the marginal cost of anesthesia services and have incentives to use these services only when medically needed.

Hangsheng Liu, PhD
Soeren Mattke, MD, DSc
Zachary Scott Predmore, AB

Author Affiliations: RAND Corporation, Boston, Massachusetts.
Corresponding Author: Hangsheng Liu, PhD, RAND Corporation, 20 Park Plaza, Ste 920, Boston, MA 02116 (hliu@rand.org).
Author Contributions: Dr Liu had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Liu, Mattke.
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Drafting of the manuscript: Liu, Predmore.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Liu.
Obtained funding: Liu, Mattke.
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Study supervision: Liu, Mattke.
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Disclaimer: Sedasys is the manufacturer of the SEDASYS Computer-Assisted Personalized System. The system is intended to allow trained physician-led teams to deliver minimal-to-moderate sedation with propofol to patients at low risk of complications during colonoscopy and other procedures. As of June 2015, Medicare had not established a reimbursement policy for the system.


Association Between Narrow Pharmacy Networks and Medication Adherence

In narrow or preferred pharmacy networks, in-network pharmacies negotiate reduced prescription prices with insurance plans. Plans then offer their members reduced cost sharing to incentivize in-network pharmacy use, thereby increasing the network’s prescription volume. In 2014, 75% of Medicare Part D and 70% of exchange plan enrollees were in a narrow or preferred network drug plan. Narrow networks are common in commercial plans as well. Concerns have been raised that these networks adversely affect medication adherence owing to reduced geographic access. Others argue that networks encourage members to establish a pharmacy home where pharmacists can better support adherence and coordinated care. We assessed the effect of narrow network implementation on members’ medication adherence. We also examined whether pre-post adherence changes between plans that implemented narrow networks and those that did not were different in the following 2 subgroups: plans with and plans without 90-day prescription programs, which are known to boost adherence. Combined with narrow network implementation, these programs may be associated with synergistic improvements in medication adherence.

Methods | Eligible members were enrolled for all 12 months of 2012 and/or 2013 (January 1 through December 31, 2012, and/or January 1 through December 31, 2013) in commercial drug plans that implemented narrow networks in 2013 or 2014. Data analysis took place from January 1, 2012, through December 31, 2013. The network design provided minimal or no reimbursement for costs associated with prescriptions filled at out-of-network pharmacies. Members’ deidentified data were used as permitted by the Health Insurance Portability and Accountability Act. Institutional review board approval was not needed for this study. Plans that implemented narrow networks in 2013 were considered intervention plans; those that implemented them in 2014 were considered control plans. For all plans, CVS/caremark was the pharmacy benefits manager. Using difference-in-difference analyses, controlling for the clustering of members in plans, we assessed the differences in members’ medication- possession ratio (MPR) before (2012) and after (2013) network implementation separately for statins, antihypertensive medications, oral antidiabetic medications, and antidepressant medications. The MPR was defined as the days’ supply from the first through last times that the prescription was filled divided by the days between the first fill date and December 31 of that year. In an interaction analysis, we explored whether MPR differences before and after narrow network implementation between the intervention and control plans differed significantly between the following 2 subgroups: plans with 90-day prescription programs in place in both 2012 and 2013 and plans without these programs.

Results | Two narrow network plans (67 906 members) and 3 nonnetwork plans (149 989 members) were analyzed. Although both network and nonnetwork plans’ MPFRs improved between 2012 and 2013, individuals enrolled in narrow network plans had greater increases in MPR than individuals enrolled in nonnetwork plans (MPR for statins: 1.65% [95% CI, 1.35%-1.92%]; for antihypertensive medications: 1.34% [95% CI, 1.11%-1.56%]; for antidiabetic medications: 0.95% [95% CI, 0.43%-1.45%]; and for antidepressants, 1.00% [95% CI, 0.73%-1.31%]) (Table 1). The
difference in MPR improvements before and after network implementation between network plans and nonnetwork plans was greater for plans that had 90-day programs already in place. Increases in MPR among patients who were taking statins were 0.63% (95% CI, 0.58%-0.68%) greater after narrow network implementation in plans with programs vs those without programs; among those taking antihypertensive medications, the MPR increase was 0.89% (95% CI, 0.72%-1.05%), the MPR increase among those taking antidiabetic medications was 1.72% (95% CI, 1.45%-1.99%), and the MPR increase among those tak-

Table 1. Effect of Plans’ Narrow Network Implementation on Patients’ MPR

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MPR, %</th>
<th>2012 Preimplementation Period</th>
<th>2013 Postimplementation Period</th>
<th>Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statins</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrow network plans</td>
<td>77.70</td>
<td>79.47</td>
<td>1.77</td>
<td></td>
</tr>
<tr>
<td>Nonnetwork plans</td>
<td>80.94</td>
<td>81.06</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>Narrow network effect on MPR</td>
<td></td>
<td></td>
<td>1.65 (1.35-1.92)</td>
<td></td>
</tr>
<tr>
<td>Antihypertensive Medications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrow network plans</td>
<td>79.69</td>
<td>81.18</td>
<td>1.49</td>
<td></td>
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<tr>
<td>Nonnetwork plans</td>
<td>83.30</td>
<td>83.45</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Narrow network effect on MPR</td>
<td></td>
<td></td>
<td>1.34 (1.11-1.56)</td>
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<tr>
<td>Antidiabetic Medications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narrow network plans</td>
<td>75.97</td>
<td>77.34</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>Nonnetwork plans</td>
<td>79.77</td>
<td>80.19</td>
<td>0.42</td>
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<tr>
<td>Narrow network effect on MPR</td>
<td></td>
<td></td>
<td>0.95 (0.43-1.45)</td>
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<tr>
<td>Antidepressant Medications</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Narrow network plans</td>
<td>70.37</td>
<td>71.97</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td>Nonnetwork plans</td>
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<td>73.78</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Narrow network effect on MPR</td>
<td></td>
<td></td>
<td>1.00 (0.73-1.31)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: MPR, medication-possession ratio.

Table 2. Comparison of Narrow Network Implementation’s Effect on MPR by Plans’ Use of 90-Day Supply Programs

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MPR, %</th>
<th>2012 Preimplementation Period</th>
<th>2013 Postimplementation Period</th>
<th>Change in MPR</th>
<th>Effect of Narrow Network Implementation on MPR</th>
<th>Additional Effect of Narrow Networks (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statins</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Plans with 90-d supply programs</td>
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</tr>
<tr>
<td>Narrow network plans</td>
<td>78.10</td>
<td>79.85</td>
<td>1.75</td>
<td>2.16</td>
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<td>Nonnetwork plans</td>
<td>79.12</td>
<td>78.71</td>
<td>−0.41</td>
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<tr>
<td>Plans with no 90-d supply programs</td>
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<tr>
<td>Narrow network plans</td>
<td>74.74</td>
<td>76.51</td>
<td>1.77</td>
<td>1.53</td>
<td></td>
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<tr>
<td>Nonnetwork plans</td>
<td>81.39</td>
<td>81.63</td>
<td>0.24</td>
<td></td>
<td></td>
<td>0.63 (0.58-0.68)</td>
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<tr>
<td>Subgroups with 90-d supply programs vs those without</td>
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<tr>
<td>Antihypertensive Medications</td>
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<tr>
<td>Plans with 90-d supply programs</td>
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</tr>
<tr>
<td>Narrow network plans</td>
<td>79.78</td>
<td>81.33</td>
<td>1.55</td>
<td>1.65</td>
<td></td>
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<tr>
<td>Nonnetwork plans</td>
<td>81.42</td>
<td>81.32</td>
<td>−0.10</td>
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<td></td>
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<tr>
<td>Plans with no 90-d supply programs</td>
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<td></td>
</tr>
<tr>
<td>Narrow network plans</td>
<td>78.94</td>
<td>79.91</td>
<td>0.97</td>
<td>0.76</td>
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<tr>
<td>Nonnetwork plans</td>
<td>83.81</td>
<td>84.02</td>
<td>0.21</td>
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<td>0.89 (0.72-1.05)</td>
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<td>Subgroups with 90-d supply programs vs those without</td>
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</tbody>
</table>

(continued)
Among commercial health plan members, implementation of an narrow pharmacy benefit network was not associated with reduced adherence to 4 medication types; in fact, we observed slight but consistent adherence improvements. We did not assess the clinical differences associated with these adherence changes. Control plans had higher MPRs than intervention plans, reducing their ability to improve adherence. CVS/caremark administers adherence programs for all its plans, so any bias introduced by such programs would be nondifferential between the intervention and control plans. Although our results may not generalize to prescription drug plans that are managed by other pharmaceutical benefit managers or other narrow network designs, our study suggests that incorporating a narrow network feature into a plan’s benefit design slightly improves and does not adversely affect medication adherence. The narrow network approach, when permitted, merits consideration by plans and payers who seek to optimize their members’ drug adherence while reducing overall health care costs.

Jennifer M. Polinski, ScD, MPH
Olga S. Matlin, PhD
Christine Sullivan, MS, MBA
Michael Gagnon, MS
Troyen A. Brennan, MD, JD, MPH
William H. Shrank, MD, MSHS

Table 2. Comparison of Narrow Network Implementation’s Effect on MPR by Plans’ Use of 90-Day Supply Programs (continued)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MPR, %</th>
<th>2012 Preimplementation Period</th>
<th>2013 Postimplementation Period</th>
<th>Change in MPR</th>
<th>Effect of Narrow Network Implementation on MPR</th>
<th>Additional Effect of Narrow Networks (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antidiabetic Medications</strong></td>
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<tr>
<td>Plans with 90-d supply programs</td>
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<tr>
<td>Narrow network plans</td>
<td>76.23</td>
<td>77.66</td>
<td>1.43</td>
<td>1.99</td>
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<tr>
<td>Nonnetwork plans</td>
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<td>76.95</td>
<td>−0.56</td>
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<tr>
<td>Plans with no 90-d supply programs</td>
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<tr>
<td>Narrow network plans</td>
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<td>75.02</td>
<td>0.93</td>
<td>0.27</td>
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<tr>
<td>Nonnetwork plans</td>
<td>80.30</td>
<td>80.96</td>
<td>0.66</td>
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<tr>
<td>Subgroups with 90-d supply programs vs those without</td>
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<td></td>
<td></td>
<td></td>
<td>1.72 (1.45-1.99)</td>
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<tr>
<td><strong>Antidepressant Medications</strong></td>
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<tr>
<td>Plans with 90-d supply programs</td>
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<tr>
<td>Narrow network plans</td>
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<td>72.28</td>
<td>1.69</td>
<td>1.01</td>
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<td>Nonnetwork plans</td>
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<td>71.25</td>
<td>0.68</td>
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<tr>
<td>Plans with no 90-d supply programs</td>
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</tr>
<tr>
<td>Narrow network plans</td>
<td>68.35</td>
<td>68.86</td>
<td>0.51</td>
<td>−0.01</td>
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<tr>
<td>Nonnetwork plans</td>
<td>73.93</td>
<td>74.45</td>
<td>0.52</td>
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<tr>
<td>Subgroups with 90-d supply programs vs those without</td>
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<td></td>
<td></td>
<td></td>
<td>1.02 (1.01-1.03)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: MPR, medication-possession ratio.
CVS Health designated a higher share of pharmacies as pre-
instance, in Medicare Part D, SilverScript plans operated by
cost sharing pharmacies as do the plans in this analysis. For
tiered pharmacy networks offer the same access to preferred
deeper discounts; lower prices paid by consumers may also
result of lower cost sharing for consumers means they offer
costsmorebroadly. The highervolume for the pharmacy asa
tions with pharmacies and the potential for lower health
works point to savings achieved by plans in their negotia-
1% to 2%.

work plans, although the observed differences ranged from
new network arrangements compared with those in nonnet-
classes of drugs for enrollees in plans that had implemented
was measured using medication possession ratios (total
days’supply, divided by total days). The authors found mod-
estly greater adherence for several commonly prescribed
classes of drugs for enrollees in plans that had implemented
new network arrangements compared with those in nonnet-
work plans, although the observed differences ranged from
1% to 2%.

While the findings by Polinski et al4 are reassuring, not all
tiered pharmacy networks offer the same access to preferred
cost sharing pharmacies as do the plans in this analysis. For
instance, in Medicare Part D, SilverScript plans operated by
CVS Health designated a higher share of pharmacies as pre-
ferred than many competitors in 2014. At 42% of all pharma-
cies, it ranks fourth highest of 13 selected Medicare Part D
plans (ranging from 10% to 49%). By contrast, one competi-
tor designated only 10% of pharmacies as preferred through a
contract with a single pharmacy chain, leaving many areas
without a preferred pharmacy. This raises a key issue of
whether the study by Polinski et alP can be generalized to all
plans using tiered pharmacy networks or whether their
favorable results were a consequence of broader access to
preferred pharmacies.

Related to this issue, an analysis by the Centers for Medi-
care & Medicaid Services found that for the average Part D plan
in 2014, only one-fourth of all network pharmacies offered pre-
ferred cost sharing. Medicare law requires that retail phar-
macy networks as an entirety meet standards whereby cer-
tain shares of beneficiaries must have access to a network
pharmacy close to their residence, tested separately for ur-
ban, suburban, and rural areas. Medicare rules do not count
mail order options in meeting access standards. Although all
plans met the standards for their full pharmacy networks in
2014, half of the plans failed when the test was applied just to
the pharmacies offering preferred cost sharing. Generally,
these failures were in urban area, not suburban or rural areas.
Although mail order may offer another means of obtaining
lower prices for some consumers, others may prefer use of re-
tail pharmacies. Mail order is used infrequently by Medicare
beneficiaries.

Another concern given the growth in the use of tiered phar-
macy networks is whether plan members understand their
rules and cost implications. Today, deductibles, cost sharing,
out-of-pocket limits, and health care provider networks for
drug benefits and broader health coverage confound even the
savviest consumers. The addition of a tiered pharmacy net-
work to a drug benefit adds to this complexity and increases
the risk of selecting a plan that is not an ideal fit for a particu-
lar consumer’s needs. Consumers already enrolled in a Part D
plan face a particular challenge if the status of their current
pharmacies is changed by the plan.7 Perhaps CVS does a bet-
ter job than other plans of explaining arrangements to their
members, but further study of this education is needed. Ef-
fective in 2016, the Medicare program intends to improve trans-
parency to its beneficiaries who are assessing drug plan op-
tions and to encourage its plans to address concerns about
access to pharmacies. But the agency has not established spe-
cific access standards for tiered pharmacy networks offering
preferred cost sharing, beyond the statutory standards that al-
ready apply to the overall networks.

Plans have introduced tiered pharmacy networks with the
goal of lowering prescription drug costs. The intent of these
arrangements is to save money without harming access to
needed medications and, thus, overall health. The study by Po-
linski et alP offers some early evidence that this may be true,
but further research in a broader array of settings is needed.
Policymakers need to ask whether plans are implementing
tiered pharmacy networks in a way that preserves access to
pharmacies for plan enrollees. The key challenge is to allow
innovative use of tiered pharmacy networks while ensuring that
consumers understand their choices and that most who
enroll in such plans can take advantage of lower prices if they choose to do so.

Jack Hoadley, PhD

Author Affiliation: Health Policy Institute, Georgetown University, Washington, DC.

Corresponding Author: Jack Hoadley, PhD, Health Policy Institute, Georgetown University, 3300 Whitehaven St NW, PO Box 571444, Ste 5000, Washington, DC 20057 (fh@georgetown.edu).

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Low Yield of Myocardial Perfusion Imaging in Asymptomatic Patients With Atrial Fibrillation

Current appropriate use criteria endorse myocardial perfusion imaging (MPI) in asymptomatic patients with atrial fibrillation, especially in patients at high global cardiovascular risk, although the evidence to support this practice is limited.2-3 Our study therefore had 2 aims: (1) Does baseline clinical risk inform the overall yield of MPI to detect inducible ischemia in asymptomatic patients with atrial fibrillation? (2) Do perfusion abnormalities in these patients provide incremental prognostic information beyond clinical risk?

Methods | Our retrospective cohort included 1700 consecutive asymptomatic patients with atrial fibrillation from October 2006 through December 2014 who had rest-stress MPI at our institution. Patients were classified as asymptomatic if they did not have chest pain or dyspnea. Our primary outcome was greater than 5% ischemic myocardium. Risk stratification was possible in 1258 patients, and high global cardiovascular risk was defined as a history of coronary artery disease (CAD) or a greater than 20% 10-year risk according to the pooled cohort equation. All-cause mortality was assessed with the Social Security and Ohio Death Indices through 2012 because the Ohio Death Index is not yet updated for 2013 and 2014. A baseline Cox proportional hazard model was created using the pooled cohort equation and an inability to adequately exercise (pharmacologic test). Additional models were then created by adding imaging variables. The assumptions of the proportionality of hazards were met, and a 2-sided P < .05 was considered statistically significant for all tests. The institutional review board of the Cleveland Clinic approved this study with a waiver for informed consent.

Results | Our patients were elderly (mean [SD] age, 69.9 [10.4] years), mostly male (63.8%), and comorbidities were common (hypertension in 77.9%, hyperlipidemia in 68.3%, obesity in 50.0%). Most patients (70.1%) were taking anticoagulant drugs, and 30.6% were taking antiarrhythmic drugs. Most patients (78.0%) had had a pharmacologic stress test. In patients with lipid values, the 10-year global cardiovascular risk was intermediate to high (median risk, 22.8% [interquartile range, 12.1%-36.4%]). In the entire cohort of 1700 patients, only 78 (4.6%) had greater than 5% ischemic myocardium. Of these patients, 37 had invasive coronary angiography, and obstructive CAD was found in only 16 patients, with subsequent revascularization in 7 patients. Therefore, the yield to detect ischemia that resulted in revascularization was 0.4%.

In patients with high global cardiovascular risk, the yield for detecting ischemia was low and similar to other patients (Figure). Finally, in 841 patients with mortality data, 47 pa-