


**Network Influences on Chronic Illness Care in Large Physician Practices:
A Study of the California Managed Care Market (2001 & 2006)**

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SACRAMENTO STATE


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Presenter Disclosures

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No relationships to disclose


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Background

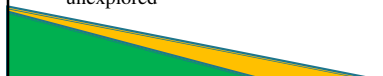
- ▶ Care management processes (CMPs) are evidenced-based methods of enhancing chronic illness care in physician practices
 - Disease registries
 - Practice guidelines
 - Feedback to physicians
 - Case management
- ▶ National surveys have found minimal CMP use in physician organizations (PO)
 - National Study of Physician Organizations (NSPO), 2001 and 2006
 - CMP use for Asthma, Congestive Heart Failure (CHF), Depression, and Diabetes

Background

- ▶ To date, studies on CMP use have focused on 2 areas:
 - Practice capabilities (e.g. Size, Clinical IT, etc)
 - External incentives (e.g. P4P, public recognition for quality)

- ▶ Networks have been shown to be influential in adoption and diffusion of medical innovations
 - *Contagion perspective* – network relationships serve as pipeline for flow of resources and information to/from the focal organization
 - *Structural perspective* – pattern of network relationships result in resource/info advantages for central (or core) organizations compared to counterparts in the periphery of network space

- ▶ Network influences on CMP use have been largely unexplored



Research Purpose and Questions

- ▶ Purpose: Examine if variations in CMP usage among POs participating in managed care in California are associated with attributes of network membership

- ▶ PO level – Is CMP use associated with..
 - Number/types of exchange relationships (eg. PO to PO, PO to hospitals; PO to HMOs)?
 - Network position (core vs. periphery)?

- ▶ Dyad Level – Is similarity in CMP use between two POs associated with....
 - Shared affiliations?
 - Shared position?



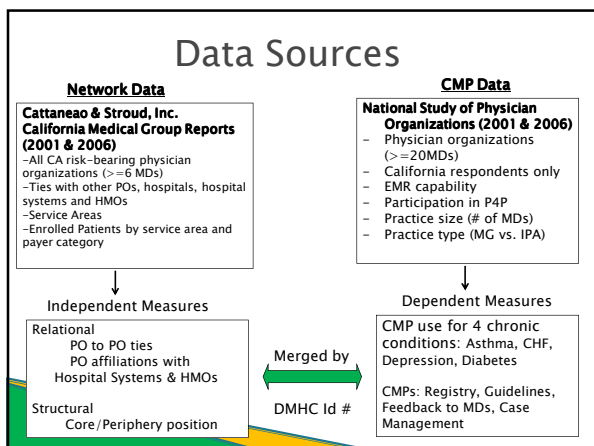
Study Design

- ▶ Network analysis of all POs participating in managed care in California
 - Ties with other POs, hospital systems, and HMOs
 - Core/periphery analyses to identify PO position

- ▶ Statistical analysis of PO subset to test for relationships between network attributes and CMP use
 - California respondents from National Study of Physician Organizations

- ▶ Cross-sectional
 - Two survey rounds (2001 and 2006)





Population & eligible sample

	2001	2006
Population (C&S Data)	383	300
# (%) NSPO eligible (>= 20 MDs)	339 (88)	269 (90)
# (%) NSPO responders	167 (50)	180 (67)

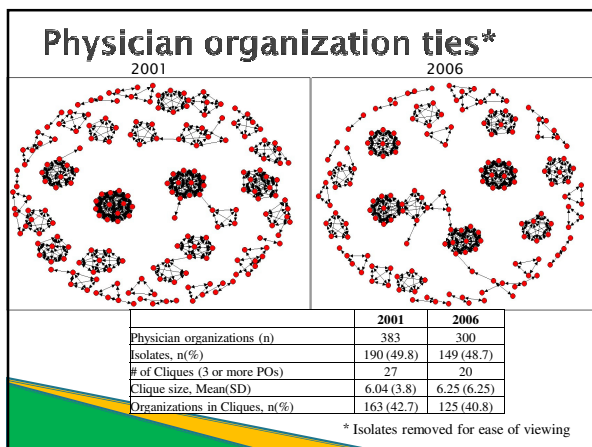
- NSPO respondents had more ties with HMOs than non-respondents
 • Mean(SD): 5.98(3.04) vs. 4.67(3.09); p<.001
- No difference in PO ties with other POs or with Hospital Systems
- No difference in Network Position (Core/Periphery)

- ### Methods - Phase I : Network Analysis
- ▶ **PO to PO** (2001: 383x383; 2006: 300x 300)
 - Cell value X_{ij} = 0/1 presence of tie between PO(i) and PO(j)
 - Row value X_i = total number of PO ties for PO(i)
 - ▶ **PO to Hospital Systems** (2001: 383 x 14; 2006: 300 x 16)
 - ▶ **PO to HMOs** (2001: 383 x 38; 2006: 300 x 36)
 - Cell value X_{im} = 0/1 presence of affiliation between PO(i) and Hospital System/HMO (m) as appropriate
 - Row total X_i = number of ties for PO(i) by category
 - ▶ **Core/periphery analysis** conducted on affiliation matrices
 - Core network membership = core members of both matrices
 - ▶ **Co-membership matrices** (2001: 383x383; 2006: 300x 300)
 - PO x PO matrices for hospital systems and HMOs
 - Cell value X_{ij} = number of shared affiliations between PO(i) and PO(j) by category

PO connectivity

Mean(SD) network affiliations for 683 physician organizations in the California managed care network (2001 and 2006).

Mean(SD)	Combined (n=683)	2001 (n=383)	2006 (n=300)	t-test	p-value
Ties with other POs	3.173 (4.646)	3.120 (4.123)	3.241 (5.247)	-0.330	.74
Ownership	.296 (1.228)	.213 (.669)	.402 (1.689)	-1.954	.05
Medical director	.370 (1.121)	.325 (.971)	.427 (1.287)	-1.147	.25
Management agency	2.508 (3.572)	2.582 (3.700)	2.412 (3.405)	0.600	.55
Number of hospital affiliations	4.116 (4.805)	4.174 (4.953)	4.042 (4.618)	0.346	.73
Number of affiliations with hospital systems	1.512 (1.980)	1.180 (1.095)	1.937 (2.664)	-4.928	<.001
Number of HMO affiliations	5.937 (2.828)	5.631 (2.985)	6.329 (2.565)	-3.150	.002



PO Characteristics by Position

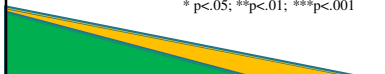
Organizational characteristics of 683 physician organizations by core and periphery position in the California managed care network.

Mean(SD)	Combined (n=683)	Core (n=152)	Periphery (n=531)	t-test	p-value
Number of physicians	496.93 (687.43)	669.83 (746.83)	429.98 (652.45)	-2.857	.005
Percent primary care physicians (PCP)	34.7 (21.8)	36.0 (16.6)	34.3 (23.2)	-0.827	.41
Total Enrolled HMO patients	55,078 (235,106)	91,914 (262,778)	43,880 (225,116)	-2.212	.03
Percent commercial patients	58.8 (38.6)	70.7 (30.6)	55.1 (40.1)	-4.434	<.001
Percent Medicare patients	7.32 (12.2)	8.89 (6.93)	6.85 (13.4)	-1.804	.07
Percent Medicaid patients	34.1 (41.8)	20.3 (34.0)	38.3 (43.1)	4.709	<.001
HMO enrollees per PCP	463.59 (401.63)	544.50 (435.83)	438.99 (387.76)	-2.852	.004

Logistic Regression Results: Top Quartile of CMP Use and Network Attributes (n=347)

DV: Top quartile of CMP use (1/0)				
	Asthma	CHF	Diabetes	All Conditions
Relational Variables	OR (SE)	OR (SE)	OR (SE)	OR (SE)
Clique membership†	1.13 (0.39)	2.13 (0.68)**	1.27 (0.35)	1.41 (0.35)
Number of Hospital Systems	1.09 (0.07)	1.03 (0.06)	1.12 (0.07)	1.05 (0.06)
Number of HMOs	0.83 (0.06)**	0.94 (0.06)	0.94 (0.05)	0.87 (0.04)**
Positional Variable				
Core Network Member (1/0)†	0.99 (0.40)	1.22 (0.46)	0.59 (0.20)	1.60 (0.46)

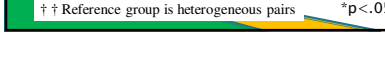
† Compared to non-clique or periphery groups as appropriate.
* p<.05; **p<.01; ***p<.001



Similarity in CMP Use and Network Attributes

DV: Common CMP Use (1/0)				
N=28,622	Asthma 1=4,406 (15%)	CHF 1=5,020 (17%)	Depression 1=3,417 (12%)	Diabetes 1=5,286 (18%)
Co-membership Variables	OR (SE)	OR (SE)	OR (SE)	OR (SE)
PO to PO co-membership	2.46 (0.26)***	2.14 (0.22)***	1.11 (0.16)	1.98 (0.21)***
Hospital system co-membership	1.11 (0.05)*	0.97 (0.04)	1.33 (0.06)***	1.17 (0.05)***
HMO co-membership	0.96 (0.01)***	1.02 (0.01)*	0.94 (0.01)***	0.97 (0.01)***
Position Variables				
Both POs in Core Network (1/0)††	0.89 (0.08)	0.94 (0.07)	1.17 (0.12)	0.99 (0.08)
Both POs in Periphery Membership	0.81 (0.06)**	0.87 (0.07)	0.66 (0.05)***	1.00 (0.07)

†† Reference group is heterogeneous pairs *p<.05; **p<.01; ***p<.001



Summary

- ▶ **Relational effects**
 - Supplier-supplier linkages appear to be beneficial for CMP use in POs and CMP homogeneity among PO pairs
 - PO to PO; PO to Hospital System
 - Negative results for Supplier-Buyer affiliations (PO and HMOs)
 - Relationships among health care delivery organizations may be qualitatively different than with HMOs
 - Closer coordination of activities
 - Homophily
- ▶ **Positional effects**
 - Core POs enjoyed resource advantage compared to periphery POs
 - Larger, Greater percent commercial patients, less Medicaid patients
 - Dyad level (compared to heterogeneous pairs)
 - Similarity in CMP use lowest among periphery pairs
 - Peripheral POs may be at a structural disadvantage in regards to the flow of information or resources necessary to implement CMPs.



Study Limitations

- ▶ Contextual aspects of relationships are ignored
 - Effects of network influences by exchange relationship a contribution of this study
- ▶ The study examined large POs in California
 - The prevalence of managed care varies considerably across the US
 - California's use of the delegated network model
- ▶ 5-year gap between survey years
 - Subject to omitted variable bias



Policy Implications

- ▶ The findings support the potential of Accountable Care Organizations (ACOs) to improve quality
 - ACOs align goals and rewards among exchange partners
- ▶ Findings also suggest that incentives should be included to facilitate linkages between core and periphery organizations
 - E.g. bonus payments for developing ties between established core POs and those in underserved and rural areas.



▶ Questions?