Hospital Use by People with COPD, Diabetes, Ischemic Heart Disease and Heart Failure in Saskatchewan

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Prepared by Population health branch, Saskatchewan ministry of health

For more information contact:
Val Mann, PhD
Chief Population Health Epidemiologist
Population Health Branch, Saskatchewan Ministry of Health
epidemiology@health.gov.sk.ca

Purpose:

The purpose of this report is to present an analysis of inpatient all-cause hospital use (days per person in hospital) information for people with chronic obstructive pulmonary disease (COPD), diabetes, ischemic heart disease (IHD) and heart failure (HF) in Saskatchewan.

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Background

This snapshot report describes inpatient hospital use for any reason for people with and without four chronic diseases: chronic obstructive pulmonary disease (COPD), diabetes (DM), ischemic heart disease (IHD) and heart failure (HF). All-cause hospital utilization includes all reasons for a hospital stay and is used to assess the health of a population.

Measuring the difference in all-cause hospital use between people with a chronic condition and those without the condition is a population-level marker of how well people are doing. The better a chronic disease is managed, the fewer days people will spend in hospital for any reason. Reducing the gap in hospital use between people with a chronic condition and those without the condition is a common objective for chronic disease management at the population level.

Chronic diseases do not always occur alone. Individuals can have more than one chronic disease. This is called multimorbidity and it presents challenges for health care, including management while in hospital. On average, a person with one or more chronic diseases will have a longer hospital stay than people without a chronic disease, regardless of the reason for hospitalization.

This report groups all-cause hospital days by combinations of the four diseases: COPD, DM, IHD, or HF. It is possible for people to have other chronic diseases but this analysis is limited to these four. Trends in hospital length of stay for these groups as well as for people without one of the diseases are described for the ten years from 2003/04 to 2012/13.

Key Findings

In the 10 years from 2003/04 to 2012/13 for residents aged 40 years and older:

- About 139,000 residents per year (28%) had at least one of the four chronic diseases: COPD, DM, IHD, or HF.
- Residents with at least one of the four chronic diseases increased from 25% of the population in 2003/04 to 30% in 2012/13.
- The majority of people (72%) did not have any of the four diseases. They spent less than one day per year in hospital and about 6% were hospitalized in each year with no significant change from year to year. Because most people without any of the four diseases spent no time in the hospital, the average days in hospital per year was less than one day.

Characteristics of chronic disease hospital use groups:

- Combining people by their conditions results in 15 possible combinations of the four diseases. They can be grouped by days per person in hospital (or the percentage of cases hospitalized) into low hospital use, medium hospital use, and high hospital use categories. Their characteristics are listed below.
- The low-hospital-use group:
  - is the largest group and includes about 65% of residents with chronic disease;
  - have a single disease (IHD, DM or COPD);
  - about 15% were hospitalized in each year;
  - on average spent 1.8 days per year in hospital; and
  - had a decrease in hospital days per person by about 0.2 days per person during the 10 years.
- The medium-hospital-use group:
  - is a smaller group and includes about 17% of residents with chronic disease;
  - have two or more of IHD, DM or COPD;
  - about one-quarter were hospitalized in each year; and
  - on average spent 3.6 days per year in hospital.
- The high-hospital-use group:
  - is similar in size to the medium-hospital-use group and includes about 19% of residents with chronic disease;
  - is comprised of people with HF alone or in combination;
  - about 40% were hospitalized in each year;
  - on average spent eight days per year in hospital; and
  - their hospital days per person were highly variable from year to year with a range of 1.7 days per year between the lowest and highest use years.

All-cause Hospital Use by People with Multiple Chronic Diseases

"Hospital use" is a commonly used population health indicator. The Canadian Chronic Disease Surveillance System (CCDSS) provides several measures for this indicator. They are:

- number of persons with and without disease who were hospitalized,
- number of hospital stays for people with and without disease, and
- numbers of days people with and without disease spent in hospital.

The last measure is the most comprehensive and therefore the preferred measure of hospital use as it combines the first two measures with the length of stay.

Each of these measures can also be expressed as a rate for overall comparison (for example, "number of hospital days per person per year"). For people with a specific disease, use can also be expressed relative to those without the disease as a rate ratio.

Individuals may have more than one chronic disease. This multimorbidity is a major determinant for health service use and mortality risk. The number of days spent in hospital per person for any reason increases with the type of disease and number of chronic diseases. Therefore, multimorbidity has important implications for primary care and disease management. Table 1 shows the number of people hospitalized for any reason and days in hospital for those with and without the four chronic diseases.

In the 10 years between 2003/04 and 2012/13 for residents aged 40 years and older:

- An annual average of about 139,000 residents (28%) had at least one of the four chronic diseases: COPD, DM, IHD, or HF.
- Collectively these individuals used about 70% of all hospital days for any reason (about 450,000) each year in Saskatchewan.
- About 22% were hospitalized for any reason in each year.
- They spent on average three days per year in hospital.
- Both the nature and number of diseases influences the number of days in hospital. With the exception of HF, the fewer the number of diseases, the less time is spent in hospital. When HF is present, alone or in combination, the time spent in hospital increases.
- With the exception of HF, the people with a single disease had the lowest use of hospital days.
  - They comprise the largest group (65% or about 90,000) of those with disease;
  - about 15% were hospitalized in each year; and
  - they spent on average less than two days per year in hospital.
- The people with any combination of IHD, COPD, and DM had medium use of hospital days.
  - They account for 17% (about 23,000) of residents with at least one of the four chronic diseases;
  - about one-quarter were hospitalized in each year; and
  - they spent on average 3.6 days per year in hospital.
- The people with HF alone or in combination had the highest hospital use.
  - They include about 19% (about 26,000) of residents with at least one of the four chronic diseases;
  - about 40% were hospitalized in each year; and
  - they spent on average eight days per year in hospital.
- The people who have all four conditions had the highest number of hospital days.
  - They comprise 0.5% (about 2,700) of the population aged 40 years and over;
  - used 5.5% of all hospital days; and
  - they spent on average 13.4 days per year in hospital.
- Residents without one of the four diseases had very little hospital use.
  - About 6% were hospitalized for any reason in each year; and
  - they spend on average less than one day per year in hospital.

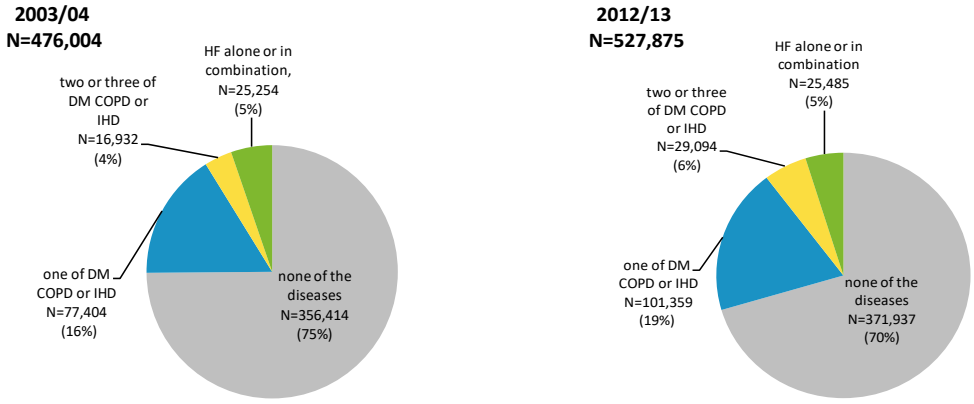
Table 1: Average All-cause Hospital Days Statistics by Chronic Disease Status, Ages 40 Years and Older, 2003/04 to 2012/13

Age 40 years and older		Persons per year	Persons with at least one hospitalization per year	Days hospitalized per year	Percent hospitalized	Days per person
LOW DM, COPD or IHD	DM	35,324	4,313	54,520	12%	1.5
	COPD	25,384	3,789	48,439	15%	1.9
	IHD	29,046	5,621	58,093	19%	2.0
	subtotal	**89,754**	**13,723**	**161,052**	**15%**	**1.8**
MEDIUM DM, COPD, IHD Combinations	DM IHD	9,738	2,403	31,442	25%	3.2
	DM COPD	4,585	1,033	15,024	23%	3.3
	COPD IHD	6,419	1,840	24,382	29%	3.8
	DM COPD IHD	2,511	850	13,108	34%	5.2
	subtotal	**23,253**	**6,126**	**83,956**	**26%**	**3.6**
HIGH HF alone or in combination with DM, COPD, IHD	HF	4,280	1,219	22,117	28%	5.2
	IHD HF	6,414	2,278	39,765	36%	6.2
	DM HF	1,698	596	11,892	35%	7.0
	COPD HF	2,195	901	17,813	41%	8.1
	DM IHD HF	3,743	1,652	33,546	44%	9.0
	DM COPD HF	1,012	468	9,711	46%	9.6
	COPD IHD HF	3,930	1,896	37,775	48%	9.6
	DM COPD IHD HF	2,672	1,536	35,703	57%	13.4
	subtotal	**25,943**	**10,546**	**208,323**	**41%**	**8.0**
total with disease		138,951	30,394	453,330	22%	3.3
total without disease		362,023	20,630	190,585	6%	0.5
TOTAL		**500,974**	**51,024**	**643,915**	**10%**	**1.3**

Note: average annual counts are rounded to the nearest integer.

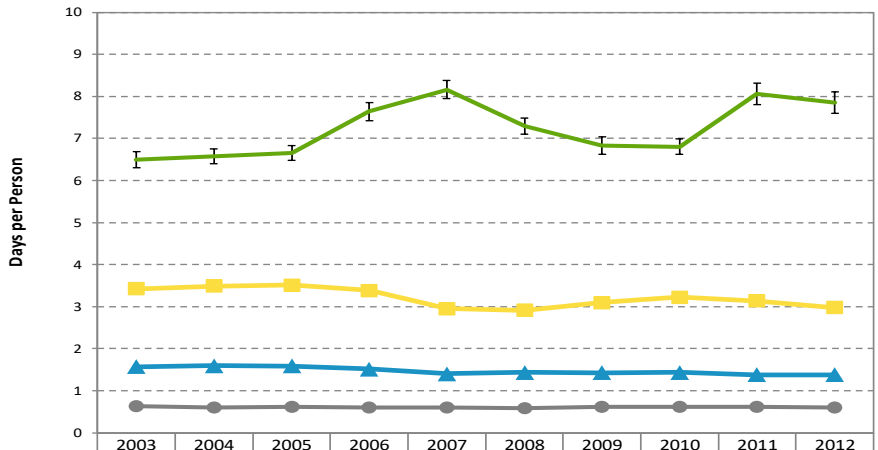
All-cause Hospital Use: Days per Person Trends

Figure 1: Population 40 years and older by Chronic Disease Group, 2003/04 and 2012/13



- From 2003/04 to 2012/13, the total population aged 40 years and older grew by 11% from 476,004 to 527,875.
- Residents with at least one of the four chronic diseases increased from 25% of the population in 2003/04 to 30% in 2012/13.
- For those with none of the four conditions:
  - The number of people increased slightly by 4%. The proportion to the total population aged 40 years and older decreased from 75% to 70% (see Figure 1).
  - The hospital days per person stayed constant over time at about 0.6 days per person (see Figure 2).
- For those with chronic disease and low hospital use:
  - The number of people increased by 31%. The proportion to the total population aged 40 years and older increased from 16% to 19% (see Figure 1).
  - The hospital days per person decreased by about 0.2 days per person (see Figure 2).
- For those with chronic disease and medium hospital use:
  - The number of people increased by 72%. The proportion to the total population aged 40 years and older increased from 4% to 6% (see Figure 1).
  - The hospital days per person were variable from year to year with a range of 0.6 days per year between the lowest and highest use years (see Figure 2).
- For those with chronic disease and high hospital use:
  - The number of people increased by 0.9%. The proportion to the total population aged 40 years and older remained at 5% (see Figure 1).
  - The hospital days per person were variable from year to year with a range of 1.7 days per year between the lowest and highest use years when adjusted for age (see Figure 2).

Figure 2: Age-standardized All-cause Hospital Days per Person by Chronic Disease Group, ages 40 years and older, Saskatchewan, 2003/04 to 2012/13



	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
none of the diseases	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
one of DM COPD or IHD	1.6	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.4
two or three of DM COPD or IHD	3.4	3.5	3.5	3.4	2.9	2.9	3.1	3.2	3.1	3.0
HF alone or in combination	6.5	6.6	6.7	7.6	8.2	7.3	6.8	6.8	8.1	7.9

Multimorbidity is defined as the presence of more than one chronic diseases in an individual.

N = number of people.

Technical Notes

Method:

Chronic disease estimates are based on the infrastructure and case definitions of the Canadian Chronic Disease Surveillance System (CCDSS), with support of the Public Health Agency of Canada. This method is based on linkage of administrative data sources including:

- person health registry system which includes all residents eligible for Saskatchewan health benefits;
- hospital services which include data on hospital inpatient separations for beneficiaries; and
- medical services which include physician and nurse practitioner service claims for beneficiaries.

Diagnoses are coded in hospital according to the International Classification of Diseases systems: ICD-9 or ICD-10-CA. Diagnoses in medical services are coded according to ICD-9 system in all years.

Ascertainment of chronic disease cases in the CCDSS starts with the 1995/96 fiscal year.

Case Definitions:

For surveillance purposes, the **COPD** case definition requires that an individual has EITHER:

- One or more inpatient hospital separations with a code of ICD-9 491, 492, 496 or ICD-10-CA J41-J44 in any field of the hospital separation record; OR
- one or more medical claims with a code of ICD-9 491, 492, 496.

The COPD case definition applies to individuals 35 years of age and older.

For surveillance purposes, the **DM** case definition requires that an individual has EITHER:

- One or more inpatient hospital separations with an ICD-9 code 250 or ICD-10-CA code E10 to E14, in any field of the hospital separation record; OR
- two or more medical claims with a code ICD-9 250 within two years.

These diabetes codes include both type 1 and type 2 diabetes.

The case definition does not include gestational diabetes. Therefore, the case criteria exclude females aged 10 to 54 with a diabetes code 120 days preceding or 180 days after any pregnancy-related hospital visit (as identified by a set of obstetric codes).

The DM case definition applies to individuals one year of age and older.

For surveillance purposes, the **IHD** case definition requires that an individual has EITHER:

- One or more inpatient hospital separations with a diagnosis of ICD-9 codes 410-414 or ICD-10-CA codes I20-I25; OR
- a percutaneous coronary intervention (PCI), or a coronary artery bypass grafting (CABG) procedure with Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures (CCP) codes 48.02, 48.03, 48.11- 48.19 or Canadian Classification of Health Intervention (CCI) codes 1.IJ.50,1.IJ.54, 1.IJ.57.GQ, 1.IJ.76 in any procedure fields of the hospital separation record; OR
- two or more medical claims with a diagnosis of ICD-9 codes 410-414 within one year.

The IHD case definition applies to ages 20 years and older.

For surveillance purposes, the **HF** case definition requires that an individual has EITHER:

- One or more inpatient hospital separations with a diagnosis of ICD-9 code 428 or ICD-10-CA code I50 in any field of the hospital separation record; OR
- two or more medical claims with a diagnosis of ICD-9 code 428 within one year.

The HF case definition applies to ages 40 years and older.

Calculations:

Age standardization of rates allows comparisons to be made over time and among groups of people with different age distributions. To adjust for differences in population age distributions and the resulting effect on rates, the hospital day rates were age-adjusted using the 2011 Canadian population as a reference. Adjustment was done via the direct method, using five-year age groups to age 85 years and older.

To facilitate comparisons, 95% confidence intervals (CIs) of all age-standardized rates were calculated for rates greater than zero. The CI includes the true value for the estimated rate 19 times out of 20. A rate difference was considered statistically significant if there was no overlap of confidence intervals.

Limitations:

The administrative data used do not capture people with unreported chronic disease or those who do not access the healthcare system.

A reported ICD code is assumed to be diagnostic and not a differential diagnosis.

The case definitions do not include services provided in emergency departments or hospital-based outpatient clinics.

Persons with physician-diagnosed chronic conditions may be excluded if they receive their care in a setting where services are not billed on a fee-for-service basis. Services delivered by physicians in salaried or contractual arrangements are not captured if the service information is not submitted through “shadow billing”.

Any system which tracks lifelong diseases over many years on an individual basis will tend to accumulate false positives. This is because a case, once identified, is carried forward from year to year. Even if false positives are extremely rare, they will inevitably comprise an increasing proportion of reported cases over time.

Provincial administrative data exclude full-time members of the Canadian Forces, individuals in the Royal Canadian Mounted Police, and inmates of federal correctional facilities whose health benefits are covered by federal jurisdiction.

Multimorbid combinations of individual chronic disease case definitions were not validated and their sensitivity and specificity are not known.