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PIVOT
STRATEGIC TRANSFORMATION

Value Demonstration with Private Payers Adherence to Treatment & Employer Economic Impact: Literature Review

Final Report
October 2018

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1. Context, Scope, Sponsors,
Summary & Conclusions

Context (1/2)

- According to the World Health Organization (WHO), non-adherence to treatment is a major problem, especially in people with chronic diseases. Numerous studies have been published in this regard, particularly to better understand the factors causing non-adherence and the various effects of non-adherence.
- Assuming that the person treated has been correctly diagnosed and that the doctor has prescribed the right medication at the right dose, taking into account his/her personal characteristics, there are good reasons for seeking to improve adherence to treatment. Expected benefits include improved health outcomes, improved quality of life, and savings for the individual, the health system and society. In many cases, non-adherence may result in lower treatment outcomes and increased risk of complications and hospitalization as well as higher health costs.
- It is widely documented that health care professionals who provide services involving medication need to make every effort to help patients improve adherence to their treatment, especially when considering the aging population and the increased prevalence of chronic diseases.
- This issue remains a shared responsibility between public authorities, health professionals and patients associations and individual patients. The private sector has also role to play as attested to by the various programs put in place by pharmaceutical companies, group benefits consultants, insurers, employers and unions.
- Employers, often in collaboration with unions, offer drug and other benefits to employees and are increasingly engaging in initiatives to promote healthy lifestyle and better disease management.

Context (2/2)

- A working group composed of key Canadian insurance companies, group benefits consultants and innovative pharmaceutical companies, created by Innovative Medicines Canada (IMC), the Canadian association of innovative pharmaceutical companies, identified in 2017 the need to better validate the value of drug treatment adherence, especially in terms of productivity gains for employers and return on investment.
- Value demonstration initiatives to date in Canada and elsewhere have focused heavily on the value of medicines, in terms of the health impacts for patients and the savings in the health system.
- This is the case of a recent study by the Conference Board of Canada and the demonstration project piloted by Concerto in Quebec, in collaboration with manufacturers and the Quebec Ministry of Health and Social Services. The objective of the Concerto study was to demonstrate the impact of best-in-class first-line management on the health of the patients and on the savings in the health network, particularly in terms of stay of averted hospitalizations.
- However, the relevant performance indicators for employers and payers are metrics related to productivity rather than to health care costs, namely presenteeism, absenteeism and disability rates of the employees. Although this topic appears at first sight less exploited, there are nevertheless several studies into the link between the use of drugs and employee productivity metrics.

The scope of the study

In this context, the Innovative Medicines Canada working group commissioned Pivot Strategy/ Concerto to validate the link between drug adherence and workplace productivity impacts

Scope of the study:

1. Identify relevant value indicators for private employers and payers in Canada
2. Identify therapeutic areas that lend themselves to a value demonstration evaluation related to adherence to treatment
3. Validate, through a review of the literature, the impact of adherence to treatment on productivity value indicators for employers

Study Sponsors



Summary

- The review of this literature review was done based on 26 selected scientific publications from 2009 to 2017, mainly in the United States, covering 55 studies.
- The literature review focused in on 40 studies that studied patients with four chronic conditions that represent some of the highest levels of expenditure for employers in terms of work productivity, absenteeism, presenteeism and short-term disability, namely depression, diabetes, hypertension and asthma.
- These therapeutic areas are the most identified in the literature (about 75% of all studies). They account for 25% of drug expenditures and 44% of group insurance program employees.
- The levels of medication adherence for these conditions fell within the 50% range, and below 40% for some studies for patients with asthma, hypertension and depression.
- The literature review confirmed a positive correlation between adherence to treatment and economic impact for employers. Absenteeism, followed by disability rates of the employees, were the indicators most commonly used to measure the economic impact on employers.
- In most cases, the lack of a positive correlation is attributable to the low number of employees enrolled in the study.
- Studies show significant economic impacts related to non-adherence are as follows:
 - 2 to 10 days lost (missed workdays) /employee/year in absenteeism and disability
 - \$1,000 to \$ 5,000 in salary losses/employee/year
- Savings generated by average treatment adherence rates ranging between \$714 and \$1870 (or between 3 and 16 saved workdays) per employee per year.

An illustrative study which looked at diabetes, hypertension and depression found savings generated by average treatment adherence rates between \$700 and \$3,300 per employee per year

Baseline : Average adherence rate			
Chronic Condition	Average adherence rate ¹	Average days saved/year at average adherence ¹	Employer savings by employee/year (2018\$US) at average adherence
Diabetes	61%	16.1	\$3,306
Hypertension	63%	3.5	\$714
Depression	43%	9.1	\$1,870

Methodology: Findings from a US econometric study on the impact of drug adherence and number of days lost per year for 3 chronic conditions. Study used the employed respondents of the 1987 Medical Expenditure Survey (approx. 10 000 respondents)²

Sources

1. Rizzo et al (1996). Labour Productivity Effects of Prescribed Medicines for Chronically Ill Workers. Health Economics, Vol 5: 249-265. Pivot Calculations

An increase of drug treatment adherence to 80% optimizes outcomes for patients and generates additional net savings (factoring in the additional cost of medicines) between \$300 and \$2,200 per employee per year

Savings from achieving 80% compliance			Difference		
Chronic Condition	Average days saved/year at 80% adherence ²	Employer savings by employee/year (2018\$US) at 80% adherence ³	Additional savings per employee/year (2018\$US) from achieving 80% adherence	Additional Drug Cost	Net savings of adherence
Diabetes	26.2	\$5,420	\$2,114	\$109	\$2,005
Hypertension	5.3	\$1,134	\$420	\$134	\$286
Depression	21.2	\$4,350	\$2,480	\$264	\$2,216

There is clearly an opportunity to generate additional savings and optimize outcomes for patients by improving adherence

Methodology: Findings from a US econometric study on the impact of drug adherence and number of days lost per year for 3 chronic conditions. Study used the employed respondents of the 1987 Medical Expenditure Survey (approx. 10 000 respondents)²

Sources

1. Rizzo et al (1996). Labour Productivity Effects of Prescribed Medicines for Chronically Ill Workers. Health Economics, Vol 5: 249-265. Pivot Calculations

Conclusion

- Beyond health outcomes of drug treatments confirmed in several studies, the key findings of this literature review show clear value of drug treatment in terms of impact on improved productivity, low pharmacologic treatment adherence among employees and an opportunity to generate additional savings for employers by improving adherence.
- Governments and health networks are focused on the need for improved adherence and seeking innovative solutions with stakeholders to achieve better results for the benefit of patients, the health system and the economy. These solutions include better access to data in real-life settings, care pathways that promote better patient care, improved communication and awareness patient programs, and technological tools to monitor patient treatments.
- But beyond the interventions of public networks, an increased dialogue between pharmaceutical companies, insurers, employers and patient associations is needed to identify additional initiatives to improve employee adherence rates to pharmacological treatments.
- The benefits to employers and employees are numerous and this literature review provides concrete data on low adherence rates in important therapeutic areas and underscores the return on investment from improved adherence stemming in terms of improved productivity.
- Thus, building on this evidence, the private sector should be encouraged to continue to act even more effectively in terms of adherence to treatment.
- But many questions remain and additional data, particularly data collected in the Canadian environment would better promote and target promising initiatives for employees and employers: What are the rates of adherence to treatment in Canadian employers? What programs exist and what results are they yielding? What are some current best practices? What are the benefits in real Canadian settings of a treatment adherence program?
- The stakeholders involved in the Canadian private sector have an opportunity to take leadership role in advancing research in Canada on the impact of medicines of productivity as well as documenting the return on investment of better adherence to treatment.

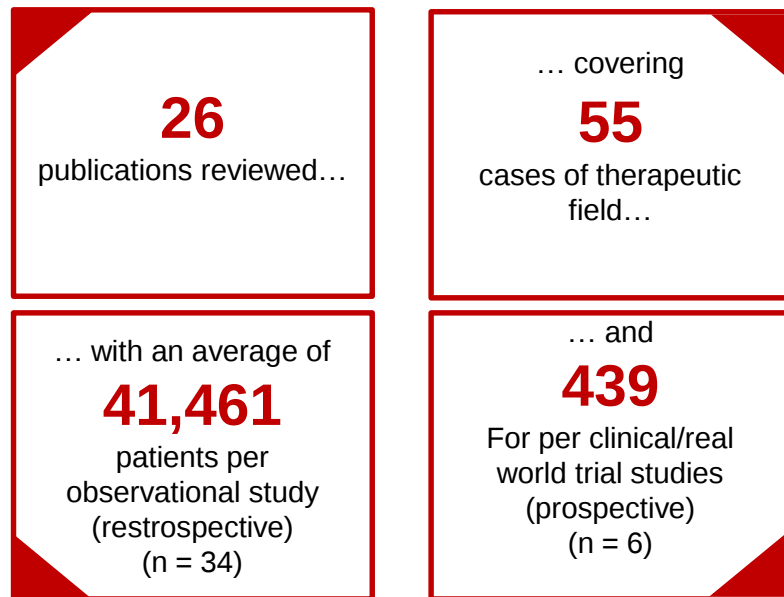
2. Literature Review

Refer to:

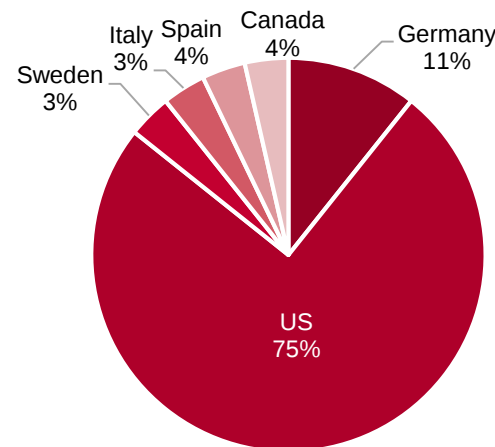
Appendix 1: Individual Case Studies

Appendix 2: Methodology & Terminology

Adherence to Treatment & Employer Economic Impact: Literature Review



Breakdown of percentage of publications by region
26 articles published between 1985-2017

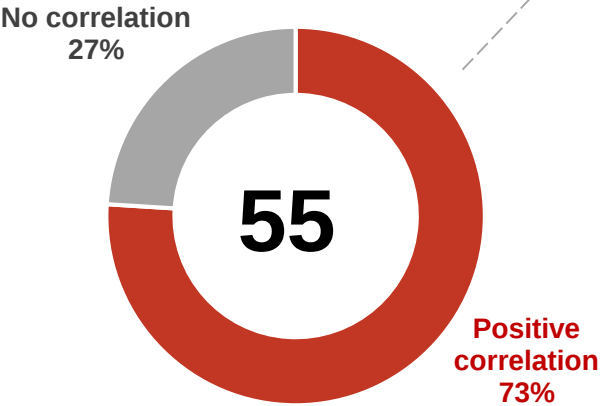


- Primarily large retrospective **econometric studies using national database** to measure employer economic impact and treatment metrics, such as:¹
 - Medical Expenditure Panel Survey by the US Government provides survey information on health status, health care utilization and cost, prescription drug usage, work, disability and other sociodemographic characteristics and is widely used for scholarly research
 - The Truven Health MarketScan Research Databases are a family of research data sets that fully integrate de-identified patient-level health data (medical, drug and dental), productivity (workplace absence, short- and long-term disability, and workers' compensation), laboratory results, health risk assessments (HRAs), hospital discharges and electronic medical records (EMRs) into data sets available for healthcare research.
 - Some prospective studies that rely largely on questionnaires
- Use of **statistical regression** to establish correlation between treatment and employer economic impact
- Limited studies in a given employer setting (aggregated employer data used)
- The studies were published **between 2009 and 2017**. The seminal 1985 study that first demonstrated the link between medication adherence and work productivity was also included.
- The studies did not include how adherence was or could be improved.
- The majority of studies was conducted in the US and published in the **American Journal of Occupation and Environmental Medicine** and the **American Journal of Managed Care**

1. Refer to the Methodology section for all sources of data used in the studies

73% of studies (40) found a positive correlation between treatment and employer economic impact (EEI)

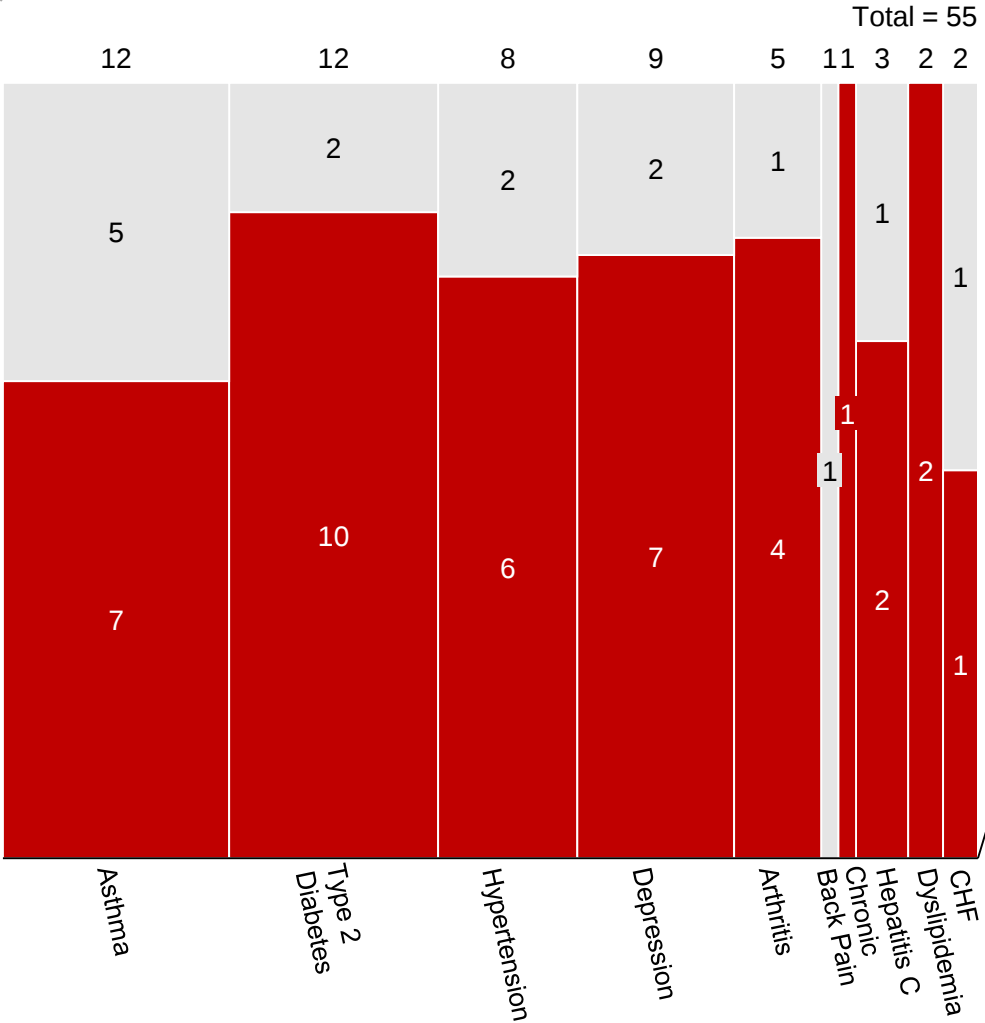
Conclusion breakdown of 55 reviewed studies



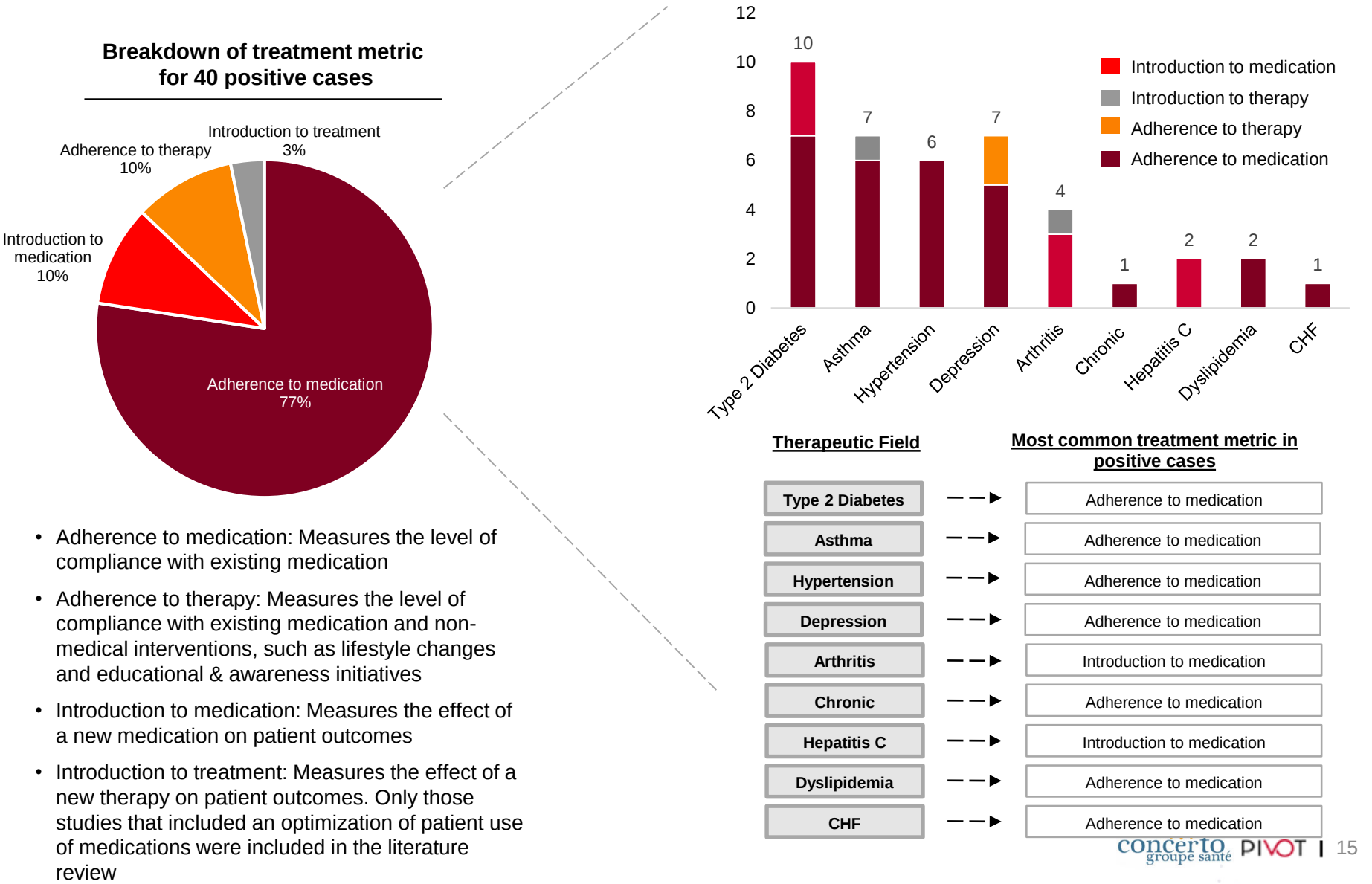
Presence of correlation

Studies' conclusion by therapeutic field

40 positive cases only, therapeutic field studied between 1985-2017

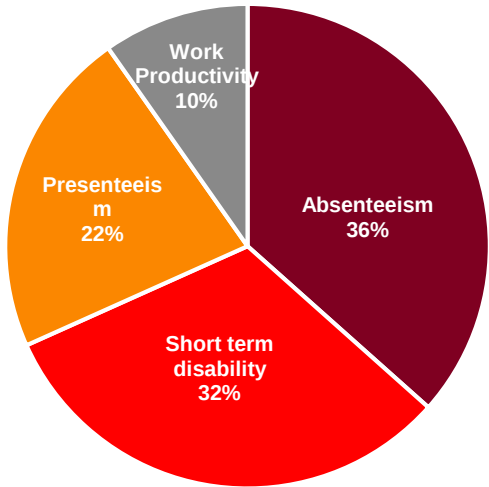


For the 40 cases with positive results, adherence to medication was the indicator most commonly used to measure treatment



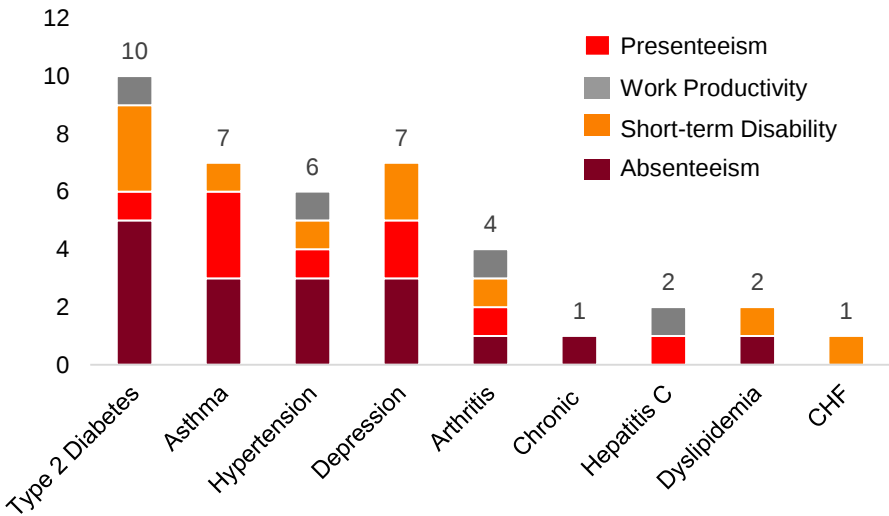
For the 40 cases with positive results, absenteeism was the indicator most commonly used to measure the economic impact on employer

Breakdown of Employer Economic Impact (EEI) for 40 positive cases



- Absenteeism: Hours of missed work converted into number of workdays on the basis of an 8-hour workday. Employees are paid their full wages for absenteeism
- Presenteeism: Percentage of impairment while working due to health reasons
- Short-term disability: Number of missed workdays due to sickness during which employees are paid a portion of their income
- Work Productivity: Absenteeism + Presenteeism

Employer economic impact measured by therapeutic field
40 positive cases only, therapeutic field studied between 1985-2017



Therapeutic Field

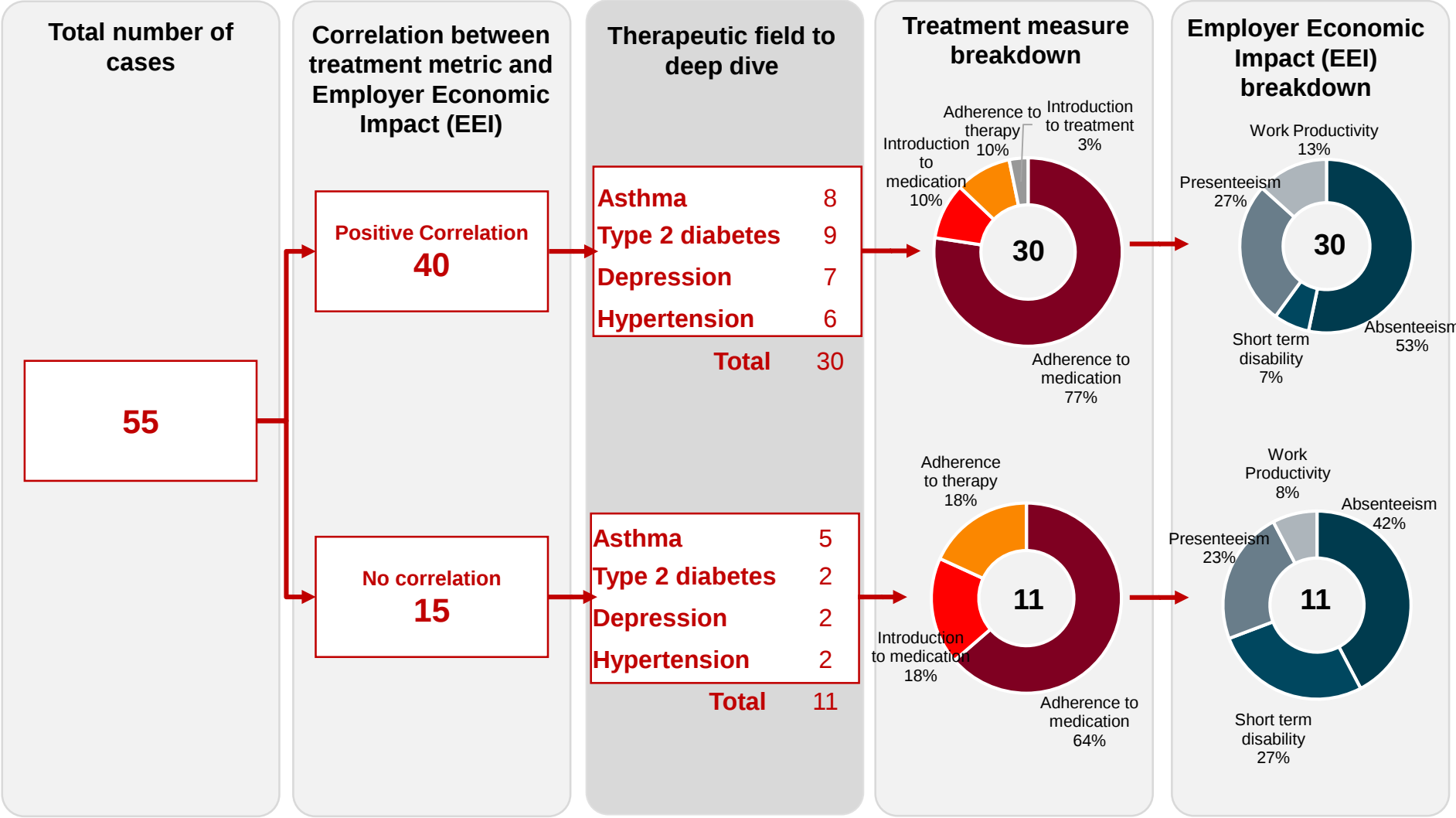
Type 2 Diabetes
Asthma
Hypertension
Depression
Arthritis
Chronic
Hepatitis C
Dyslipidemia
CHF



Most common indicator in positive cases

N/A
Absenteeism
N/A
Short-Term Disability
N/A
Absenteeism
Presenteeism and Work Productivity
Absenteeism and Short-Term Disability
Short-Term Disability

Therapeutic areas retained for study: Diabetes, Hypertension, Depression, Asthma



Overview of studies: Diabetes

Results Outcome	Grand Total	Treatment Metric				Employer Economic Impact (EEI)			
		Adherence to medication	Introduction to medication	Adherence to therapy	Introduction to therapy	Absenteeism	Presenteeism	Short term disability	Work Productivity
Positive correlation	9	7	2	0	0	5	1	3	0
No positive correlation	2	2	0	0	0	2	0	0	0
Total	11	9	2	0	0	7	1	3	0

1 9 of 11 studies yielded positive results

2 The metric used to measure treatment was adherence to medication in 7 of the 9 cases

3 The metric for employer economic impact included all four measures but absenteeism and disability were the most frequently-used metrics for employer economic impact

4 Adherence ranged from 53% to 75%

5 Employer Economic Impact

	Days saved per employee/year (adherent vs. non adherent employees)	\$ Savings per employer/year (2018\$)
Absenteeism	1.5 to 4	\$360-\$700
Disability	2 to 9	\$400-\$3,300
Presenteeism	3.5	\$840

CASE STUDY

The opportunity: Illustration of optimizing compliance at Ford and reducing disability for approx. 5,000 employees with prescription for hypoglycemic drug (Case #3)

- Current situation: 60% adherence = \$2,700 (2018\$) savings/employee/year
- Pivot/Concerto hypothesis: Achieving 80% adherence = \$3,800 (2018\$) savings/employee/year

Overview of studies: Hypertension

Results Outcome	Grand Total	Treatment Metric				Employer Economic Impact (EEI) 5			
		Adherence to medication 4	Introduction to medication	Adherence to therapy	Introduction to therapy	Absenteeism 3	Presenteeism	Short term disability	Work Productivity
Positive correlation	6 1	6 2	0	0	0	3	1	1	1
No positive correlation	2	2	0	0	0	1	1	0	0
Total	8 1	8	0	0	0	4	2	1	1

1 6 of 8 studies yielded positive results

2 The metric used to measure treatment was adherence to medication in all cases

3 The metric for employer economic impact included all four measures but absenteeism was the most frequently-used metric

4 Adherence ranged from 30% to 65%

5 Employer Economic Impact

	Days saved per employee/year (adherent vs. non adherent employees)	\$ Savings per employer/year (2018\$)
Absenteeism	2 to 4	\$450-\$1,300
Disability	2 to 5	\$330-\$1,130
Presenteeism	4 to 7	\$840-\$1,600

CASE STUDY

The opportunity of increased adherence on absenteeism (Case #10)

- 63% adherence = Savings of \$700 (2018\$) per employee/year
- 100% compliance* = Total savings of \$1,100 (2018\$) per employer/year

- Note: Conversion into 2018 dollars carried by Pivot/Concerto

Overview of studies: Depression

Results Outcome	Grand Total	Treatment Metric				Employer Economic Impact (EEI) 5			
		Adherence to medication 4	Introduction to medication	Adherence to therapy	Introduction to therapy	Absenteeism	Presenteeism	Short term disability	Work Productivity
Positive correlation	7 1	5 2	0	2 2	0	3 3	2 3	2 3	0
No positive correlation	2	0	2	0	0	1	1	0	0
Total	9 1	5	2	2	0	4	3	2	0

1 7 of 9 studies yielded positive results

2 Adherence to medication was the most widely used metric but adherence to therapy (including education and active follow-up with patients) was also used

3 The employer economic impacts included absenteeism, presenteeism and disability

4 Adherence to medication ranged from 25% to 54%

5 Employer Economic Impact

	Days saved per employee/year (adherent vs. non adherent employees)	\$ Savings per employer/year (2018\$)
Absenteeism	6- to 10	\$860-\$1,870
Presenteeism	22 ¹	\$5,280
Disability	43 ¹	\$10,320

CASE STUDY

The opportunity of achieving full adherence: Impact on absenteeism (Case #14)

	Average days saved at average compliance (43%)	Average days saved at 100% compliance	Employer savings (2018\$) at average compliance	Employer savings (2018\$) at full compliance	Incremental savings from achieving full compliance
Depression	9	21	\$1,870	\$4,350	\$2,480

- Note: Conversion into 2018 dollars carried by Pivot/Concerto

Overview of studies: Asthma

Results Outcome	Grand Total	Treatment Metric				Employer Economic Impact (EEI) 5			
		Adherence to medication 4	Introduction to medication	Adherence to therapy 2	Introduction to therapy	Absenteeism 3	Presenteeism 3	Short term disability	Work Productivity
Positive correlation	8 1	5 2	0	3 2	0	3 3	3 3	1	1
No positive correlation	5	2	0	1	2	3	1	0	1
Total	13 1	7	0	4	2	6	4	1	1

1 8 of 13 studies yielded positive results (no correlations were likely due to

1. Small samples sizes: n = 87 and n = 385
2. Self-reported data

2 Adherence to medication was the most widely used metric but adherence to therapy (including education and active follow-up with patients) was also used

3 The employer economic impacts included absenteeism, presenteeism and work productivity

4 Adherence to medication ranged from 23% to 50%

5 Presenteeism was the major source of employer economic impact at over \$7,000/employee/year

CASE STUDY

Impact of asthma control on presenteeism (Case #21)

Hours of productivity lost per week/employee	3.7
Dollars lost per week/employee (2010 CDN\$)	\$167
Dollars lost per week/employee (2018 CDN\$)	\$192
Annual savings per employee (2018 CDN\$)	\$10,000

Conclusions

- Clear & demonstrated link between adherence to treatment and economic impact for employees (absenteeism, presenteeism, disability) in terms of days and dollars saved
- Overall, very low levels of adherence: in the range of 50% but below 30% for some studies with patients with asthma, hypertension and depression
- There is clearly an opportunity to generate additional savings by improving adherence as illustrated in the table below for one study which looked at employees with hypertension, diabetes and depression

CASE STUDY

Savings from achieving 100% compliance

Chronic Condition	Average adherence rate	Average days saved/year at average adherence	Average days saved/year at 100% adherence	Employer savings by employee/year (2018\$) at average adherence	Employer savings by employee/year (2018\$) at full adherence	Additional savings per employee/year (2018\$) from achieving full adherence
Hypertension (Case #10)	63%	3.5	5.5	\$714	\$1,134	\$420
Diabetes (Case #2)	61%	16.1	26.5	\$3,306	\$5,420	\$2,100
Depression (Case #14)	43%	9.1	21.2	\$1,870	\$4,350	\$2,480

- Note: Conversion into 2018 dollars carried by Pivot/Concerto

Appendix 1 | Literature Review: Detailed Case Studies

Studies

Top four therapeutic areas

- **Type 2 Diabetes**

- Hypertension
- Depression
- Asthma

Economic Impacts for diabetes: Savings from \$360 to \$3,300 per employee/year (1/2)

Study	Economic metric	# Days saved per year	Average adherence	% of Adherent Subjects	Annual savings per employee in 2018 dollars at adherence as per column 3 & 4	Annual additional savings per employee in 2018\$ at full compliance ²	Comments
#1A	Absenteeism	3		59%	\$700 (\$36/h)	\$700/person for 41% of non-adherent subjects	Total savings not relevant as multi-employer databases
#1B	Short-term disability	2		59%	\$385 (\$25/h) ³	\$385/person for 41% of non-adherent subjects	Total savings not relevant as multi-employer databases
#2	Absenteeism and Short-term disability (not separated)	16	61%		\$3,300 (\$20/h)	\$2,055 additional benefits of achieving full compliance	Can calculate a meaningful total because have average adherence rate
#3	Short-term disability	7		57%	\$2,700 (\$48/h) Ford	By achieving 80% adherence for all its employees Ford could save up to \$3,800	Can calculate a meaningful total because have a single employer database
#4	Absenteeism	4		Initiation to medication	\$540 (\$17/h)	\$540/person by introducing to medication	Total savings not relevant as multi-employer databases

1. Average wage of \$30 was obtained using diabetes averages cited by the authors, stated in 2018 dollars

2. Ignoring the cost of achieving that level of compliance and assuming that compliance can be increased to full compliance for all employees

3. Disability was calculated as 70% of \$36/h wage

Economic Impacts for diabetes: Savings from \$360 to \$3,300 per employee/year (2/2)

Study	Economic metric	# Days saved per year	Average adherence	% of Adherent Subjects	Annual savings per employee in 2018 dollars at adherence as per column 4	Annual additional savings per employee in 2018\$ at full compliance ²	Comments
#5	Absenteeism	1.5		66%	\$360 (\$30/h ¹)	\$360/person for 34% of non-adherent subjects	Total savings not relevant as multi-employer databases
#6	Absenteeism	4% reduction in employees with absence days		Initiation to medication	NA		Could not be calculated as # of days of absence as # of days was not specified but rather # of employees for ranges of absences
#7	Short-term disability	4-9		75%	\$960-\$2,160 (\$30/h ¹)	\$800-\$1,800/person for 25% of non-adherent subjects	Total savings not relevant as multi-employer databases
#8	Presenteeism	3.5		53%	\$840 (\$30/h ¹)	\$840/person for 47% of non-adherent subjects	Total savings not relevant as multi-employer databases

1. Average wage of \$30 was obtained using diabetes averages cited by the authors, stated in 2018 dollars

2. Ignoring the cost of achieving that level of compliance and assuming that compliance can be increased to full compliance for all employees

3. Disability was calculated as 70% of \$36/h wage

#1 Impact of Medication Adherence on Absenteeism and Short-Term Disability for Five* Chronic Diseases (2012)

Treatment Measure
Adherence to Medication
 Variable
Medication Possession Ratio (MPR) Dichotomous

Chronic Diseases studied
Diabetes
Hypertension
Asthma

EEl measure
Absenteeism
Short-Term Disability

Population studied
Diabetes = 7,817
Hypertension = 33,245
Asthma = 5,416
 (US)



Results

Positive correlation ☒

No correlation ☐

Annual savings in absenteeism by adherent employees

	Days saved	Cost savings ¹ 2012\$	Cost Savings ² 2018\$
Hypertension	1.7	\$408	\$444
Diabetes	2.8	\$672	\$703
Asthma	3.0	\$720	\$783

Annual savings in short term disability by adherent employees

	Days saved	Cost savings ³ 2012\$	Cost Savings ² 2018\$
Hypertension	1.8	\$302	\$328
Diabetes	2.1	\$353	\$384
Asthma	0.7	\$118	\$128

1. Cost savings for absenteeism were calculated in 2012 dollars using an average daily wage of \$240
2. Conversion made using officialdata.org
3. Cost savings for short term disability were calculated in 2012 dollars using 70% of daily wage of \$240

Observation

☐ Prospective study ☒ **Retrospective Study**

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	MarketScan
Duration: 4 years	

EEl Measure

Data Type	Data Source
Payroll Data	MarketScan
Duration: 4 years	

• Percentage of adherent subjects (MPR>80%):

- Diabetes: 59%
- Hypertension: 65%
- Asthma: 23%

*The 2 conditions not included in the case study are congestive heart failure and dyslipidemia

#2 Labour Productivity Effects of Prescribed Medicines for Chronically Ill Workers (1996)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio Continuous

Chronic Diseases studied

Diabetes

Hypertension

Depression

Productivity measure

Absenteeism & Disability

(Not separated out)

Population studied

Respondents of the 1987 National Medical Expenditure Panel Survey (MEPS) in the (US)



Results

Positive correlation ☒

No correlation ☐

Estimated days lost per year

Chronic Condition	Average days saved at 100% compliance	Average days saved at average compliance	Employer savings (1987\$) at average adherence	Employer savings (2018\$) ¹ at average adherence	Employer savings (1987\$) at full adherence	Employer savings (2018\$) ¹ at full adherence
Hypertension	5.5	3.5	\$325	\$714	\$516	\$1,134
Diabetes	26.5	16.1	\$1,505	\$3,306	\$2,467	\$5,420
Depression	21.2	9.1	\$851	\$1,870	\$1,979	\$4,350

- Females have significantly more absence days (1 more day/year)
- Heavy smokers have more days off
- Educated workers have significantly fewer days off
- Unionized workers and workers in large firms use more disability days potentially because they have greater discretion to use sick days without fears about job security

1. Conversion made using officialdata.org

Observation

☐ Prospective study ☒ **Retrospective Study**

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	MEPS

Duration: 1 year

EEl Measure

Data Type	Data Source
Self-Reported (structured survey)	MEPS

Duration: 1 year

• **Average adherence rate:**

- Hypertension: 63%
- **Diabetes: 61%**
- Depression: 43%

#3 Impact of Compliance to Oral Hypoglycemic Agents on Short-Term Disability Costs in an Employer Population (2014)

Treatment Measure
Adherence to Medication
 Variable
Percentage Days Covered

Chronic Diseases studied
Diabetes

EEl measure
Short-Term Disability

Population studied
4,978
 Ford employees with prescription for
 an hypoglycemic agent
 (US)



Results

Positive correlation ☒

No correlation ☐

Relationship between adherence with oral hypoglycemic agents and costs

Characteristic	Adherent Employees In 2007\$	Adherent Employees In 2018\$ ²	Non-Adherent Employees In 2007\$	Non-Adherent Employees In 2018\$ ²	% Difference ³
Mean healthcare costs per employee	\$7,782	\$9,366	\$7,642	\$9,198	+1.8%
Mean pharmacy costs	\$3,155	\$3,797	\$1,668	\$2,008	+89.1%
Mean medical costs	\$4,627	\$5,569	\$5,974	\$7,190	-22.6%
Mean STD costs per employee	\$7,667	\$9,228	\$9,913	\$11,931	-22.7%
Mean short-term disability duration ¹	10.5 weeks		11.9 weeks		-11.8%
Total costs per employee (STD + Healthcare)	\$15,449	\$18,594	\$17,555	\$21,129	-12.0%

- While adherent employees have higher healthcare cost due to higher drug spending, the reduction in short-term disability cost is large enough to decrease total cost of employees by 12%

1. Mean short-term disability was only calculated with individuals who had reported short-term disability

2. Conversion made using officialdata.org

3. (Adherent Employees - Non Adherent Employees / Non-Adherent Employees)*100

Observation

☐ Prospective study

☒ Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	Ford
Duration: 3 years	

EEl Measure

Data Type	Data Source
Claims Data	Ford
Duration: 3 years	

- Key Findings:
 - As in other studies, total healthcare cost was higher for adherent employees, fueled by higher pharmacy costs
 - However, STD was lowered by 11.8% resulting in net savings in total costs (STD + Healthcare) of 12%
- Percentage of adherent subjects:
 - 57%

#4 Effects of Vildagliptin/Metformin Therapy on Patient-Reported Outcomes: Work Productivity, Patient Satisfaction, and Resource Utilization (2013)

Treatment Measure

Introduction to Medication

Medication

Vildagliptin

Chronic Diseases studied

Diabetes

EEl measure

Absenteeism

Population studied

967

Adult outpatients with a diagnosis of Type 2 Diabetes Mellitus (Italy)

 **Results**

Positive correlation ☒

No correlation ☐

Impact of Vidagliptin in the treatment of Type 2 Diabetes on Employee Absenteeism

EEl Measure	Before introduction to Vildagliptin	1 year after introduction of Vildagliptin	Cost savings (in euros) ¹ (2008\$)	Cost savings (in euros) ¹ converted in (2018\$) ²
Average hours of work missed per year	59	26	400.15	463.81

The addition of Vildagliptin yielded major improvement in absenteeism even 6 months after the beginning of the treatment. After a year, absenteeism decreased by 53%.

1. Cost savings were calculated using the average wage of the patients

2. Conversion made using officialdata.org

Observation

☒Prospective study ☐Retrospective Study

Sources:

Treatment Measure

Study Type	Study Design
Clinical Trial	Observational study on outpatients who were given Vildagliptin medication. Patients served as their own control group Duration: 1 year

EEl Measure

Data Type	Data Source
Self-reported	Work Productivity and Activity Impairment

Duration: for 1 year with survey administered in 7 day increments

Study design: Patients were chosen on the basis that they were no longer responding to metformin based on a new medication prescription

#5 The Association of Insulin Medication Possession Ratio, Use of Insulin Glargine, and Health Benefit Costs in Employees and Spouses with Type 2 Diabetes (2008)

Treatment Measure
Adherence to Medication
 Variable
Medication Possession Ratio (MPR) Dichotomous

Chronic Diseases studied
Diabetes

EEl measure
Absenteeism

Population studied
1,588
 Employees identified within the Human Capital Management Services (HCMS) survey with type 2 diabetes (US)



Results

Positive correlation ☒
 No correlation ☐

Average Annual Sick Days Leave for Adherent and Non-Adherent Insulin Gargline Users

EEl Measure	Adherent	Non-Adherent	% Difference
Absence days	4.1	5.4	-24%

1. Percentage difference calculated as (Adherent – Non-Adherent/ Non-Adherent)*100

Observation

☐ Prospective study ☒ Retrospective Study

• Sources:

Treatment Measure	
Data Type	Data Source
Prescription claims data	HCMS
Duration: 1 year	
EEl Measure	
Data Type	Data Source
Claims and Payroll Data	HCMS
Duration: 1 year	

• Key Findings:

- Study found an estimated \$450 savings per employee in total medical and prescription drug cost per each 10% increase in MPR.
- Because this type of insulin requires only one dose a day, rather than multiple injections, patients taking insulin glargine had significantly higher MPRs than patients taking other forms of insulin

• Average adherence:

- 66%

#6 Health Economic Benefits and Quality of Life During Improved Glycemic Control in Patients with Type 2 Diabetes Mellitus (1998)

Treatment Measure

Introduction to medication

Medication

Glipizide GITS¹

Chronic Diseases studied

Diabetes

EEl measure

Absenteeism

Population studied

569

patients with Type 2 Diabetes (US)



Results

Positive correlation ☒

No correlation ☐

Difference in Percentage of Patient Absenteeism Between Placebo and Treatment Group

	% of employees with absence days before introduction of treatment ¹	% of employees with absence days after 15 weeks of treatment	% Difference ²
Placebo	2.4%	10.5%	+77%
Glipizide GITS	5.6%	4.8%	-4%

• Employees initiated on GITS reduced absenteeism slightly while the % of non-controlled employees with diabetes rose sharply potentially because they were taken off their medication

1. The study only reported the amount of patients experiencing absence days, without taking into account the duration of those absences

2. Percentage difference calculated as (Absence days after treatment – Absence days before treatment / Absence days after treatment)*100

Observation

☒Prospective study ☐Retrospective Study

• Sources:

Treatment Measure	
Study Type	Study Design
Clinical Trial	Double-blind control experiment (GITS vs Placebo); with 3 week-period to wash prior treatment
Duration: 15 weeks	
EEI Measure	
Data Type	Data Source
Self-reported Data	Study Questionnaire
Duration: 12 weeks	

• Study Duration: the treatment and EEI measure overlapped during the last 12 weeks

• Key Findings: Both groups were subject to a diet, suggesting that the presence of medication can assume to have been a real predictor of absenteeism

1. Refers to glipizide gastrointestinal therapeutic system

#7 Cost Sharing, Adherence, and Health Outcomes in Patients with Diabetes (2010)

Treatment Measure

Adherence to Medication

Variable

Percentage Days Covered

Chronic Diseases studied

Diabetes

EEl measure

Absenteeism

Short-Term Disability

Population studied

Absenteeism = 2,869

Short-term disability = 4,780

(US)



Results

Positive correlation ☒

No correlation ☒

Relationship between adherence with oral hypoglycemic agents and costs in a 2 year time frame

OAD¹-only users/year

OAD users with or without insulin²/year

EEl Measure	Adherent	Non-Adherent	% Difference ³	Adherent	Non-Adherent	% Difference ³
STD days	8	12	-33.3%	11	20	-45.0%
Absence days	Mixed Effects ⁴		N/A	Mixed Effects ⁴		N/A

1. OAD refers to orally administered agents

2. Database for this group did not specify that patients were taking only OAD

3. Percentage difference calculated as (Adherent – Non-Adherent/ Non-Adherent)*100

4. Study found slightly higher rates of absence among patients who were adherent for the full sample. This may be due to non-adherent patients slipping into disability as opposed to taking absence days. OAD-only users had the same rates of absence as those who were non-adherent.

Observation

☐Prospective study
 ☒Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	MarketScan

Duration: 1 year

EEl Measure

Data Type	Data Source
Claims Data	MarketScan

Duration: 1 year

• Percentage of adherent subjects (MPR>80%):

- OAD only: 73%
- On OAD with or without insulin: 75%

#8 Medication Adherence, Comorbidities, and Health Risk Impacts on Workforce Absence and Job Performance (2011)

Treatment Measure
Adherence to Medication
 Variable
Medication Possession Ratio (MPR) Dichotomous

Chronic Diseases studied
Diabetes
Depression
Hypertension

EEl measure
Absenteeism
Presenteeism

Population studied
Hypertension = 5,449
Diabetes = 1,312
Depression = 2,120
 Employees from 5 major undisclosed companies (US)



Results

Positive correlation ☒

No correlation ☒

Effect of Medication Adherence on Job Performance and Absenteeism

Chronic Condition	Sample Average MPR	Absenteeism for adherent employees (MPR > 80%)	Job performance ¹ for adherent employees (MPR > 80%)
Hypertension	79%	Did not find significant results	Did not find significant results
Diabetes	77%	Did not find significant results	+3.5 days per year
Depression	70%	Did not find significant results	Did not find significant results

1. Hours of improved work performance were transformed into days per year assuming an 8 hour work day and 262 work days per year

Observation

☐ Prospective study ☒ Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	Insurance Company
Duration: 29 months	

EEl Measure

Data Type	Data Source
Self-Reported	Health Productivity Questionnaire
Duration: 28 days	

- **Study Limitations:** Use of self reported data on absence and job performance
- **Percentage of adherent subjects (MPR>80%):**
 - **Diabetes: 53%**
 - Hypertension: 65.6%
 - Depression: 63.1%

Studies

Top four therapeutic areas

- Type 2 Diabetes
- **Hypertension**
- Depression
- Asthma

Economic Impacts for hypertension: Savings from \$330 to \$1,600 per employee/year

Study	Economic metric	# Days saved per year	Average adherence	% of Adherent Subjects	Annual savings per employee in 2018 dollars* at adherence as per column 3 & 4	Annual additional savings per employee in 2018\$ at full compliance ²	Comments
#9 A	Absenteeism	1.7		65%	\$450 (\$33/h)	450\$/ person for remaining 35% of non-adherent employees	Total savings not relevant as multi-employer databases
#9 B	Short-term disability	1.8		65%	\$330 (\$33/h)	\$330/person for 35% of non-adherent subjects	Total savings not relevant as multi-employer databases
#10	Short-term disability	5.3	63%		\$1,130 (\$20/h)	\$830 benefits of achieving full compliance	Can calculate a meaningful total because have average adherence rate
#11 A	Presenteeism	6.7		40%	\$1,600 (\$30/h) ¹	\$1,400/person for 60% of non-adherent subjects	Total savings not relevant as multi-employer databases
#11 B	Work productivity	6.9		40%	\$1,660 (\$30/h) ¹	\$1,400/person for 60% of non-adherent subjects	Total savings not relevant as multi-employer databases
#12	Absenteeism	4.3		30%	\$1,300 (\$30/h) ¹	\$870/person for 70% of non-adherent subjects ³	Total savings not relevant as multi-employer databases
#13	Presenteeism	3.5		66%	\$840 (\$30/\$) ¹		

1. Average wage of \$30 was obtained using diabetes averages cited by the authors, stated in 2018 dollars

2. Ignoring the cost of achieving that level of compliance and assuming that compliance can be increased to full compliance for all employees

#9 Impact of Medication Adherence on Absenteeism and Short-Term Disability for Five* Chronic Diseases (2012)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio Dichotomous

Chronic Diseases studied

Diabetes

Hypertension

Asthma

EEl measure

Absenteeism

Short-Term Disability

Population studied

Diabetes = 7,817

Hypertension = 33,245

Asthma = 5,416

(US)



Results

Positive correlation ☒

No correlation ☐

Annual savings in absenteeism by adherent employees

	Days saved	Cost savings ¹ 2012\$	Cost Savings ² 2018\$
Hypertension	1.7	\$408	\$444
Diabetes	2.8	\$672	\$703
Asthma	3.0	\$720	\$783

Annual savings in short term disability by adherent employees

	Days saved	Cost savings ³ 2012\$	Cost Savings ² 2018\$
Hypertension	1.8	\$302	\$328
Diabetes	2.1	\$353	\$384
Asthma	0.7	\$118	\$128

1. Cost savings for absenteeism were calculated in 2012 dollars using an average daily wage of \$240

2. Conversion made using officialdata.org

3. Cost savings for short term disability were calculated in 2012 dollars using 70% of daily wage of \$240

Observation

☐ Prospective study

☒ **Retrospective Study**

• Sources:

Treatment Measure	
Data Type	Data Source
Prescription claims data	MarketScan
Duration: 4 years	

EEI Measure	
Data Type	Data Source
Payroll Data	MarketScan
Duration: 4 years	

• Percentage of adherent subjects:

- Diabetes: 59%
- **Hypertension: 65%**
- Asthma: 23%

*The 2 conditions not included in the case study are congestive heart failure and dyslipidemia

Authors: Ginger Carls, Christopher Roebuck and Teresa Gibson (Journal of Occupational and Environmental Medicine)

#10 Labour Productivity Effects of Prescribed Medicines for Chronically Ill Workers (1996)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio Continuous

Chronic Diseases studied

Diabetes

Hypertension

Depression

Productivity measure

Absenteeism

Population studied

Respondents of the 1987 National Medical Expenditure Panel Survey (MEPS) in the (US)



Results

Positive correlation ☒ *No correlation* ☐

Estimated days lost per year

Chronic Condition	Average days saved at 100% compliance	Average days saved at average compliance	Employer savings (1987\$) at average adherence	Employer savings (2018\$) ¹ at average adherence	Employer savings (1987\$) at full adherence	Employer savings (2018\$) ¹ at full adherence
Hypertension	5.5	3.5	\$325	\$714	\$516	\$1,134
Diabetes	26.5	16.1	\$1,505	\$3,306	\$2,467	\$5,420
Depression	21.2	9.1	\$851	\$1,870	\$1,979	\$4,350

- Females have significantly more absence days (1 more day/year)
- Heavy smokers have more days off
- Educated workers have significantly fewer days off
- Unionized workers and workers in large firms use more disability days potentially because they have greater discretion to use sick days without fears about job security

1. Conversion made using officialdata.org

Observation

☐ Prospective study ☒ **Retrospective Study**

• **Sources:**

Treatment Measure	
Data Type	Data Source
Prescription claims data	MEPS
Duration: 1 year	

EEI Measure	
Data Type	Data Source
Self-Reported (structured survey)	MEPS
Duration: 1 year	

• **Average adherence rate:**

- Hypertension: 63%
- Diabetes: 61%
- Depression: 43%

#11 Impact of Medication Adherence on Work Productivity in Hypertension (2012)

Treatment Measure

Adherence to Medication

Variable

Morisky Medication Adherence Scale (MMAS)

Chronic Diseases studied

Hypertension

EEl measure

Presenteeism

Work Productivity

Population studied

3,041

National Health and Wellness Survey (NHWS) respondents employed and with hypertensive medication (US)



Results

Positive correlation ☒

No correlation ☐

Time lost at work by level of hypertensive medication adherence (% per period of 7 days)

EEl Measure	Average for full sample (n = 3,041)	Low Adherence (n = 1,355)	High Adherence (n = 1686)	Percentage Difference ¹
Percentage Work Productivity Loss (absenteeism + presenteeism)	21.4%	23.8%	19.5%	-18% (6.7 days)
Percentage time lost due to Presenteeism only	18.4%	20.5%	16.7%	-19% (6.9 days)

1. Percentage difference calculated as (High Adherence - Low Adherence / Low Adherence) *100

Observation

☐ Prospective study ☒ **Retrospective Study**

• **Sources:**

Treatment Measure	
Data Type	Data Source
Self-reported data (structured survey)	NHWS
Duration: 1 year	

EEl Measure	
Data Type	Data Source
Self-reported Data (structured survey)	NHWS
Duration: 7 days	

• **Study Limitations:** Use of self reported data

• **Key Findings:**

- Comorbidities like depression, high cholesterol and obesity had significant impact on work productivity losses
- Adherent patients were more likely to be Caucasian, married and non-smokers
- **% of adherent subjects (MMAS = 1-4):**
 - 34%
- **% of low adherent subjects (MMAS = 0):**
 - 66%

#12 Effect of Antihypertensive Medication Adherence Among Employees With Hypertension (2009)

Treatment Measure
Adherence to Medication
 Variable
Percentage Days Covered

Chronic Diseases studied
Hypertension

EEl measure
Absenteeism

Population studied
6,236
 Employees with hypertension
 (US)



Results

Positive correlation ☒
 No correlation ☐

Annual number of work absence days per level of medication adherence

Absence days	Percentage Days Covered, %				
	0	25	50	75	100
Hypertension-specific high prior cost ¹	21.6	15.4	11.0	7.9	5.7

- While the “high prior cost” group showcased a negative correlation between medication adherence and days missed from work, the “low prior cost group” had more absence days as their medication adherence increased. A potential explanation could be the secondary effect associated with the medication leading to higher impairment for employees.
- Thus, an increase in adherence will have significant positive outcomes for high prior medical costs patients, but not for low prior medical costs patients.

1. Employees with high medical costs 6 months prior to study

Observation

☐ Prospective study ☒ Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	Human Capital Management Services
Duration: 2 years	

EEl Measure

Data Type	Data Source
Claims and Payroll Data	Human Capital Management Services
Duration: 1 year	

• Key Findings: each 10% increase in PDC results, on average, in:

- +7.4 absence days for employees with low prior costs
- -12.5 absence days for employees with high prior cost
- % of adherent subjects (PDC>90%): 30%
- % of low adherent subjects (PDC between 1% and 60%): 40.3%

#13 Medication Adherence, Comorbidities, and Health Risk Impacts on Workforce Absence and Job Performance (2011)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio (MPR) Dichotomous

Chronic Diseases studied

Diabetes

Depression

Hypertension

EEl measure

Absenteeism

Presenteeism

Population studied

Hypertension = 5,449

Diabetes = 1,312

Depression = 2,120

Employees from 5 major undisclosed companies (US)



Results

Positive correlation ☒

No correlation ☒

Effect of Medication Adherence on Job Performance and Absenteeism

Chronic Condition	Sample Average MPR	Absenteeism for adherent employees (MPR > 80%)	Job performance ¹ for adherent employees (MPR > 80%)
Hypertension	79%	Did not find significant results	Did not find significant results
Diabetes	77%	Did not find significant results	+3.5 days per year
Depression	70%	Did not find significant results	Did not find significant results

1. Hours of improved work performance were transformed into days per year assuming an 8 hour work day and 262 work days per year

Observation

☐ Prospective study ☒ **Retrospective Study**

• **Sources:**

Treatment Measure

Data Type	Data Source
Prescription claims data	Insurance Company

Duration: 29 months

EEl Measure

Data Type	Data Source
Self-Reported	Health Productivity Questionnaire

Duration: 28 days

• **Study Limitations:** Use of self reported data on absence and job performance

• **Percentage of adherent subjects:**

- Diabetes: 53%
- **Hypertension: 66 %**
- Depression: 63 %

Studies

Top four therapeutic areas

- Type 2 Diabetes
- Hypertension
- **Depression**
- Asthma

Economic Impacts for depression: Savings from \$860 to over \$10,000 per employee/year

Study	Economic metric	# Days saved per year	Average adherence	% of adherent subject	Annual savings per employee in 2018 dollars	Annual additional savings per employee in 2018\$ at full compliance ³	Comments
#14	Absenteeism	9	43%		\$1,870 (\$20.5/h)	\$2,480 additional benefits of achieving full compliance	Can calculate a meaningful total because have average adherence rate
#15A	Absenteeism	10 ¹		25% (>95%)	\$2,400 (\$30/h) ²	\$2,380/person for 75% of non-adherent subjects	Total savings not relevant as multi-employer databases
#15B	Presenteeism	22 ¹		25% (>95%)	\$5,280 (\$30/h) ²	\$5,327/person for 75% of non-adherent subjects	Total savings not relevant as multi-employer databases
#16A	Absenteeism	6.1		N/A: adherence to therapy	\$860		Total savings not relevant as multi-employer databases
#16B	Presenteeism	N/A		N/A: adherence to therapy	\$2,372		Total savings not relevant as multi-employer databases
#17	Short-term disability	43		54% after 3 months	\$10,320 (\$30/h) ²	\$520,000/person for 46.3% of non-adherent subjects	Can calculate a meaningful total because have a single employer database
#18	Absenteeism	N/A		85% patients initiate treatment	N/A		# of days not calculated but rather number of people on ranges of sick leave

1. Annual savings given by authors divided by estimated daily wage of \$240 (2018\$)

2. Average wage of \$30 was obtained using diabetes averages cited by the authors, stated in 2018 dollars

3. Ignoring the cost of achieving that level of compliance and assuming that compliance can be increased to full compliance for all employees

#14 Labour Productivity Effects of Prescribed Medicines for Chronically Ill Workers (1996)

Treatment Measure
Adherence to Medication
 Variable
Medication Possession Ratio Continuous

Chronic Diseases studied
Diabetes
Hypertension
Depression

Productivity measure
Absenteeism

Population studied
Respondents of the 1987 National Medical Expenditure Panel Survey (MEPS) in the (US)



Results

Positive correlation ☒

No correlation ☐

Estimated days lost per year

Chronic Condition	Average days saved at 100% compliance	Average days saved at average compliance	Employer savings (1987\$) at average adherence	Employer savings (2018\$) ¹ at average adherence	Employer savings (1987\$) at full adherence	Employer savings (2018\$) ¹ at full adherence
Hypertension	5.5	3.5	\$325	\$714	\$516	\$1,134
Diabetes	26.5	16.1	\$1,505	\$3,306	\$2,467	\$5,420
Depression	21.2	9.1	\$851	\$1,870	\$1,979	\$4,350

- Females have significantly more absence days (1 more day/year)
- Heavy smokers have more days off
- Educated workers have significantly fewer days off
- Unionized workers and workers in large firms use more disability days potentially because they have greater discretion to use sick days without fears about job security

1. Conversion made using officialdata.org

Observation

☐ Prospective study ☒ **Retrospective Study**

• **Sources:**

Treatment Measure	
Data Type	Data Source
Prescription claims data	MEPS
Duration: 1 year	

EEI Measure	
Data Type	Data Source
Self-Reported (structured survey)	MEPS
Duration: 1 year	

• **Average adherence rate:**

- Hypertension: 63%
- Diabetes: 61%
- **Depression: 43%**

#15 Assessing the relationship between compliance with antidepressant therapy and employer costs among employees in the United States* (2010)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio (MPR) Continuous

Chronic Diseases studied

Depression

Productivity measure

Absenteeism

Presenteeism

Population studied

488 employees from 2 US employers' privately insured medical and prescription claims databases (US)



Results

Positive correlation ☒

No correlation ☐

Direct & Indirect costs¹ per employee with depression

Characteristic	MPR < 0.26 ¹	2018\$ ²	0.26 < MPR < 0.95 ¹	2018\$ ²	MPR > 0.95 ¹	2018\$ ²	% Difference ³
Mean direct cost per employee	610	755	844	1,045	1,450	1,795	58%
Mean pharmacy costs	194	240	525	650	1,086	1,344	82%
Mean medical costs	480	594	306	379	396	490	-22%
Mean indirect cost per employee	25,542	31,617	21,702	26,864	19,315	23,909	-24%
Mean absenteeism costs	5,899	7,302	4,477	5,542	3,976	4,922	-33%
Mean presenteeism costs	19,643	24,315	17,225	21,322	15,339	18,988	-22%

1. Annualized 2006 Dollars during the 6-month study period

2. Conversion made using officialdata.org

3. $(MPR > 0.95) - (MPR < 0.26) / (MPR < 0.26)$

Observation

☐ Prospective study ☒ **Retrospective Study**

• Sources:

Treatment Measure	
Data Type	Data Source
Prescription claims data	Employer databases
Duration: 114 days before survey (3 months plus buffer)	
EEI Measure	
Data Type	Data Source
Self-reported	Health Performance Questionnaire (HPQ) was given to employees when they signed up for benefits
	Salary data in the database was used to transform measures of lost work performance into dollars
Duration: 1 year (6 months prior to and after the survey)	

*The subset of employees with depression was used since the category of employees with antidepressant may be too broad to observe impact on costs as patients may receive antidepressants for conditions other than depression (bipolar, pain, etc)

#16 The effect of improving primary care depression management on employee absenteeism and productivity (2004)

Treatment Measure
Adherence to Therapy

Chronic Diseases studied
Depression

EEl measure
Absenteeism
Presenteeism

Population studied
326
patients in 12 community primary care practices across the US who reported being employed during the study (US)



Results

Positive correlation ☒

No correlation ☐

Impact of treatment on absenteeism and presenteeism

EEl Measure	Absenteeism	Absenteeism cost savings (1996\$)	Absenteeism cost savings (2018\$) ³
Employees impact	-23%	\$539	\$857

EEl Measure	Presenteeism	Presenteeism cost savings (1996\$)	Presenteeism cost savings (2018\$) ³
Employees impact	6.1%	\$1,491	\$2,372

- Depression management, including medication therapy, improved presenteeism by 6%, translating into \$1,500 (in 1996\$) per year per FTE suffering from depression and reduced absenteeism by 23 % at an annual value of \$539

1. Conversion made using officialdata.org

Observation

☒ Prospective study ☐ Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Real-world trial/self-reported data	Study questionnaire asking patients their medication use and whether they had any counselling
Duration: 2 years	

EEl Measure

Data Type	Data Source
Self-reported	Study questionnaire
Duration: 2 years	

#17 The association of antidepressant medication adherence with employee disability absences (2007)

Treatment Measure
Adherence to Medication
 Variable
 Health Plan Employer
 Data and Information Set

Chronic Diseases studied
Depression

Productivity measure
Short term disability

Population studied
2,112 employees from a large financial services corporation in the Midwest with an antidepressant prescription (US)



Results

Positive correlation ☒
 No correlation ☐

Relationship between STD absences and HEDIS

Characteristic	Non adherent ¹	Adherent ¹	% Difference ²
For acute phase, % of employees that had STD in follow-up period (%)	12.7%	8.8%	-31%
For continuation phase, % of employees that had STD in follow-up period (%)	12.0%	8.4%	-30%

- For the continuation phase, the authors calculated \$ savings
 - # of employees non-adherent: 1146
 - % with probability of STD: 12% or 137 employees
 - # with STD: 94
 - # of employees saved from STD: 43
 - Average duration of disability claim: 46 days
 - @ \$200/day: \$396,000 in 2007
 - In 2018 \$: \$520,000

1. Values represent the % of subjects with a given STD status, except where indicated

2. (Adherent – Non adherent) / Adherent

3. Conversion made using officialdata.org

Observation

☐ Prospective study ☒ Retrospective Study

• Sources:

Treatment Measure

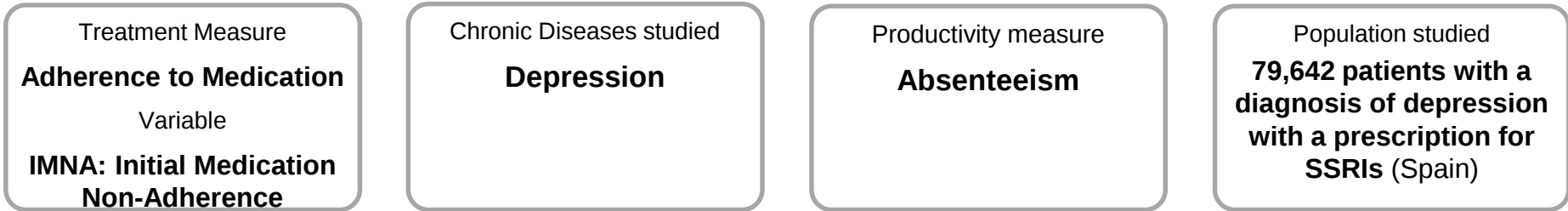
Data Type	Data Source
Prescription claims data	Employer's database
Duration:	
Acute treatment: 3 months + buffer for refills gaps or washout when changing medication=114 days	
Continuation phase: 231 days ensuring medication for 180 days	

EEI Measure

Data Type	Data Source
STD claims	Employer's database
Duration: 1 year (after initial antidepressant prescription)	

- Percentage of adherent subjects during the acute phase: 62%
- Percentage of adherent subjects remaining adherent for the continuation phase: 46%
- Adherent employees were more likely to be older, female and Caucasian

#18 Impact of initial medication non-adherence to Selective Serotonin Reuptake Inhibitors (SSRI) on sick leaves (2007)



 **Results**

Positive correlation ☒

No correlation ☐

Days on sick leave per year

Days on Sick Leave

0 days

1-30 days

Initially non adherent (17%)	66% of these patients had 0 sick days	12% of these patients had between 1-30 sick days
Initially adherent patients (83%)	75% of these patients had 0 sick days	9% of these patients had 1-30 sick days
Initial adherence gain	9% more patients with 0 sick days	3% fewer patients with 1-30 sick days

Observation

☐ Prospective study ☒ Retrospective Study

Sources:

Treatment Measure	
Data Type	Data Source
Prescription claims data to see if medication claim was filed*	Public payer database (Catalan Health Institute)

Duration: 4 year

EEI Measure	
Data Type	Data Source
	Public payer database (Catalan Health Institute)**

Duration: 1 year (6 months prior to and after the index prescription)

* The patient had to not have a prescription for 30 days prior to initiation to SSRI

** The system was able to capture sick days as a medical authorization is required for a sick leave

#19 Medication Adherence, Comorbidities, and Health Risk Impacts on Workforce Absence and Job Performance (2011)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio (MPR) Dichotomous

Chronic Diseases studied

Diabetes

Depression

Hypertension

EEl measure

Absenteeism

Presenteeism

Population studied

Hypertension = 5,449

Diabetes = 1,312

Depression = 2,120

Employees from 5 major undisclosed companies (US)

Results

Positive correlation ☒

No correlation ☒

Effect of Medication Adherence on Job Performance and Absenteeism

Chronic Condition	Sample Average MPR	Absenteeism for adherent employees (MPR > 80%)	Job performance ¹ for adherent employees (MPR > 80%)
Hypertension	79%	Did not find significant results	Did not find significant results
Diabetes	77%	Did not find significant results	+3.5 days per year
Depression	70%	Did not find significant results	Did not find significant results

1. Hours of improved work performance were transformed into days per year assuming an 8 hour work day and 262 work days per year

Observation

☐ Prospective study ☒ **Retrospective Study**

• **Sources:**

Treatment Measure

Data Type	Data Source
Prescription claims data	Insurance Company

Duration: 29 months

EEl Measure

Data Type	Data Source
Self-Reported	Health and Productivity Questionnaire

Duration: 28 days

• **Study Limitations:** Use of self reported data on absence and job performance

• **Percentage of adherent subjects (MPR>80%):**

- Diabetes: 53%
- Hypertension: 65.6%
- **Depression: 63.1%**

Studies

Top four therapeutic areas

- Type 2 Diabetes
- Hypertension
- Depression
- **Asthma**

Economic impacts for asthma: Impact very high for losses due to presenteeism, in the range of \$7,000 per employee per year

Study	Economic metric	# Days saved per year	% of adherent subject	Annual savings per employee in 2018 dollars
#20A	Absenteeism	3	23%	\$780 (\$30/h)
#20B	Disability	0.5	23%	\$130 (\$30/h)
#21	Presenteeism	24	Asthma control was used as proxy for medication adherence	\$7,800 (\$45 CDN/h)
#22	Work productivity	30	51% ¹	\$7,200 (\$30/h) ²
#23	Work productivity (presenteeism)		44% ¹	

1. Percentage of patients with controlled asthma (ACT > 20)

2. Average wage of \$30 was obtained using diabetes averages cited by the authors, stated in 2018 dollars

#20 Impact of Medication Adherence on Absenteeism and Short-Term Disability for Five* Chronic Diseases (2012)

Treatment Measure

Adherence to Medication

Variable

Medication Possession Ratio Dichotomous

Chronic Diseases studied

Diabetes

Hypertension

Asthma

EEl measure

Absenteeism

Short-Term Disability

Population studied

Diabetes = 7,817

Hypertension = 33,245

Asthma = 5,416

(US)



Results

Annual savings in absenteeism by adherent employees

Positive correlation ☒ No correlation ☐

	Days saved	Cost savings ¹ 2012\$	Cost Savings ² 2018\$
Hypertension	1.7	\$408	\$444
Diabetes	2.8	\$672	\$703
Asthma	3.0	\$720	\$783

Annual savings in short term disability by adherent employees

	Days saved	Cost savings ³ 2012\$	Cost Savings ² 2018\$
Hypertension	1.8	\$302	\$328
Diabetes	2.1	\$353	\$384
Asthma	0.7	\$118	\$128

1. Cost savings for absenteeism were calculated in 2012 dollars using an average daily wage of \$240
2. Conversion made using officialdata.org
3. Cost savings for short term disability were calculated in 2012 dollars using 70% of daily wage of \$240

Observation

☐ Prospective study ☒ Retrospective Study

• Sources:

Treatment Measure	
Data Type	Data Source
Prescription claims data	MarketScan
Duration: 4 years	

EEI Measure	
Data Type	Data Source
Payroll Data	MarketScan
Duration: 4 years	

• Percentage of adherent subjects:

- Diabetes: 59%
- Hypertension: 65%
- **Asthma: 23%**

*The 2 conditions not included in the case study are congestive heart failure and dyslipidemia
Authors: Ginger Carls, Christopher Roebuck and Teresa Gibson (Journal of Occupational and Environmental Medicine)

#21 The Preventable Burden of Productivity Loss Due to Suboptimal Asthma Control (2014)

Treatment Measure
Adherence to Therapy
Variable
**Global Initiative for
Asthma (GINA)**

Chronic Diseases studied
Asthma

EEl measure
Absenteeism
Presenteeism

Population studied
300
Employed adults¹
(Canada)



Results

Positive correlation ☒
No correlation ☒

Impact of Asthma Control on Absenteeism and Presenteeism (Hours in a Week)

Uncontrolled vs. controlled	Absenteeism	Presenteeism	Overall Productivity Loss
Adjusted incremental effect on hours of productivity loss per week	0.42	3.68	4.10
Adjusted incremental effect on productivity loss (CAD\$2010) per week ¹	\$17.4	\$167.4	\$184.8
Adjusted incremental effect on productivity loss (CAD\$2018) ² per week	\$19.9	\$191.6	\$211.5

- In 2018 US dollars, savings = \$7,800

- Hourly wage was calculated by matching stated job titles to National Occupation Classification Codes from Statistics Canada
- Conversion made using officialdata.org

Observation

☒ Prospective study ☐ Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Real world trial Self-reported + lung function test	GINA
Duration: 1 year	

EEI Measure

Data Type	Data Source
Self-reported	Work Productivity Activity Impairment questionnaire, VLP
Duration: 1 year	

• **Study Design:** Asthma control was measured as opposed to adherence to treatment

• **Key Findings:**

- Presenteeism was statistically significant, accounting for almost 80% (7.6/10.1) of lost work hours in those with uncontrolled asthma and almost 3 times more days lost than those with controlled asthma

1. Individuals were selected from having participated in the Economic Burden Asthma study in BC and invited to study centers where questionnaires and a lung function test were administered

#22 The Association Between Asthma Control and Health Care Utilization, Work Productivity Loss and Health-Related Quality of Life (2009)

Treatment Measure

Adherence to Medication

Variable

Asthma Control Test

Chronic Diseases studied

Asthma

EEL measure

Absenteeism

Presenteeism

(Work Productivity)

Population studied

5,679

Respondents of the National Health and Wellness Survey (NHWS) with controlled and uncontrolled asthma (US)

Results

Positive correlation ☒

No correlation ☐

Effects of Uncontrolled Asthma on Employer Economic Impact¹

EEL Measure	Controlled Asthma (n = 2,912)	Uncontrolled Asthma (n = 2,767)	% Difference ²
Level of Absenteeism (%)	4.7%	10.4%	-4.1%
Level of Presenteeism (%)	19.0%	34.3%	-13.3%
Overall Work Productivity Impairment (%)	15.4%	27.6%	-10.8%

• The authors calculated the well-controlled asthma can save up to 229 hours of productivity per year, or 6 weeks of productivity

1. Metrics are expressed as percent impairment, with higher values indication a greater proportion of impairment at work (less productivity)

2. Percentage difference calculated as (Controlled - Uncontrolled / Uncontrolled)*100

Observation

☐ Prospective study ☒ **Retrospective Study**

• Sources:

Treatment Measure	
Data Type	Data Source
Self-reported (structured survey)	NHWS
Duration: 1 year	

EEL Measure	
Data Type	Data Source
Self-reported (structured survey)	NHWS
Duration: 7 days	

• ACT > 20: 51%

#23 Asthma Control in Patients Treated with Inhaled Corticosteroids and Long-Acting Beta Agonists: A Population-Based Analysis in Germany (2016)

Treatment Measure
Adherence to Therapy
Variable
Asthma Control Test

Chronic Diseases studied
Asthma

EEl measure
Absenteeism
Presenteeism

Population studied
382
Respondents from the German
National Health and Wellness Survey
(NHWS) with asthma
(Germany)



Results

Positive correlation ☒
No correlation ☐

Impact of asthma control on patient related outcomes

EEl Measure	Not Well-Controlled (n = 169)	Well-Controlled (n =213)	Difference ⁴
Time missed from work ¹	12.9%	4.3%	-8.6%
Impairments while at work ²	29.0%	14.9%	-14.1%
Overall Work Impairment ³	36.4%	17.3%	-19.1%

- The results show that well-controlled asthma results in less time missed from work, less impairment while at work and less overall work impairment (-19.1%) compared with not well-controlled

- Absenteeism
- Presenteeism
- Work Productivity
- Percentage difference calculated as (Not Well-Controlled - Well-Controlled)

Observation

☐ Prospective study ☒ Retrospective Study

• Sources:

Treatment Measure

Data Type	Data Source
Prescription claims data	MarketScan
Duration: 1 year	

EEl Measure

Data Type	Data Source
Payroll Data	MarketScan
Duration: 1 year	

- Study Design:** Patients were separated between well-controlled asthma and not-well controlled asthma depending on their ACT score.

• Key Findings:

- Found that self-reported medication adherence did not differ significantly between groups.
- Patients with not-well controlled asthma reported more emergency visits and hospital visits than those with well-controlled asthma

• Patients with well-controlled asthma (ACT>20):

- 44%

#24 Impact of an Adherence Intervention Program on Medication Adherence Barriers, Asthma Control, and Productivity/Daily Activities in Patients With Asthma (2010)

Treatment Measure
Introduction to Therapy

Chronic Diseases studied
Asthma

EEl measure
Absenteeism
Presenteeism

Population studied
87
Employees of a large Southeastern public school system with asthma (US)

 **Results**

Positive correlation ☐
No correlation ☒

Effects of Intervention Program on Patient-Reported Productivity

EEl Measure	Baseline	End of Intervention	P value
Presenteeism Days ¹	1.1	0.8	0.2021
Absence Days ²	4.5	3.1	0.1442

1. Days less productive at work because of asthma

2. Days missed work at least a half-day because of asthma

Observation

☒ Prospective study ☐ Retrospective Study

• Sources:

Study Type	Study Design
Real world trial	6-month intervention with educational mailings and phone calls to reduce barriers to adherence

Duration: 6 months

Data Type	Data Source
Self-reported	Authors' survey

Duration: 12 months¹

• Study Design: Participants identified as having asthma through claims data and were sent a letter to participate in study

• Key Findings: Study found that the intervention increased medication adherence of patients. This did not translate into statistically significant correlations, likely because of the too-small sample

1. Number of missed days in the 6 months prior to intervention were compared to the number of missed days during the 6 months intervention

#25 Association of Medication Adherence with Workplace Productivity and Health-Related Quality of Life in Patients with Asthma (2006)

Treatment Measure

Adherence to Medication

Variable

Morisky Medication Adherence Scale

Chronic Diseases studied

Asthma

EEL measure

Absenteeism

Presenteeism

Population studied

385

State employees with a diagnosis for asthma and completed the study (US)



Results

Positive correlation ☐

No correlation ☒

Effects of Patient Adherence to Asthma Medication on Absenteeism and Presenteeism in a Year

EEL Measure	High Adherent	Medium Adherent	Low Adherent
Absence Days	5.64	5.42	4.23
Presenteeism Hours¹	0.9	1.4	1.1

1. Calculated as (days when patient was able to attend work despite experiencing lung/respiratory problems)*(number of hours patient was unproductive while experiencing the disease during a typical 8-hour workday)

Observation

☒ **Prospective study** ☐ **Retrospective Study**

• **Sources:**

Treatment Measure	
Data Type	Data Source
Real world trial Self-reported data	Morisky Adherence Scale
Duration: 2 years	

EEL Measure	
Data Type	Data Source
Self-reported	WPSI
Duration: 1 year	

• **Study Design:** After approval from health insurance provider, patients were mailed a 3-part questionnaire consisting of the Morisky Adherence Scale and the Work Productivity Short Inventory (WPSI)

• **Study Limitations:**

- Use of self-reported data for adherence when it has been shown that patients with asthma tend to over report adherence with self-report measures and under report workdays missed
- Small sample size coupled with low adherence

• **Percentage of adherent subjects:** 39%

Appendix 2 | Literature Review: Methodology & Terminology

Definition and Methodology of Studies of Treatment Measures

Treatment Measures		Definition	Methodology of Studies	Data Source		
				Self-reported N = 7	Prescription Claims Data N = 19	Clinical Trial N = 5
Adherence	Medication	Measures the level of compliance with prescribed medication	Most widely referenced treatment measure. Refer to slide 4 for details	✓	✓	
	Therapy	Measures the level of disease control	Referenced only in study # 16 in the case of asthma control. Asthma control is defined as the adequate management of asthma symptoms, including but not limited to medication adherence (other elements were not identified). Patients were grouped into controlled, partially-controlled or uncontrolled	✓		
Introduction	Medication	Measures the effect of a new medication on patient outcomes	Referenced only in 2 studies (#13, #14) for diabetes medications. In the first case, impact of placebo-treated patients vs medication-treated patients; in the second, baseline non-treated patients are compared to treated patients 6 and 12 months later			✓
	Treatment	Measures the effect of a new therapy on patient outcomes	Referenced in only 2 studies (#12, # 15). In both cases, educational tools were provided to patients with asthma to stimulate overall asthma control			✓

Treatment measures

Adherence to Medication Measures detailed (1/2)

Type of data	Tool	Definition
Database: Patient refill records via prescription claims data	Medication Possession Ratio (MPR) N = 12	MPR is the sum of the days' supply for all fills of a given drug in a particular time period divided by the number of days in the time period. $\text{MPR} = \frac{\text{Sum of days supply for all fills in period}}{\text{Dumber of days in period}} \times 100\%$ The major shortcoming of this measure is that it can overestimate adherence. Patients who routinely refill their medications early will have an inflated MPR, as the numerator in this equation will be larger than the denominator. MPR is thus usually capped at 100%. It can be continuous or dichotomous. When dichotomous, the cut of rate is usually 80% for determining adherence but this figure can be set higher for disease areas where greater levels of adherence are required.
	Percentage of Days Covered (PDC) N = 4	Proportion of days covered (PDC) is a newer more conservative measure of refill-record based adherence. The formula is similar to MPR but instead of simply adding the days' supplied in a given period, the PDC considers the days that are "covered", removing overlapping days. $\text{PDC} = \frac{\text{Sum of days in period « covered »}}{\text{Dumber of days in period}} \times 100\%$
	HEDIS (only for depression)	Dichotomous adherence method dividing treatment into two periods, an acute and a continuation phase of treatment. The acute phase lasts 114 days, during which an employee needs to fill a sufficient number of antidepressant prescriptions to provide medication for at least 84 days. The continuation phase lasts 231 days, during which an employee needs to fill a sufficient number of antidepressant prescription for at least 180 days. Employee who are non-adherent for the 3-month acute phase were automatically considered non adherent during the 6-month continuation phase. According to these adherence guidelines, employees are classified as either adherent or non adherent for both the acute phase and continuation phase of treatment

Treatment measures

Adherence to Medication Measures detailed (2/2)

Type of data	Tool	Definition
Patient reported: Questionnaire- based self- reported evaluation	Morisky Medication Adherence Scale (MMAS) N = 4	4 questions using a 0/1 response scale. Questions: 1. Do you ever forget to take your medicine? 2. Are you careless at times about taking your medicine? 3. When you feel better do you sometimes stop to take your medicine? 4. Sometimes when you feel worse when you take your medicine do you stop taking it? Respondent score is calculated as the sum of the 4 question responses, high adherence: MMAS = 0, low adherence: MMAS = 1 - 4 An 8 question-version is more rarely used.
	Prescription Renewal N = 1	Subjects are surveyed 4 times, each time they are asked for the start and stop date of their prescription. If individuals give a start date that coincides with the beginning of the period measured and an end date that coincides with the end of the period, they are judged compliant with their medication.
	Asthma Control Test (ACT) N = 2	A validated instrument for assessment of asthma control in patients 12 years of age and older. The test consists of 5 questions and each question is worth 5 points. If a respondent's score is 15 or less, asthma is considered poorly controlled. A score above 19 is considered well-controlled.
	Global Initiative for Asthma score (GINA) N = 2	The GINA score is a measure that evaluates the level of asthma control. Asthma is categorized as controlled or uncontrolled based on measures of perceived impairment as well as the ratio of FEV (forced expiratory volume) to its predicted value.

Employer Economic Impact (EEI) measures

Definition and Methodology of Studies of treatment measures

EEI Measures	Definition	Data Source		
		Self-reported N = 9	Claims Data N = 5	Payroll Data N = 2
Absenteeism	Hours of missed work converted into number of workdays on the basis of an 8-hour workday. Employees are paid their full wages for absenteeism	✓	✓	✓
Presenteeism	Percentage of impairment while working due to health reasons	✓		
Short-term disability	Number of missed workdays due to sickness during which employees are paid a portion of their income	✓	✓	✓
Work Productivity	Overall work impairment due to health (Absenteeism + Presenteeism)	✓		

Data Sources for EEI and Treatment Measures Databases

Type of data	Data Source	Definition
Patient survey databases	National Health and Wellness Survey by Kantar Health Consultancy (NHWS) N = 3	Largest international patient database based on primary research into health care attitudes, behaviors, disease status, adherence, treatment choices and outcomes in adults over 18. Data is available for Brazil, China, France, Germany, Italy, Japan, Russia, Spain, UK, and U.S.
	Medical Expenditure Panel Survey By US Government Agency (MEPS) N = 2	MEPS is the most complete source of data on the cost and use of health care in the United States and on U.S. health insurance coverage. It provides survey information on health status, health care utilization and cost, prescription drug usage, work, disability and other sociodemographic characteristics and is widely used for scholarly research.
Payer claims and employer record databases	MarketScan by Truven Health Analytics (MarketScan) N = 10	The Truven Health MarketScan Research Databases are a family of research data sets that fully integrate de-identified patient-level health data (medical, drug and dental), productivity (workplace absence, short- and long-term disability, and workers' compensation), laboratory results, health risk assessments (HRAs), hospital discharges and electronic medical records (EMRs) into data sets available for healthcare research. Data are contributed by large employers, managed care organizations, hospitals, EMR providers, Medicare and Medicaid. Over the years, the original claims-centric databases have been enriched and integrated with the addition of absence, disability, workers' compensation, health risk, lab, dental, EMR, hospital and mortality data. The Truven MarketScan used to be the Healthcare business of Thomson Reuters and is referred to the Thomas Reuters MarketScan in the studies reviewed.
	Research Reference Database by Human Capital Management Services (HCMS) N = 3	A database which includes employment, demographic, compensation, health care, disability, absence and workers' compensation data sources from numerous large employers in the U.S.

Data Sources for EEI Questionnaires

Measure	Data Source	Definition
Employer Economic Impact	Work Productivity and Activity Impairment (WPAI) questionnaire N = 3	Four metrics are computed from the WPAI: absenteeism, presenteeism, overall work productivity loss (combination of absenteeism and presenteeism), and activity impairment due to health. The NHWS uses the WPAI survey to measure productivity impact. The WPAI measures are for a period of 7 days.
	Health and Performance Questionnaire (HPQ) N = 4	A survey for capturing self-reported data on health conditions, absence, and job performance. The survey consists of a brief self-reported questionnaire that obtains three types of information: 1. information about the prevalence and treatment of commonly occurring health problems; 2. information about of workplace consequences (sickness absence, presenteeism, and critical incidents)and; 3. basic demographic information.
	Work Productivity Short Inventory (WPSI) N = 2	The survey estimates decrements in productivity associated with 15 common disease conditions. The WPSI asks respondents to note the amount of time missed from work resulting from their medical conditions and the amount of unproductive time spent at work when affected by the condition.
	Valuation of Lost Productivity (VLP) N = 2	A survey for the assessment of the impact of health conditions on productivity output. Doesn't solely focuses on the loss in wages, but also on the potential losses due to lower team production and time lost to find a substitute worker.

Appendix 3 | Profile of Pivot Strategy & Concerto



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Pivot's expertise

Pivot is a boutique strategy & operations consulting firm specializing in the Life Sciences and Private Payer sectors

Experience working with pharma companies on a range of topics including **strategy, product launches, access, policy and government affairs**

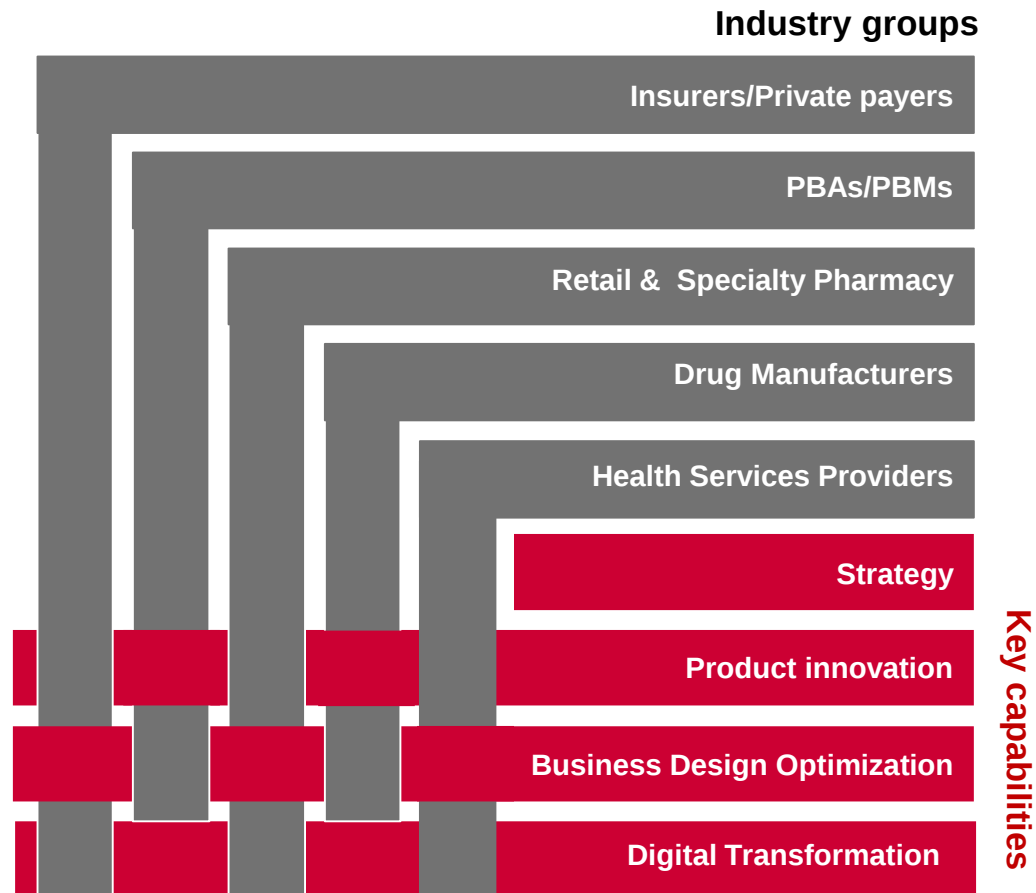
In-depth understanding of the **private payer health benefits value chain**, including strategy development with PBMs, retail/specialty pharmacy, drug manufacturers and health and specialty service providers

Expertise in the development of data-driven, **value-based business models** for drug manufacturers and pharmacy

**High Impact
&
Performance**

> We work best in organizations that are looking for new growth avenues, to optimize operations or inspire the organization to evolve in a different way

Pivot brings together a unique expertise that cuts across the different industries in the Private Payer market



- The Private Payer market is going through fundamental changes, affecting all players in the ecosystem
- While the structure and dynamics of the Canadian Private Payer market is unique, current changes in the US market are likely to have a significant impacts in Canada
- Our consultants have a solid understanding of the market structure, business model, economics and potential future developments in all segments of the Health & Life Sciences sector
- This places us in a unique position to help our clients take a broad view of the Health & Life Sciences sector, identify value migration patterns and new “white space” opportunities

Pivot's experience across the Private Payer value chain

Drug Manufacturers	Retail & Specialized Pharmacy	Health Service Providers/ Specialized Players	PBAs / PBMs	Payers/ insurance
- Development and implementation support for a new payer-driven vision, business model and organization for a leading pharma - Development of integrated access strategies for product launches in oncology, cardiovascular and diabetes - Design and piloting of a chronic disease management program for a major pharma	- Development of an integrated PBM/HBM strategy, integrating existing and newly-acquired assets for a major retail and specialty pharmacy player - Development of a business offering in support for value-based PLAs - Developing retail pharmacy offerings to support greater role of the pharmacist	- Creation of an intranet-based health and prevention solution offered directly to employees by a network of preventative health clinics - Piloting of an e-prescribing solution with a major manufacturer - Identification of expansion opportunities for private clinics	- Development of a growth strategy for a PBA, focused on transitioning to a PBM - Development of a value-based PLA strategy for a major PBM and insurer - Development of new products based on health data analytics	- Development of a growth strategy for a major Canadian insurer - Review of the operating model for a major group insurer - Development of a customer-driven digital strategy for a major diversified insurer - Development of a health strategy and 5-year product roadmap for a major Canadian insurer



Kathy Megyery, Private Payers Practice Leader



Kathy Megyery, MA, MBA
Partner, Pivot

Kathy Megyery has over 25 years of experience in strategy development and implementation both as a consultant and a pharmaceutical industry executive.

Over the last 10 years, she has held various roles within Sanofi Canada and Sanofi North America focused on developing and implementing strategies to foster the organization's leadership in innovation, access and prevention. She was Vice-President Strategy & Policy and a member of the Canadian Executive Committee from 2006 to 2012. In this role, she led the annual planning exercise as well as spearheaded focused strategic initiatives to capture opportunities around the emergence of specialty pharma, the increased focus on wellness and prevention as well as the growing role of payers. In 2012, she was appointed Vice-President Public Affairs for North America.

Previously, during her 15-year tenure at Secor Consulting, she supported senior management of large organizations to define strategies via a formal planning process as well as with specific issues related to growth, diversification, changing market conditions and competitive threats with a strong focus on healthcare & life sciences.

Sample of relevant experiences include:

- Developed and implemented a payer-driven vision, business model and organization for Sanofi Canada
- Defined and implemented a pilot project to demonstrate healthcare savings and productivity improvements stemming from best-in-class management of patients with multiple chronic diseases, including optimal drug therapy
- Fostered collaborations with thought leaders notably the Milken Institute to ensure the sustainability of innovation in biosciences and the inclusion of the patient in drug development from R&D through to access
- Supported commercial teams with the launch of the vaccine against dengue through policy and advocacy initiatives to obtain registration and financing of vaccination campaigns
- At Secor Consulting, led its Life Sciences practice, providing strategic counsel and planning support

Kathy holds an MBA from McGill University and a Master's degree in Economics from Concordia University

Michel Bernier, Managing Partner



Michel Bernier, PhD
Managing Partner, Pivot

Michel Bernier is co-founder and Managing Partner of Pivot, a strategy & operations consulting boutique specializing in the Financial Services and Private Payers. Dr. Bernier is a senior strategic advisor with over 25 years of experience working in different segments of the private payers market, including Group Life & Health insurance, TPAs, PBMs, retail & specialty pharmacy and drug manufacturers. A recognized senior advisor in the area of strategy and business transformation, he consults with CEOs, senior leaders and their executive teams in the area of business & growth strategies, M&A, digital strategies, organizational design and business model innovation. He has worked with major companies in the Private Payers industry in Canada, the US and Europe. An experienced strategy and organizational consultant, he integrates the disciplines of strategy development, organizational design and transformation management, bridging the gap between strategy and implementation.

Before founding Pivot in 2012, he was a Senior Partner and Canadian leader of Oliver Wyman's Business Transformation Practice, a senior partner of SECOR, senior vice president of strategic initiatives at Bell Canada.

Sample of relevant experiences include:

- Developing a payer strategy for a major retail & wholesale pharmacy
- Developing a growth strategy for a major Canadian PBM
- Developed a customer-centric growth strategy for a diversified Group Benefits insurer strategy, including a digital platform, to enable cross-sell between the Group and Individual insurance platform
- Working with a Fintech fund, developed the prototype for a digital advice and distribution platform focusing on the Group market
- Assisted the new CEO of a major Canadian Group Life & Health insurance company in developing a growth strategy and implementing a major organizational and business transformation program
- Working with a major Canadian Group Benefits insurer, assisted in developing an innovative product strategy and product development roadmap, positioning the
- Developed a new structure and operating model for the Canadian subsidiary of a major pharmaceutical company with a focus on providing end-to-end solutions to payers and providers
- Developed a customer-based entry strategy for the launch of a new oncology and diabetes product for a major pharmaceutical company

Michel Bernier holds a PhD in Psychology (Industrial & Organizational) from the University of Montréal

concerto
groupe santé

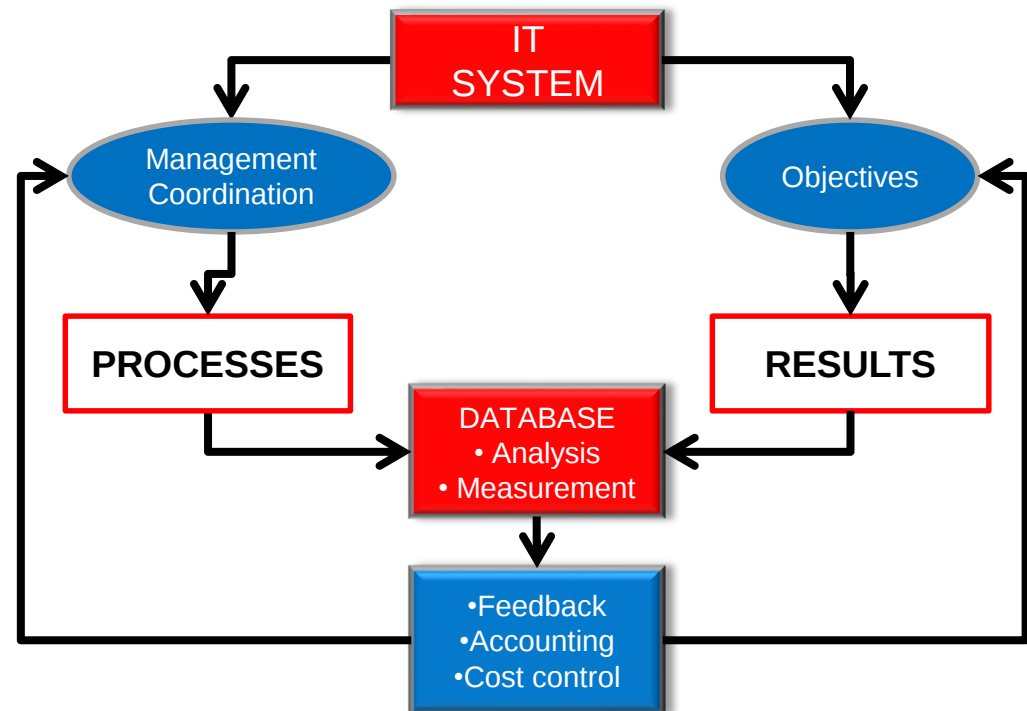
Concerto has developed 11 standardized care pathways that optimize interventions and patient's adherence

Interdisciplinary care pathways

Diabetes
High blood pressure
Dyslipidemia
COPD
Asthma
Inflammatory joint disease
Chronic heart failure
Chronic renal failure
ADHD
Mental health

Based on best practices
Can be adapted for several concomitant pathologies in a single patient
Computerized for a front-line practice
With an optimal specialists support

Implemented in real world : more than 2000 patients
Enables better risk management



Our innovation: Deliver optimally coordinated, world-class chronic disease patient care, improve health outcomes and lower costs

Guylaine Chabot, Concerto Groupe Santé



With a BA in Psychosociology of Communication and a Master of Public Administration, Guylaine Chabot brings relevance and coherence to your internal and external communications.

20 years of experience in strategic communication and project management related to health care - In health and social service centers and regional health agencies.

Mandates involving planning and managing communications for emergency response, coordinating communications in matters involving service transformation and information system implementation; at the supraregional level and as a management consultant.

Communication Director at the Quebec Order of Nurses for 10 years, she has been Editor in chief of different publications. She has published articles and research reports concerning patient's satisfaction in Health services and about different health professionals preoccupations for better practices and better results.

Her politic experience as Deputy chief of staff, Minister of State for Health and Social Services, gives her a solid strategic approach to manage health matters in Quebec.

Dr. Alain Larouche, Concerto Groupe Santé



Dr. Larouche is thoroughly familiar with healthcare system and the organizations that comprise it, and with the legislative and professional environment surrounding it. For 10 years, he has been the senior medical advisor for Regional Health Authorities Association in Québec.

He has developed particular expertise on the impacts of chronic disease on the patients and the healthcare system and on ways of adapting the care and service response to those needs. As a consultant for healthcare authorities, he has promoted the importance of chronic care management, based on Chronic Care Model principles.

He has also conducted studies on *frequent flyers* of the healthcare system. He has given talks on the subject here in Canada and for stakeholders in France and Switzerland. He has several projects in hand related to those issues. Dr. Larouche is currently a member of the disciplinary board of the Collège des médecins du Québec (Quebec Medical Board), correspondent for the “Caisse d’assurance maladie de France”, columnist for “L’Actualité Médicale”, the Medical Post french counterpart and Santé Inc. owned by Joule a subsidiary of Canadian Medical Association.

He is also a member of Joule’s Innovation Council and trainer for the Quebec Medical Association Leadership program.