Association of Multiple Chronic Conditions With Health-Related Quality of Life and Physical Functioning

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BACKGROUND

- Multiple chronic conditions (MCCs) are defined as a co-occurrence of two or more chronic conditions.

- In 2010, more than half (51.7%) of all Americans had at least one chronic condition and nearly one-third (31.5%) had MCCs.[1] The prevalence of MCCs will increase in coming decades because of the aging United States (US) population.

- Patients with MCCs have higher health care expenditures, lower survival, and poor quality of life.

- Previous studies have examined the effect of MCCs on physical and mental functioning in different countries.

OBJECTIVE

- To determine the association of MCCs with health-related quality of life (HRQOL) and physical functioning

METHODS

- Data Source: Medical Expenditure Panel Survey (MEPS) database (2011 and 2012), a nationally representative survey of families and individuals, their medical providers, and employers across the US. MEPS is the most complete source of data on the cost and use of health care and health insurance coverage in the US.

- Study Design: Retrospective cross-sectional study

- Study Cohort: Adult population aged 18 years and older

- MCCs: Included 17 chronic conditions based on the Centers for Medicare and Medicaid Services' list of chronic conditions

- Physical and Mental HRQOL: Measured using short-form health survey (SF-12)

- Physical Functioning: Measured using Activities of Daily Living (ADL) and instrumental ADL (IADL)

Table 1. Chronic Conditions Included in MCC

Alzheimer's disease and related dementia	Diabetes
Arthritis	Heart failure
Asthma	Hyperlipidemia
Atrial fibrillation	Hypertension
Autism spectrum disorders	Ischemic heart disease
Cancer (breast, colorectal, lung, and prostate)	Osteoporosis
Chronic kidney disease	Schizophrenia and other psychotic disorders
Chronic obstructive pulmonary disease	Stroke
Depression	

Table 2. Statistical Analysis

Descriptive Statistics		
Proportions, mean ± standard deviation; chi-square and student's t-test		
Identify top 5 dyads and triads with lowest PCS and MCS		
• Dyads: Combinations of two chronic conditions (136 possible dyads)		
• Triads: Combinations of three chronic conditions (680 possible triads)		
Regression Analysis		
	Multiple linear regression	Multiple logistic regression
Outcome variables	HRQOL (PCS and MCS)	Physical functioning (ADL and IADL)
Primary independent variable	• MCC as continuous variable • Number of MCCs – 0, 1, 2, 3, 4, 5, ≥ 6	
Covariates	Age, gender, race/ethnicity, marital status, education, federal poverty line, usual source of care, urban residence, region, health insurance coverage, smoking status, and body mass index	

MCS = mental component score; PCS = physical component score.

RESULTS

- The study cohort included 47,087 adults from 2011 and 2012 (Table 3).

- Of all patients, a majority (51.9%) did not have any chronic condition; 19.9% had one chronic condition, 12.1% had two chronic conditions (dyads), 8.4% had three chronic conditions (triads), 4.5% had four chronic conditions, and 3.2% had five or more chronic conditions.

- Patients with no MCCs had a mean physical HRQOL of 49.2 and a mental HRQOL of 51.0 (Figure 1).

- The two most frequent dyads were hypertension + hyperlipidemia and hypertension + diabetes; the two most frequent triads were diabetes + hypertension + hyperlipidemia and hypertension + hyperlipidemia + ischemic heart disease (Table 4).

- Risk-adjusted regression models showed that each additional chronic condition reduced the physical HRQOL (: –3.02) and the mental HRQOL (: –1.76) and increased the odds of ADL (odds ratio [OR]: 1.66, 95% CI: 1.57-1.74) and IADL (OR: 1.68, 95% CI: 1.60-1.76).

Table 3. Descriptive Statistics of the Cohort

	Overall Cohort		No Chronic Condition		At Least One Chronic Condition		P Value
Characteristics	N	%	N	%	N	%	
Sample size	**47,087**	**100**	**26,419**	**51.9**	**20,668**	**48.1**	**–**
Age							< 0.0001
18 to 44 years	23,524	46.5	18,554	68.2	4,970	23.1	
45 to 64 years	15,938	35.1	6,800	27.2	9,138	43.5	
≥ 65 years	7,625	18.4	1,065	4.6	6,560	33.3	
Gender							< 0.0001
Male	21,670	47.9	12,834	50.0	8,836	45.5	
Female	25,417	52.1	13,585	50.0	11,832	54.5	
MCCs							
0	26,419	51.9	26,419	100	–	–	
1	8,544	19.9	–	–	8,544	41.3	
2	5,184	12.1	–	–	5,184	25.1	
3	3,604	8.4	–	–	3,604	17.5	
4	1,942	4.5	–	–	1,942	9.4	
5	851	2.0	–	–	852	4.2	
≥ 6	543	1.2	–	–	543	2.5	
PCS (SE)	49.2	(0.1)	53.3	(0.1)	44.7	0.1	< 0.0001
MCS (SE)	51.0	(0.1)	52.5	(0.1)	49.3	0.1	< 0.0001
ADL	1,479	3.1	171	0.7	1,308	5.7	< 0.0001
IADL	2,590	5.5	319	1.3	2,271	10.1	< 0.0001

SE = standard error.

Please see handout for a full Table 3 with additional details on cohort characteristics.

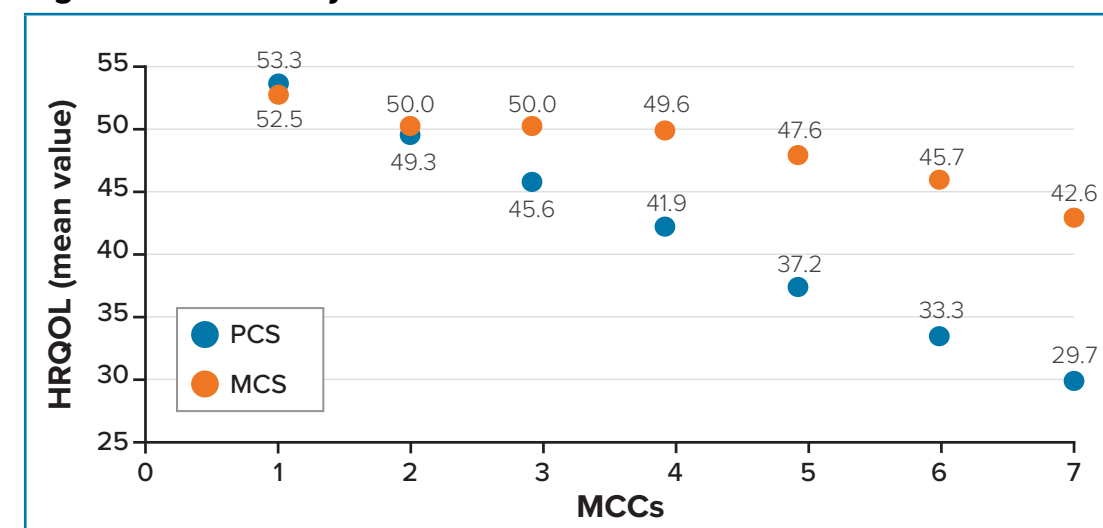### Figure 1. HRQOL by Number of Chronic Conditions

Figure 2. Percentage of Patients Having Difficulty With ADL and IADL, by Number of Chronic Conditions
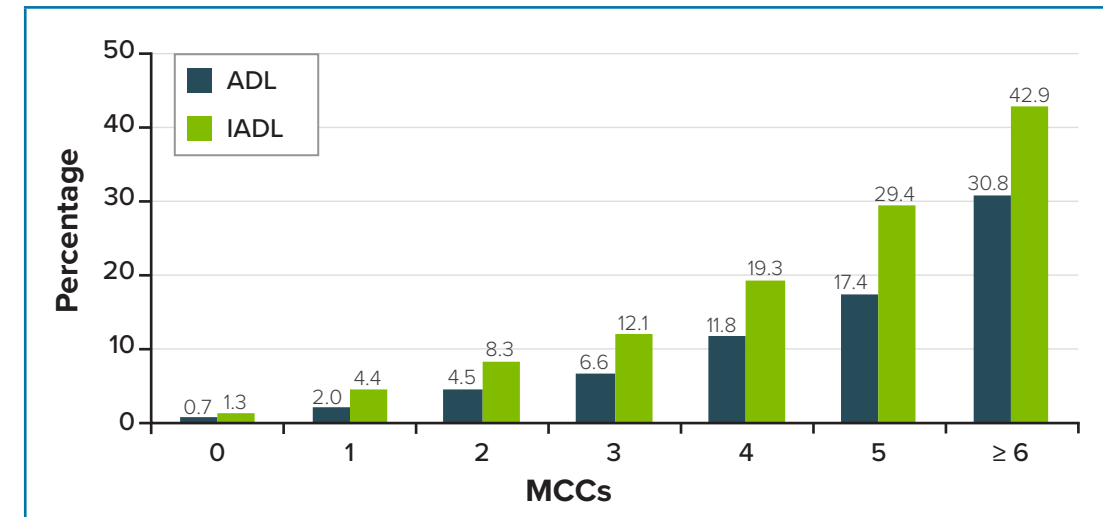

Table 4. Unadjusted PCS and MCS for Five Most Prevalent Dyads and Triads of Disease Condition

Disease Conditions	Prevalence, %	PCS, Mean (se)	MCS, Mean (se)
No disease condition	**51.9**	**49.2 (0.1)**	**51.0 (0.1)**
Dyads			
1. Hypertension, hyperlipidemia	14.2	40.9 (0.1)	49.3 (0.1)
2. Diabetes, hypertension	8.0	38.6 (0.2)	48.1 (0.2)
3. Diabetes, hyperlipidemia	6.9	38.8 (0.2)	48.1 (0.2)
4. Arthritis, hypertension	5.0	34.7 (0.2)	46.9 (0.3)
5. Hypertension, ischemic heart disease	4.2	35.6 (0.3)	47.1 (0.3)
Triads			
1. Diabetes, hypertension, Hyperlipidemia	5.8	37.9 (0.2)	48.1 (0.2)
2. Hypertension, hyperlipidemia, ischemic heart disease	3.3	35.7 (0.3)	47.5 (0.3)
3. Arthritis, hypertension, hyperlipidemia	3.1	34.6 (0.3)	47.1 (0.3)
4. Depression, hypertension, hyperlipidemia	2.1	36.2 (0.4)	40.5 (0.4)
5. Diabetes, hypertension, ischemic heart disease	1.8	33.4 (0.4)	46.3 (0.4)

Table 5. Multiple Linear and Logistic Regression Results: Association of MCC with PCS, MCS, ADL, IADL[a]

	Multiple Linear Regression				Multiple Logistic Regression			
	PCS		MCS		ADLs		IADLs	
Characteristics	Beta Coefficient	(SE)	Beta Coefficient	(SE)	Odds Ratio	(95% CI)	Odds Ratio	(95% CI)
MCCs								
0	Ref		Ref		Ref		Ref	
1	-2.76	(0.18)*	-3.27	(0.18*	2.29	(1.64-3.18)	2.85	(2.16-3.75)
2	-5.23	(0.23)*	-4.01	(0.23)*	4.64	(3.23-6.69)	4.88	(3.53-6.65)
3	-8.32	(0.34)*	-4.96	(0.27)*	5.94	(4.09-8.61)	6.69	(5.05-8.87)
4	-12.54	(0.41)*	-7.07	(0.39)*	10.13	(6.86-14.98)	11.20	(7.83-16.01)
5	-15.73	(0.55)*	-8.94	(0.57)*	15.20	(10.22-22.58)	19.36	(13.55-27.66)
≥ 6	-18.67	(0.64)*	-11.40	(0.79)*	26.74	(18.08-39.52)	27.32	(18.72-39.87)

CI = confidence interval. *p < 0.0001.

[a]Adjusted for age, gender, race/ethnicity, marital status, education, income, region, metropolitan statistical area, insurance status, usual source of care, smoking status, and body mass index.

CONCLUSIONS

- MCC adversely affects HRQOL and physical functioning, with significantly greater deterioration associated with an increasing number of chronic conditions

- Diabetes, hypertension and hyperlipidemia were the most common chronic conditions contributing to MCC, and they were associated with lower quality of life and physical functioning

- Clinicians should monitor HRQOL and physical functioning in patients with MCC and use evidence-based interventions such as smoking cessation to improve physical functioning and quality of life

REFERENCES

1. Gerteis J, Izrael D, Deitz D, et al. Multiple Chronic Conditions Chartbook. AHRQ Publications No, Q14-0038. Rockville, MD: Agency for Healthcare Research and Quality; April 2014.

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