Diabetes and Mental Health – Related Inpatient Hospital Utilization In Maine, 2004

January 2006

Maine Center for Disease Control and Prevention
Division of Chronic Disease
Diabetes Prevention and Control Program

This publication was supported by Cooperative Agreement Number U32/CCU122694 from the Centers for Disease Control and Prevention/Division of Diabetes Translation. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of the CDC.

John Elias Baldacci
Governor

Maine Department of Health and Human Services

Maine Center for Disease Control and Prevention
(Formerly Bureau of Health)
286 Water Street – 5th Floor
11 State House Station
Augusta, ME 04333-0011

Brenda M. Harvey
Acting Commissioner

Dora Anne Mills, MD, MPH
Public Health Director
Maine CDC Director

Diabetes and Mental Health – Related Inpatient Hospital Utilization In Maine, 2004

John Elias Baldacci, Governor
State of Maine

Brenda M. Harvey, Acting Commissioner
Department of Health and Human Services

Dora Anne Mills, MD, MPH Director
Maine Center for Disease Control and Prevention

Ron Bansmer, MBA Acting Director
Division of Chronic Disease

James F. Leonard, MSW Program Director
Maine Diabetes Prevention and Control Program

Lucinda A. Hale, MS, RD, CDE
Maine Diabetes Prevention and Control Program

Katie Meyer, ScD, MPH
Chronic Disease Epidemiology Consultant

Maine Diabetes Prevention and Control Program
January, 2006.

Table of Contents

Executive Summary

- Diabetes is a chronic disease with no known cure. The prevalence of diabetes has more than doubled in the last ten years in Maine and increases are projected to continue through 2025 according to national estimates. Diabetes is an expensive disease; the direct medical costs for people with diabetes are estimated to be five times higher than for people without the disease. Although diabetes is not curable, it is manageable. Significant advances have been made in the treatment and self-management of diabetes that dramatically reduce many costly complications. Nine out of ten cases of diabetes are type 2, a form of diabetes that can be lifestyle related.

- There is evidence that diabetes is more prevalent (14%) in the mentally ill than in the general population (6%)[1]. Diabetes is considered one of the most psychologically demanding of the chronic medical illnesses because it requires strict daily management of the treatment by the patients themselves[2]. The presence of psychiatric comorbidity can result in difficult clinical courses, because it may affect adherence to medication and self-care regimes[3].

Summary of Findings

- Diabetes is a frequent cause of hospitalization either directly, as a result of complications, or indirectly, as a contributor to other disease, such as cardiovascular. Our analysis shows 16% of all hospital discharges in 2004 had a diabetes diagnosis mentioned. Almost a third (30%) of the records with a diabetes diagnosis also had a diagnosis of a mental health disorder.

- Persons hospitalized and discharged with diabetes and a mental health diagnosis were younger than those hospitalized with diabetes alone. Fifty-six percent (56%) of persons with both diabetes and a mental health diagnosis were less than 65 year old compared to 36% of those with diabetes and no mental health diagnosis.

- The category of mental health diagnoses with the highest frequency was that of affective disorders, which includes depression and anxiety. Severe and persistent mental illness (e.g., schizophrenia) was the second most frequent principle discharge diagnosis.

- Almost 18% of persons with diabetes and a mental health diagnosis were covered by MaineCare.

- Additional data cited in this report also indicate that a large proportion of the individuals hospitalized with diabetes and a mental health diagnosis are insured by Medicare.

---

[1] Marion, L., et al. Diabetes Management in the Context of Serious and Persistent Mental Illness. 2002 by The Nursing Institute, College of Nursing University of Illinois at Chicago.
[2] Cox DJ, Gonder-Frederick L: Major developments in behavioral diabetes research. J Consult Clin Psychol 60:628–638, 1992.
[3] Blumenthal JA, et al. Physiological and psychological variables predict compliance to prescribed exercise therapy in patients recovering from myocardial infarction. Psychosom Med 44:519–527, 1982.

Medicare beneficiaries include persons 65 years of age and older, people under 65 with certain disabilities, and persons on dialysis with end-stage renal disease.

- Persons with diabetes and a mental health diagnosis had a higher proportion of avoidable hospitalizations (45%) compared to those with a diabetes diagnosis only (23%). MaineCare was the primary payer in both accounting for 45% of the mental health group and 34% of the diabetes only group.

- Diabetes increases the risk of cardiovascular disease. Among those aged 45-64, a higher proportion of the diabetes and mental health group were hospitalized for cardiovascular disease (43%) compared to those in the diabetes-only group (30%).

Recommendations

- Diabetes requires daily management along with a planned-care medical program. Reductions in complications and health care costs are dependent upon consistent control of blood glucose and medical treatment based on the chronic care model. Efforts are underway in Maine to make the chronic care model a standard of care for people with chronic diseases. Medical care itself, however, is not the answer to diabetes control. The majority of diabetes care occurs outside of the medical setting. Increased self-management skills are needed by people with mental health disorders and diabetes. The following interventions are a good starting point and can reduce future complications through better control and management without being overly burdensome to the health care system:

Education of individuals

- Encourage participation in a diabetes self-management education program (DSME). Our findings indicate that a large percentage of the diabetes-related hospitalizations were for diabetic keto-acidosis, which is preventable with appropriate disease management. Therefore, special attention should be directed to the importance of self-blood glucose monitoring and appropriate treatment to avoid hospitalization for diabetic keto-acidosis. Education on self-management to assist with weight control, regular physical activity, and tobacco cessation to prevent cardiovascular disease is also included in a DSME program.

Education of personal care assistants

- Education of personal care assistants who may assist individuals in boarding homes, group homes, or residential facilities in the basics of meal planning, self blood glucose monitoring, medication administration, and appropriate physical activity. The goal of this education would be to insure that personal care assistants are able to reinforce self-management behaviors important to diabetes care.

Education of case managers

- Educate case managers to provide information on standards of medical care and appropriate therapy for people with diabetes. This will help insure that the individual receives on-going essential medical care and is referred to appropriate community self-management resources.

- Encourage use of local community self-management resources – such as attendance of individual at local community self-management resources for weight control, physical activity, smoking cessation, and stress reduction as appropriate to aid in diabetes management and reduction of development of complications[4].

Educate staff in long-term care

- Educate staff in long-term care, residential facilities, and boarding and group homes about the prevention of diabetes complications, especially hyperosmolar coma. Hyperosmolar coma is the result of high blood glucose in individuals, particularly in those with type 2 diabetes. Hyperosmolarity was noted as a common reason for hospitalization in the diabetes and mental health group. This complication can be prevented with regular blood glucose monitoring to detect elevated blood glucose, prompt treatment of infection, and proper hydration[5].

[4] McCulloch DK, Price MJ, Hindmarsh M, Wagner EH. A population-based approach to diabetes management in a primary care setting: early results and lessons learned. Eff Clin Pract 1998; 1(1)
[5] American Diabetes Association. Diabetes Care – American Diabetes Association: Clinical Practice Recommendations 2006, Hyperglycemic Crises in Diabetes, Supplement 1, January 2006

Introduction

Diabetes is a common and costly chronic disease. Maine's diagnosed diabetes prevalence has more than doubled in adults, from less than 3.4% in 1994 to more than 7% in 2005[6]. The most recent Behavioral Risk Factor Surveillance System survey estimates 74,000 adults diagnosed with diabetes in the state[7]. Diabetes is on the rise worldwide; the World Health Organization projects a 27% increase in diabetes prevalence in developed countries by the year 2025 and a 48% increase in developing countries[8]. The direct medical costs for people with diabetes are estimated to be five times higher than for people without diabetes[9]. In Maine, health care spending has increased and diabetes has been cited, as one of seven chronic diseases that contributes to increased health care costs[10].

Mental illness is also a common and costly chronic disease. According to a report by the U.S. Surgeon General, one in five adults has a diagnosable mental health disorder[11]. Nationally, mental illness is estimated to account for 7.3% of total health spending, excluding costs for Alzheimer's and substance-abuse treatment[12]. Like diabetes, mental illness has been cited in the Maine State Health Plan as contributing to increased health care costs. The state Medicaid program (MaineCare) has seen a dramatic increase in the amount of overall health expenditures dedicated to treating persons with mental illness: from 26.7% in 1996 to 37.2% in 2002[13]. In addition, mental disorders made up the largest proportion (9.5%) of hospital discharges 2004 when the frequencies of hospital discharges were ranked by cause.

Diabetes is frequently co-morbid with other chronic diseases, which complicates the disease course and treatment. Only one person out of six with diabetes has no other chronic conditions[14]. On average, a person with diabetes has 3.5 other chronic conditions[15]. Mental illness, especially depression, co-occurs with diabetes at high rates[16] [17]. Studies have shown that people with mental illness and diabetes are at greater risk for complications[18].

---

[6] CDC Behavioral Risk Factor Surveillance System
[7] Maine Behavioral Risk Factor Surveillance System: Diabetes Prevalence and Disease Management Analyses 2002-2004. Muskie School of Public Service
[8] King, H. et al. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections." Diabetes Care. 1999 Apr; 22(4):650.
[9] Economic costs of diabetes in the U.S. in 2002. American Diabetes Association
[10] Governor Office of Health Policy and Finance. Maine's State Health Plan: A Road Map to Better Health (DRAFT). November, 2005, p.15.
[11] U.S. Surgeon General. Mental Health: A report of the surgeon general.
[12] Ibid.
[13] Governor Office of Health Policy and Finance. MaineCare Behavioral Health Care Expenditures: State Fiscal Years 1996-2002. March, 2005.
[14] Diabetes: The Impact of Multiple Conditions. Partnership for Solutions. June 2004.
[15] Ibid.
[16] **www.news-medical.net** People with serious mental illness have higher rates of type 2 diabetes
[17] National Institute of Mental Health. Diabetes and depression. 2002.
[18] Carney, C. Diabetics with mental disorders at increased risk for diabetic complications. Medical Care. December, 2004.

Given this background, we sought to examine the co-existence of diabetes and mental illness in Maine. We were particularly interested in learning about how the presence of mental illness might impact the management of diabetes and occurrence of complications, especially those that could be avoided through improved management. Specifically, how does the existence of mental illness appear to impact the experience of having diabetes? One can address this question by comparing those with diabetes without mental illness to those with both diabetes and mental illness.

For the present report, we compare hospital discharge data for those discharged with a diagnosis of diabetes, but not of mental illness, to those with both diabetes and mental illness diagnoses. It should be noted that this is not equivalent to studying the population of Mainers who have diabetes to the population of Mainers with diabetes and mental illness. Our analysis considered people as having diabetes and mental illness only if they received a discharge diagnosis of those conditions. This raises the possibility of both underascertainment and of biased ascertainment and prevents our making statements about people with diabetes and mental illness generally in the state. In addition, we include in this early work only one year of data, which severely limited our ability to conduct subgroup analysis.

Despite these limitations, we believe that studying the hospitalization experience will yield valuable information about these populations. We hope to gain insight into the experience of those with both diabetes and mental illness in a way that guides us to possible approaches for improved health. This work fits into a larger goal of identifying opportunities to benefit persons with both diabetes and mental health disorders. By comparing healthcare data of persons diagnosed with diabetes and a mental health disorder to those with diabetes alone we can initiate an investigation into whether differences exist in disease management and the development of complications from diabetes. If such differences exist, focused interventions, perhaps in the health system, could result in a healthier population.

Methods

We used the Maine hospital discharge database for these analyses. Non-federal Maine hospitals report 100% of discharge records to the Maine Health Data Organization (MHDO) who compile the data and release them to the Maine Center for Disease Control and Prevention. From among the 160, 570 total discharge records for Maine residents in 2004, we identified 25,035 records with a diabetes diagnosis (ICD-9-CM codes: 250.0 - 250.9)listed on any of the ten diagnostic fields. We then separated the 25,035 records into those with a diagnosis code of diabetes alone and those with discharges with of both diabetes and mental health (ICD-9-CM codes: 290.0-319.9). In the following discussion, the diagnosis indicated first in the list of ten reported diagnoses is considered the principle diagnosis, the reason for hospitalization. All subsequent diagnoses (fields 2-9 in the discharge record) are considered secondary or contributing diagnoses.

Age and Gender Comparisons

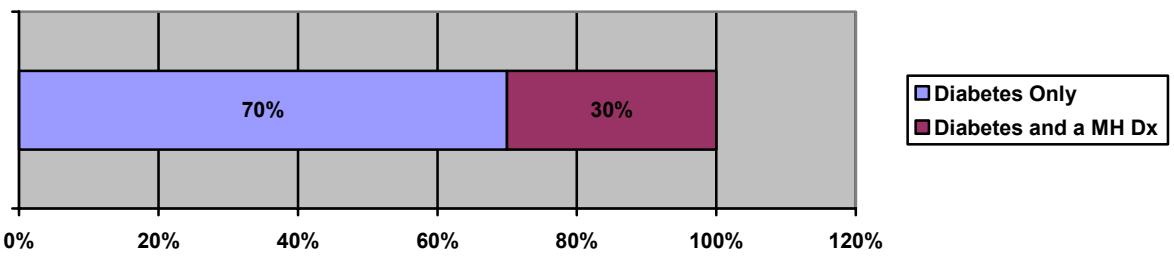
We compared the age distribution of persons discharged from the hospital with diabetes alone to those discharged with both diabetes and a mental health disorder. Persons hospitalized and discharged with diabetes and a mental health diagnosis are younger compared to those hospitalized with diabetes alone. Fifty-six percent (56%) of persons with a mental health diagnosis were less than 65 year old compared to 36% of those with diabetes and no mental health diagnosis. These findings suggest that those with both diabetes and mental illness may experience more diabetes-related hospitalizations at a younger age, compared to those with diabetes alone.

The groups differed slightly in their gender composition with the diabetes only group almost evenly divided between genders while the diabetes and mental health group had slightly more females than males. This may reflect the fact that females tend to be more likely to receive a mental health diagnosis through treatment-seeking than men. It does not necessarily imply that underlying mental illness is more prevalent among females. To the extent that males with mental illness were hospitalized without a receiving a discharge diagnosis of mental illness, they will be misclassified into the diabetes alone group.

Mental health appears to be prevalent among those with diabetes

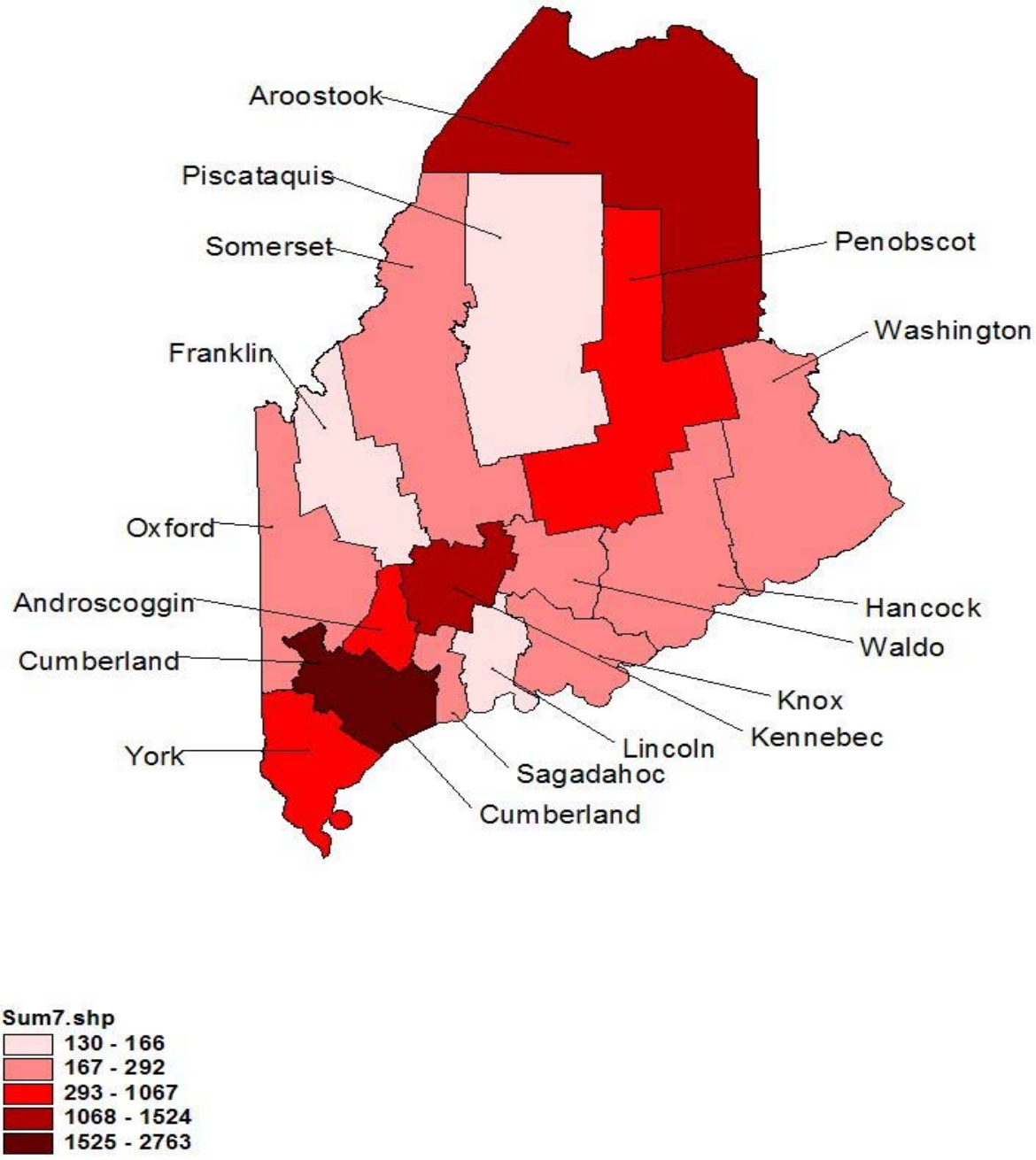
Diabetes is a frequent cause of hospitalization either directly, as a result of complications, or indirectly, as a contributor to disease. Our analysis shows 16% of all hospital discharges in 2004 had a diabetes diagnosis mentioned. Almost a third (30%) of those records also had a diagnosed mental health disorder.

Figure 1: Proportion of Diabetes Hospitalizations that are Diabetes Alone and Diabetes with a Mental Health Diagnosis



In figure 2 below we show hospital discharges for those diagnosed with both mental health and diabetes by county. The largest number of discharges correspond with darker colors. Aroostook and Kennebec counties stand out with respect to having greater numbers of discharges compared to county population rankings.

Figure 2: Distribution of Mental Disorders and Diabetes by County



Health Insurance

Persons with diabetes incur significant financial costs for supplies, health care, and other diabetes-related expenses. Hartley, et. al., pointed out in their 2002 study on diabetes and the rural safety net that high out-of-pocket costs contribute to sub-optimal management of diabetes[19]. Although Maine has one of the more comprehensive insurance regulations related to coverage of diabetes supplies and services (PL 592), there is still significant expense for the person with diabetes in the form of co-payment and deductibles. In table1 we show the payment source listed in the hospital discharge database for those discharged with a diabetes diagnosis alone and for those with both diabetes and mental health diagnoses. The principal payer on the claim record was grouped into one of six payer types; Medicare, Medicaid, Veterans, Commercial, Self-pay, and Charity.

Table 1: Comparison of Primary Payer Among Groups

Payer	Diabetes Only	Diabetes and Mental Health Diagnosis
Medicare	71.5%	62.1%
Medicaid	7.4%	17.5%
Veterans	2.2%	2.1%
Commercial	17.9%	16.3%
Charity	.1%	.3%
Self-pay	.9%	1.7%

In table 1 we see the largest differences between the two groups in proportions of Medicare and Medicaid. For diabetes-only there was a greater proportion of Medicare as the primary payer, reflecting more persons 65 and older in the group. Medicare is a health insurance program for people 65 or older, people under 65 with certain disabilities, and people with End-Stage Renal Disease[20]. Medicaid was the principle payer for greater numbers of persons with diabetes and a mental health diagnosis. MaineCare (Medicaid) is a health insurance program available to certain low-income individual and families who fit into an eligibility group that is recognized by federal and state law[21]. Commercial and Veteran's insurance proportions were similar between groups. Charity and Self-Pay, although small numbers, do show a higher proportion attributed to those with a mental health diagnosis. For other types of coverage, the percentage of diabetes-only and diabetes with mental health were fairly equally represented. This shows that those discharged with diabetes and mental health were not only younger, but tendered to be from the lower-income segment of the young population.

[19] Hartley D. et al. Diabetes and the Rural Safety Net. Maine Rural Health Research Center. Muskie School. 2002.
[20] Center for Medicare and Medicaid Services. www.cms.hhs.gov/MedicareGenInfo/
[21] Ibid.

Cardiovascular Disease (CVD)

CVD is a major complication of diabetes and is responsible for the vast majority of deaths in people with diabetes. People with diabetes are two to four times more likely to develop cardiovascular disease due to a variety of risk factors. There was a higher proportion of people 45-64 in the mental health group that were hospitalized for CVD (43%) compared to the diabetes only group (30%).

In the table below we show how the CVD hospitalizations within the two groups compare by age group at the time of hospitalization. Among those hospitalized for CVD in the diabetes-only group a considerably larger proportion were 65 and older, while a larger proportion of the diabetes and mental health group was in the 45-64 year old age range. Thus those diagnosed with both diabetes and mental health group appeared to have a larger portion of younger people hospitalized for cardiovascular diseases.

Table 2: Distribution of CVD Hospitalizations by Age Group

	Age Groups	Frequency	Percent
Diabetes Only	18-44	80	2.2
	45-64	1089	29.6
	65+	2514	68.3
	Total	3683	100.0
Diabetes and MH	18-44	69	6.7
	45-64	444	43.1
	65+	517	50.2
	Total	1030	100.0

Ambulatory Care Sensitive (ACS) Conditions

Ambulatory Care Sensitive (ACS) conditions are those for which hospitalization might be avoided through timely and adequate clinical preventive and primary care services. For diabetes, there are several diagnoses considered ACSs : ketoacidosis, hyperosmolarity, and coma are the three diagnoses most commonly included in “short term” avoidable hospitalizations. Persons with diabetes and a mental health diagnosis had a higher proportion of avoidable hospitalizations (45%) compared to those with a diabetes diagnosis only (23%). The age distributions, once again, showed a higher proportion of 18-44 year olds (68%) in the diabetes and mental illness group compared to in the diabetes only group. MaineCare was the primary payer for avoidable hospitalizations in both groups with 45% of the mental health group and 34% of the diabetes only. The gender distribution was similar between groups with 55% of the mental health group being female compared to 52% of the diabetes only.

Figure 3: ACS by Group

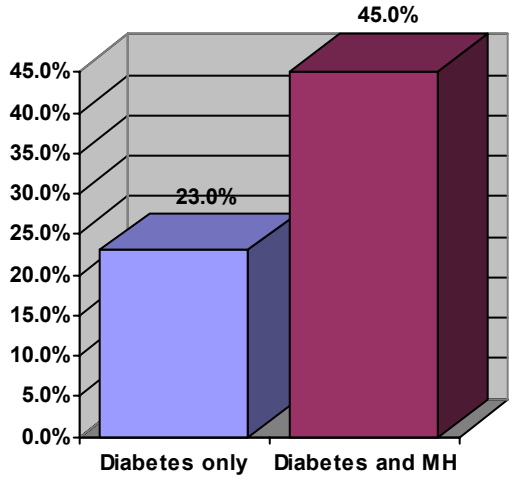


Table 3: Ambulatory Care Sensitive Conditions

	Complication	Age Group				Total
		0-17	18-44	45-64	65+	
Diabetes Only	Diabetes with other coma	2.9%	3.1%	4.9%	22.9%	6.2%
	Hyperosmolarity	3.2%	25.8%	14.8%	41.9%	12.0%
	Ketoacidosis	15.5%	54.7%	23.1%	6.6%	81.9%
		13.5%	49%	23.6%	13.5%	259
Diabetes with a mental health Dx	Diabetes with other coma		17%	50%	33%	2.8%
	Hyperosmolarity		1.4%	16.7%	47.1%	8.0%
	Ketoacidosis	5.3%	74.2%	16.8%	3.7%	89.2%

.

Recommendations

As these data indicate, it would be important to consider strategies to intervene as early as possible with individuals with diabetes and a mental health diagnosis. Data also indicate a large percentage of individuals with both a diabetes and a mental health diagnosis have health insurance coverage through the MaineCare Program.

Recommendations for the Maine Care Program recipients include:

Planned approach to care

Planned care involves guideline implementation, support of self-management, and use of clinical information systems[22]. Planned care is associated with improvements in metabolic control[23]. Improved metabolic control leads to reductions in health care utilization and costs[24]. Attempts should be made to encourage the use of planned visits for the purpose of improving diabetes management. Ample evidence, particularly for diabetes, demonstrates that planned visits are associated with improved outcomes[25].

Education of individuals

Education of individuals that encourage participation in a diabetes self-management education program[26] (DSME). Our findings indicate that this population had a large percentage of hospitalizations for diabetic keto-acidosis, which is preventable. Therefore, special attention to education on the importance of self-blood glucose monitoring to determine high blood glucose and appropriate treatment to avoid hospitalization for DKA is important[27]. Education on self-management to assist with weight control, regular physical activity, and tobacco cessation to prevent cardiovascular disease would also be included in the education at a DSME program.

Education of personal care assistants

Education of personal care assistants to provide education for personal care assistants who may assist individuals in boarding homes, group homes, or residential facilities in the basics of meal planning, self blood glucose monitoring, medication administration, appropriate

---

[22] Montori, V.M. The Impact of Planned Care and a Diabetes Electronic Management System on Community-Based Diabetes Care. Diabetes Care.25:1952, 2002.
[23] Ibid.
[24] Wagner, EH, et al. Effect of improved glycemic control on health care costs and utilization. JAMA. Apr 18; 285 (15): 1963-4, 2001.
[25] Bodenheimer, T. Planned visits to help patients self-manage chronic conditions. American Family Physician. 10,1,2005.
[26] American Diabetes Association. Clinical Practice Recommendations, 2006.
[27] American Diabetes Association. Diabetes Care – American Diabetes Association: Clinical Practice Recommendations 2006, Hyperglycemic Crises in Diabetes, Supplement 1, January 2006

physical activity. The goal of this education would be that personal care assistants would be able to reinforce these self-management behaviors important to diabetes care.

Education of case managers

Education of case managers to provide information on standards of medical care and appropriate therapy for people with diabetes. This will help insure that the individual receives on-going essential medical care and is referred to appropriate community self-management resources.

Encourage use of local community self-management resources – such as attendance of individual at local community self-management resources for weight control, physical activity, smoking cessation, and stress reduction as appropriate to aid in diabetes management and reduction of development of complications[28].

Additional data cited in this report also indicate that a large proportion of the individuals hospitalized with diabetes and a mental health diagnosis are insured by Medicare. Medicare beneficiaries include persons 65 years of age and older, people under 65 with certain disabilities, and persons on dialysis with end-stage renal disease.

[28] McCulloch DK, Price MJ, Hindmarsh M, Wagner EH. A population-based approach to diabetes management in a primary care setting: early results and lessons learned. Eff Clin Pract 1998; 1(1)