male	108	32.3	1
Female	111	29.8	0.76(0.54-1.07)
Age group (years)			
45-59	62	26.2	1
60-74	84	29.2	0.89(0.59-1.34)
≥75	73	40.1	1.19(0.75-1.89)
Education			
University	25	42.4	1
Trade/Certificate/Diploma	70	32.3	1.09(0.69-1.72)
At least year 10	67	32.5	0.99(0.62-1.57)
Less than Year 10	52	24.2	1.31(0.68-2.52)
Household Income			
≥\$70,000	39	17.7	1
\$40,000-\$69,999	34	32.4	2.20(1.26-3.86)
\$20,000-\$39,999	35	38.5	2.90(1.58-5.32)
<\$20,000	56	40.9	3.04(1.73-5.33)
Number of health conditions			
None	95	27.1	1
1	67	31.6	1.15(0.78-1.69)
2	39	40.2	1.66(1.01-2.72)
≥3	18	37.5	1.38(0.72-2.65)
SF-36(level of limitation)			
No (100)	22	17.2	1
Minor (90-99)	36	30.0	1.98(1.06-3.70)
Moderate (60-89)	58	29.3	1.70(0.95-3.04)
Severe (0-59)	78	40.8	2.51(1.38-4.55)
K-10(level of psychological distress)			
Low (10-15)	134	28.1	1
Moderate (11-21)	33	35.5	1.33(0.82-2.17)
High (22-29)	15	37.5	1.31(0.65-2.64)
Very high (30-50)	8	50.0	1.80(0.63-5.10)
Visit Specialist in 2 weeks			
No	65	32.2	1
Yes	54	27.7	0.77(0.53-1.13)
Readmission			
No	131	29.4	1
Yes	88	33.6	1.08(0.76-1.53)

TABLE 5E: GP FOLLOW-UP WITHIN 2 WEEKS STRATIFIED BY PARTICIPANT CHARACTERISTICS DEMOGRAPHIC, AND HEALTH CARE FOR PARTICIPANTS WHO WERE ADMITTED WITH A PRIMARY DIAGNOSIS OF GENITOURINARY SYSTEM DISORDERS (N=530).

Characteristics	GP follow up <2 weeks		Odds ratio of GP follow up within 2 weeks
	n=190	%	OR (95%CI)
Gender			
Male	112	40.9	1
Female	78	30.5	0.66(0.44-0.99)
Age group (years)			
45-59	67	28.5	1
60-74	61	37.7	1.00(0.62-1.61)
≥75	62	46.6	1.09(0.64-1.87)
Education			
University	44	25.6	1
Trade/Certificate/Diploma	64	39.0	1.45(0.89-2.37)
At least year 10	60	41.4	1.70(1.03-2.82)
Less than Year 10	19	45.2	1.46(0.69-3.09)
Household Income			
≥\$70,000	36	22.6	1
\$40,000-\$69,999	25	28.4	1.23(0.66-2.28)
\$20,000-\$39,999	25	41.7	1.99(1.01-3.91)
<\$20,000	49	55.7	3.40(1.79-6.47)
Number of health conditions			
None	89	33.3	1
1	51	32.9	0.94(0.60-1.48)
2	32	43.8	1.51(0.87-2.65)
≥3	18	51.4	1.66(0.78-3.54)
SF-36(level of limitation)			
No (100)	34	22.5	1
Minor (90-99)	36	28.1	1.17(0.66-2.08)
Moderate (60-89)	62	52.1	3.39(1.92-5.98)
Severe (0-59)	33	48.5	2.30(1.14-4.62)
K-10(level of psychological distress)			
Low (10-15)	121	34.1	1
Moderate (11-21)	25	31.7	0.81(0.47-1.40)
High (22-29)	9	50.0	1.69(0.63-4.56)
Very high (30-50)	7	53.9	1.36(0.42-4.35)
Visit Specialist in 2 weeks			
No	127	34.3	1
Yes	63	39.4	1.29(0.86-1.93)
Readmission			
No	114	32.3	1
Yes	76	42.9	1.40(0.94-2.09)

DISCUSSION

This was a preliminary analysis of data held by CPHCE as a part of a demonstration project to show the use of linked administrative data collections for exploring questions of interest to both Local Health Districts and the Primary Health Network. This demonstration project explored some demographic, socioeconomic, and health and wellbeing factors that were associated with timely return to GP among 45 and Up Study participants who resided in Central and Eastern Sydney and who were admitted to hospital in the 12 months following their recruitment to the Study (n=7,235).

The mean time to GP follow-up was 35 days (Table 1). Thirty nine percent returned to GP within 2 weeks while there were 16% of participants in this study who did not return to their GP within 12 months of discharge. A claim for specialist care was observed for 40% of participants.

Timely return to GP was associated with older age, less than 12 years of education, low income, multiple health conditions, limitations in physical functioning, and high levels of psychological distress. Participants who saw their specialist within 2 weeks were also more likely to have a claim for GP care within 2 weeks of discharge.

In these data there was a relatively high rate of readmission; 36% were readmitted within 4 weeks of discharge. Participants who saw their GP within 2 weeks were more likely to be readmitted than participants who did not see their GP. These results suggest that GPs are likely to refer patients back to hospital. Further research is needed to explore these associations.

The percent of participants who had a claim for timely return to GP varied from about 30% to 70% depending on the primary diagnostic reason for admission. While this also requires further investigation the low rate of timely return to GP is concerning and indicates that there are opportunities for interventions to improve return especially for those conditions such as musculoskeletal and respiratory conditions that are likely to be mainly managed in the primary care setting.

For conditions more likely to be managed in a hospital setting such as primary diagnosis of neoplastic condition poor rates of timely return to GP care were observed even though primary care might have a role in overall care.

There are a number of limitations of these data for this purpose. Firstly the project used participant information collected as recruitment to the 45 and Up Study which occurred between 2006 and 2009 with 70% occurring in 2008. The Index hospitalisation was determined from the APDC which was used to identify participants who were admitted in the year following their recruitment. GP follow-up and specialist care was determined from claims for care that were recorded in the MBS data in the year following the index hospitalisation. All data was collected prior to 2010. The analysis based on the primary reason for admission (ICD10) used only the chapter headings. These may have been broad groups that missed potential information. Further we did not distinguish those admissions that were day only admissions, procedural, or avoidable/unplanned. Further analysis of these factors is warranted.

However the message overall is that there are low rates of return to general practice following a hospital admission. This said, participants who may be at risk of poorer outcomes including those with low socioeconomic status, poor overall health status, and physical limitations or high levels of psychological distress were more likely to attend GP within 2 weeks of discharge. Further investigation of the reasons for variability by diagnostic codes is required. These results have implications for discharge communication and handover during transition from hospital to community care, particularly for those with complex care needs.

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