

Oregon Health Information Technology Oversight Council

**Health Information Exchange Adoption Impact:
Potential Avoidable Service and Productivity Savings from
Widespread Adoption**

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Executive Summary

Overview

To support Oregon's development of the strategic and operational plans under the HIE Cooperative Agreement from the Office of the National Coordinator, Witter & Associates conducted an analysis of the potential annual savings associated with the widespread adoption and use health information exchange services across Oregon that could be achieved within three to five years.

This study:

- Assessed the potential avoided services and productivity improvements associated with electronic health information exchange (HIE) in Oregon;
- Considered the best available approach at the time to estimate potential HIT savings for Oregon.
- Reviewed and modeled recent national estimates of the impact of HIE;
- Obtained Oregon specific population, payment, and utilization statistics; and
- Quantitatively applied the national savings models to Oregon statistics assuming the widespread adoption of HIE over the next several years. Several assumptions were used to generate potential savings estimates:
 - Estimation of savings using multiple approaches applied with a standardized method and updated to 2009 dollars;
 - Conservative recognition of savings already being achieved by existing levels of HIT/HIE adoption (30% for the general community, 70% related to Kaiser Permanente) and maximum achievable benefits (80%).

Oregon Electronic HIE Savings Estimates

It is estimated that Oregon HIE services will provide broad annual healthcare savings. The savings estimates are based on avoided laboratory testing, avoided imaging studies, and provider productivity improvements.

- Savings from avoided services are estimated to range from \$57.7 to \$90.7 million per year.
- Savings from improved physician practice productivity are estimated at \$33.3 million per year.
- Combined savings from avoided services and improved productivity are estimated at \$89.1 to \$124.0 million per year.

Oregon HIE savings will accrue across all healthcare stakeholders.

- Oregon other health plan payers (insurance plans and self-insured plans) may realize 55.5% to 60.3% of annual savings resulting from avoided services. The value of these annual savings range from \$33.3 to \$54.7 million.
- Medicare services, including Medicare Advantage, will accrue 27.1% to 31.0% of the annual avoided service savings, ranging from \$15.7 to \$24.5 million per year.
- Medicaid services, including fully capitated health plans, will accrue 5.2% to 6.7% of the annual avoided service savings, ranging from \$2.9 to \$5.2 million per year.
- Physician practices, clinics and hospitals will accrue 6.3% and 6.4% of the annual avoided services savings related to avoided services provided to the uninsured. These total savings range from \$3.6 to \$5.6 million per year.
- Although not assessed in this analysis, some savings will also accrue to patients for reduced co-pays and deductibles for unnecessary services as well as downstream benefits of reduced costs for plan coverage.
- Physician practices, clinics and hospitals are estimated to realize savings from of improved productivity estimated to be \$33.3 million per year.

This analysis only assessed the avoided service and productivity savings associated with the widespread adoption of HIE services in Oregon. This analysis did not assess other potential savings areas that may substantially increase the impact of electronic HIE services in the community. Some notable areas in which additional savings related to electronic HIE use have been described in the literature that may be applicable to Oregon HIE activities include:

- The impact of medication list and history availability, overall prescription drug use, generic substitution, reductions in adverse drug events (ADEs) and reductions in overall medical errors.
- Improved efficiency in medication reconciliation processes in practices, clinics and hospitals.
- Improved management of individuals with an MRSA (or other high cost communicable disease) history or high-risk along with reduced hospital stays and collateral infections.
- Improved public health monitoring and prevention efforts from general health information sharing.

These savings estimates are intended to inform the discussion regarding an appropriate investment distribution and commitments of healthcare stakeholders. As with any new venture, there are up-front costs that will need to be borne by some stakeholders unequally. The estimated annual savings associated with the widespread adoption and use of HIE services in Oregon make a compelling argument for ongoing support in an electronic HIE by the healthcare stakeholder community of Oregon.

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Background

To support the planning for the Oregon Health Information Exchange (HIE), Witter & Associates conducted an analysis of the potential community-wide annual savings associated with HIE services in Oregon. This analysis is designed to assist the HITOC in developing and valuing initial and ongoing funding strategies for electronic HIE activities in Oregon by estimating the potential, achievable savings associated with HIE services. The goals of the study are to:

- Estimate the potential savings associated with HIE services in Oregon using methods from similar HIT/HIE project assessments;
- Utilize recent national estimates of the impact of HIE;
- Match relevant savings estimates based on Oregon data that is:
 - Reasonable based on HIE successes to date;
 - Applicable to the widespread adoption of HIE services; and
 - Achievable by the participating stakeholders;
- Assist the Oregon HIE planning process in understanding the potential range of savings impacts; and
- Facilitate development of sustainable business plans for local and statewide HIE services in Oregon.

The findings of this analysis review potential annual healthcare savings opportunities resulting from the widespread adoption of HIE services in Oregon. Specific savings presented relate to potential avoidable services in ambulatory care settings and emergency rooms (ER), as well as productivity gains by providers who have access to the electronic HIE network. The savings are estimated by the major healthcare payer categories: Other plan payers (insurance plans and self-insured plans), Medicare, Medicaid, Kaiser and the uninsured. Kaiser is estimated as a separate category due to its unique role in the Portland and Salem areas as both a health plan and provider organization.

Methods for Oregon HIE Savings Analysis

This analysis estimates savings from avoided services and physician productivity directly related to the impact of electronic HIE functions on Oregon health care services.

This analysis estimates savings for the following components:

- Outpatient – Ambulatory Care Settings:
 - Avoidable laboratory testing caused by missing information;
 - Avoidable imaging studies caused by missing information;
 - Avoidable visits caused by missing information;
 - Physician/staff productivity loss looking for missing information; and
 - Physician productivity impact for repeated work for history taking and medication reconciliation.
- Emergency Room Settings:
 - Avoidable emergency room costs for outpatient ER visits;
 - Avoidable emergency room costs related to inpatient admissions;
 - Avoidable admissions through the emergency room caused by missing information;
 - Avoidable ER laboratory testing caused by missing information;
 - Avoidable ER imaging studies caused by missing information;
 - Physician/staff productivity loss looking for missing information; and
 - Physician productivity impact for repeated work for history taking and medication reconciliation.

This analysis relies on studies and methods that have evolved over the last six to eight years and incorporates a number of refinements including:

- The latest modeling methods based on recent national and regional studies;
- The latest available data:
 - Oregon population coverage by payer category;
 - Healthcare claim payment and service utilization rates from recent available studies with local confirmation; and
 - Hospital discharges, visits, and ER rates.
- Estimation of savings using multiple approaches applied with a standardized method and updated to 2009 dollars;
- Estimation of savings by primary payer/sponsor categories;
- Recognition of savings already being achieved by existing levels of HIT adoption and maximum achievable benefits:
 - Assuming that 30% of potential savings proposed by the national estimates are already being accrued as a result of current information sharing practices in community Oregon healthcare organizations (floor) and a 70% floor related to Kaiser Permanente as both a payer and provider organization;
 - Assuming that only up to 80% of the savings could be captured due to the inability to involve all providers in the HIE efforts and health system issues preventing the realization of additional savings (ceiling).

SUMMARY MODELING DATA

Estimating the potential savings from electronic HIE services requires basic data about the community environment including population data estimates by healthcare payer categories in Oregon, estimated payment rates for various services and summary healthcare delivery statistics.

Table 1 presents the estimated July 2009 Oregon population by age and primary healthcare payer source.

Table 1: Oregon July, 2009 Population Estimate by Age and Primary Payer Source
Oregon July, 2009 Population Estimate by Age and Primary Payer

Age	Other Plan Payers(1)(2)	Kaiser(2)	Medicare	Medicaid	Uninsured	Total
0-17	430,983	68,808	- 0 - (3)	271,493	114,232	885,516
18-64	1,408,954	224,891	61,400	155,602	581,278	2,432,125
65+	27,186	4,468	468,100	- 0 - (4)	6,070	505,824
Total (%)	1,867,123 (48.8%)	298,167 (7.8%)	529,500 (13.8%)	427,095 (11.2%)	701,580 (18.3%)	3,823,465 (100%)

(1) Includes insurance plans and self-insured plans as well as VA and some other residual categories.

(2) Excludes Medicare and Medicaid covered lives.

(3) Assumed to be zero since there are relatively few Medicare covered lives in the 0-17 age range.

(4) Assumed to be zero since nearly all over 65 covered lives are persons with dual Medicare-Medicaid eligibility with Medicare covering the primary medical care services.

This estimated population distribution by payer is derived from a number of sources. Some of these sources use different time frames, eligibility/inclusion criteria, and counting methodologies. The population figures presented here therefore, represent the 'best' synthesized estimate based on the information available in mid 2009. Criteria used to estimate the current Oregon population includes:

- Overall population estimates by age-group from the Portland State University Center for Population Research for July 2009 provide the overall totals for the Oregon.
- Uninsured population estimated using preliminary rates from Office of Oregon Health Policy and Research, Profile of Oregon's Uninsured in 2008 with an adjustment for the effect of increased unemployment in 2009.¹ Oregon unemployment in 2008 averaged 6.45% but increased to a monthly average of 11.05% in 2009.
- Under 18: Medicare is assumed to be zero. Some data sources report a few cases but this is deemed to be insignificant;

¹ The impact on uninsured rates from increased unemployment were adjusted based on data from Holahan J, Garrett AB, Rising Unemployment, Medicaid and the Uninsured, January 2009, Kaiser Family Foundation report #7850.

- 65 & Over, Medicaid: Medicare-Medicaid dual eligible individuals were treated as Medicare for services related to the modeling. Medicaid individuals reported as 65 & over include persons waiting for Medicare eligibility due to enrollment lag, varying eligibility requirements, and persons without citizenship; and
- 65 & Over, Other: Many analyses assume all 65 & over individuals are covered by Medicare. There is a small portion of 65 & over individuals that are not eligible for Medicare and are uninsured or have employer-based or individual coverage.
- Other Plan Payers were treated as the remainder of the population that is not uninsured or covered by Medicare, Medicaid or Kaiser. Other Plan Payers includes commercial health insurance plans, self-insured plans, VA coverage and other payers.

The 2009 population estimates by major payer categories used in this analysis are similar to 2008 information from the Oregon Insurance Division, Department of Consumer and Business Services.² Table 2 shows Oregon health insurance enrollment data for 2008.

Table 2: Oregon Health Insurance Enrollment, 2008

Oregon Health Insurance Enrollment, 2008		
	Population	% of Population
Oregon population, 2008	3,791,000	100.0%
	Enrollment	% of Population
Commercial/state regulated insurance		
Individual	201,000	5.3%
Portability	21,000	0.6%
Small group (2-50)	254,000	6.7%
Oregon Medical Insurance Pool	15,000	0.4%
Large group	727,000	19.2%
Associations and trusts	222,000	5.9%
Subtotal covered under state regulation	1,440,000	38.1%
Large group self-insured	499,000	13.2%
Subtotal commercial and self-insured	1,939,000	51.3%
Federal health care programs		
Medicare	584,000	15.4%
Medicaid	418,000	11.0%
Subtotal covered under federal regulation	1,002,000	26.4%
Uninsured	637,000	16.8%
Subtotal – identified categories	3,578,000	94.5%
Residual – unspecified – unknown coverage	213,000	5.5%
Total Oregon Population	3,791,000	100.0%

² Health Insurance in Oregon, January 2010, Department of Consumer and Business Services, January 2010, Data from Figure 2-1. Available at http://insurance.oregon.gov/health_report/3458-health_report-2010.pdf.

Payment Rates: Payment rate data for healthcare services by various healthcare payer categories in Oregon is not readily available. The Metropolitan Portland HIE (MPHIE) mobilization planning efforts in 2007 used conservative payment rate data based on discussion with a few physicians in the Portland area. Modeling done for Maine's HealthInfoNet in 2008 was based on payment and utilization rates calculated from the Maine all-payer claims database maintained by the Maine Health Information Center (MHIC).

The payment rates from the Maine HealthInfoNet analysis seem to represent a more authoritative data source than used in the MPHIE analyses. Additionally these rates were reviewed by several local physicians who expressed the opinion that the rates did not seem to be unreasonable and may be conservative.

Commercial payment rate and utilization data were obtained from the MHIC's commercial and Medicare claims data. Payment rates were adjusted for inflation to current (2009) dollars. Medicare and Medicaid standard payment rates were also obtained from public data sources. Some notable assumptions used in the inclusion of specific payment and utilization rate estimates for this analysis include:

- Medicare payment rates were assumed to be approximately equal to cost;
- Average payment rates for laboratory tests and imaging studies are derived from MHIC commercial claims data;
- Uninsured payment rates were assumed to be the equivalent to cost and provider organizations are the primary financing source;
- Uninsured use rates were derived as a percentage of commercial use rates based on a published estimates from the Urban Institute³; and
- Commercial payment rates from 2006-7 MHIC commercial claims data were adjusted to current dollars by an annualized rate of 3.33%. Medicare payment rates from 2003-4 MHIC claims data were adjusted to 2008 by an annualized rate of 2.22%. Each of these adjustments was considered to be conservative to prevent over-estimation of savings and was in line with national estimates.

Table 3 shows the assumed 2009 payment rates used in this analysis.

³ Hadley, J, Holahan J, Coughlin T, Miller D, Covering the Uninsured in 2008: Current Costs, Sources of Payment, and Incremental Costs. Health Affairs, June 2008. 25:5w399.

Table 3: Oregon 2009 Healthcare Service Payment Rate Estimates

Oregon 2009 Payment Rate Estimates (Based on 2009 Dollars)					
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured
PCP visits	\$100	\$78	\$78	\$78	\$78
Specialty visits	\$115	\$82	\$82	\$82	\$82
ER visits	\$400	\$40	\$40	\$180	\$180
Laboratory tests	\$70	\$13	\$13	\$25	\$25
Standard imaging	\$190	\$110	\$110	\$110	\$110
Advanced imaging	\$1000	\$460	\$460	\$460	\$460
Combined standard & advance imaging	\$375	\$184	\$184	\$184	\$184

Table 4 shows key hospital statistics for Oregon hospital inpatient discharges, outpatient visits, and emergency room encounters.

Table 4: Hospital Inpatient Discharges, Outpatient Visits and ER Encounters: CY2009

Oregon Hospital Inpatient Discharges, Outpatient Visits and ER Encounters: CY2009						
	Total	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured
Inpatient Discharges	347,116	121,936	10,067	138,284	55,684	21,145
Discharges with an ER service	171,617	57,120	9,067	72,985	23,488	8,957
Outpatient ER Visits	1,082,383	479,572	34,368	376,761	119,369	72,313
Total ER Encounters	1,254,000	536,692	43,435	449,746	142,857	81,270
Outpatient Visits	7,184,863	3,285,460	5,100	2,581,125	817,775	495,404

Source: Total data for the 58 Oregon hospitals from Hospital DataBank CY2009 data courtesy of the Oregon Association of Hospitals and Health Systems.

SUMMARY OF SAVINGS STUDIES APPLIED IN THIS ANALYSIS

The projected annual savings developed in this analysis represent a synthesis of selected savings estimates and source data from various national and regional studies. These studies include analysis and research conducted by the Center for Information Technology Leadership (CITL)⁴, the RAND Corporation⁵, Mark Overhage et al. from two hospital emergency rooms in Indiana (Community Hospital East, and Wishard Memorial

⁴ Pan E, Johnston D, Walker J, Adler-Milstein J, Bates DW, Middleton B, The value of healthcare information exchange and interoperability. Center for Information Technology Leadership (HIMSS) report 2004.

⁵ Hilstead R, Bigelow J, Bower A, Girosi F, Meili R, Scoville R, Taylor R. Can electronic medical record systems transform healthcare? Potential health benefits, savings and costs. Health Affairs, 25(5) Sept/Oct 2005 pp 1103-1117.

Health Services)⁶, and Peter Smith et al. from 32 primary care clinics in the state of Colorado. Each of these studies is further described in Appendix A. Savings Study Methods.⁷

The CITL HIE and RAND HIT models estimated the aggregate benefits and savings on a national basis for various health information technologies and electronic HIE services. These two studies represent the most comprehensive studies available. These two studies were used in the Metropolitan Portland HIE (MPHIE) mobilization planning effort in 2007 to develop a standardized approach for MPHIE estimating savings.⁸ This standardized MPHIE approach was applied to information contained in the Overhage and Smith papers to develop saving estimates for other savings opportunities.

This standardized methodology has been subsequently used in several other projects:

- Developing Oregon statewide expenditure impact estimates from the widespread adoption of advance HIT including estimating the savings by region.⁹
- Scaling the Oregon statewide impact results for use in developing savings estimates for the Minnesota Health Information Exchange.¹⁰
- Developing savings estimated for the phased deployment of Maine's health information exchange (HealthInfoNet).¹¹
- Developing savings estimates for the Salem Area Health Information Exchange (SACHIE) planning in mid 2009.¹²

This Oregon analysis closely follows the analysis conducted for Maine's HealthInfoNet project and SACHIE planning including the estimation of savings by healthcare payer categories.

⁶ Overhage JM, Dexter PR, Perkins SM, Cordell WH, McGoff J, McGraff R, McDonald CJ. A randomized controlled trial of clinical information shared from another institution. *Ann Emerg Med.* January 2002; 39:14-23.

⁷ Smith PC, Araya-Guerra R, Bublitz C, Bennett P, Dickinson LM, Van Vorst R, Westfall JM, Pace WD. Missing Clinical Information During Primary Care Visits. *JAMA*, February 2005: 293,5.

⁸ Metropolitan Portland Health Information Exchange Business Plan 2.0, May 2007. Available at <http://www.q-corp.org/q-corp/images/public/pdfs/MPHIE%20BizPlan2%20053007.pdf>.

⁹ Witter DM, Ricciardi T. Potential Impact of Widespread Adoption of Advanced Health Information Technologies on Oregon Health Expenditures. Prepared for the Oregon Healthcare Quality Corporation and the Office of Oregon Health Policy and Research. September 2007.

¹⁰ Minnesota Department of Health. Administrative Efficiency: Background Information Prepared for the Health Care Transformation Task Force, November 13, 2007. Available at <http://www.health.state.mn.us/divs/hpsc/hep/transform/novdocuments/administrativeefficiency.pdf>.

¹¹ Alfreds ST, Witter DM. The Impact of Electronic Health Information Exchange (HIE) Services in Maine: Avoidable Service and Productivity Savings Estimates Related to HealthInfoNet Services, November 2008. Available at

http://www.umassmed.edu/uploadedFiles/CWM_CHPR/Publications/Clinical_Supports/HINValuation19november2008.pdf. Included as Appendix D (pp. 124-164) in HealthInfoNet Sustainability Stakeholder Process Final Report (approved by Stakeholders on December 15, 2008). Available at http://www.hinonet.org/meetings/HealthInfoNet_FinalReport20081215.pdf.

¹² Witter DM, Salem Area Community Health Information Exchange (SACHIE): Potential Avoidable Service and Productivity Savings, November 2009.

RANGE OF MODELING ESTIMATES

Due to the differences in the methods and the organization of specific savings across the studies reviewed and modeled in this analysis, there are several overlapping categories of services that are included in the final savings estimates. To avoid double counting of savings associated with electronic HIE services in Oregon, the savings figures in the findings section are presented in a range with the specific savings categories identified by study to help stakeholders understand the source of the savings identified.

Categories of savings were chosen for inclusion in the final Oregon estimates based on the specificity of the underlying supporting data. The savings estimates presented also assume that 30% of the possible estimated savings are already being accrued to providers, payers, and purchasers in private practice setting in the community due to existing information sharing capacities (floor). In addition, it was assumed that only 80% of the possible savings could be achieved, in order to address the fact that some healthcare stakeholders will not adopt electronic HIE technologies due to environmental (economic and non-economic) conditions (ceiling).

The floor level was set at 70% for the Kaiser payer category. For the most part, Kaiser Permanente functions as a self-contained delivery system that has been using a comprehensive EHR system for a number of years. Kaiser is farther along the spectrum in adoption and use of HIT, including exchanging health information, than the general provider community in the Portland and Salem areas. As such Kaiser is already achieving a higher proportion of the possible savings.

The savings estimates presented below are grouped by avoided services and productivity savings. The avoided services savings most immediately benefit the payers of those services. Payers include patients, health plans (commercial plans, self-insured employer plans, Medicare, Medicaid and fully capitated Medicaid health plans) as well as providers who function as the payers for uncompensated care rendered to the uninsured and partially to the under-insured. The productivity savings most immediately benefit the providers and practice sites. Eventually all these savings should translate into lower healthcare expenditures for the community as a whole. Over time, efficiency and productivity savings dampen and/or delay the need for price increases in the fees charged to patients.

Findings

It is estimated that widespread use of electronic health information exchange services can save between \$89.1 and \$124.0 million per year when broadly deployed and used in the community. As discussed above, the savings presented here were reduced by the floor and ceiling assumptions relating to the current level of HIE occurring and a conservative estimate of the maximum level of HIE diffusion.

To date, few empirical studies have attempted to articulate the distribution of HIE benefits among provider, payers, and purchasers of healthcare. The reasons include the nascent stage of electronic HIE implementations, limited availability of necessary data and variations in the size, services, and technological operations of electronic HIE organizations. In addition, many HIE organizations have limited capacity for formal evaluations and have been challenged to identify evaluation measures that can be consistently applied across the varied HIE implementations and stakeholders.¹³ Due to the focus on the impact of missing information in the healthcare practice site, the Smith study allowed for the estimation of savings that impact providers and the organizations that employ them, while each of the CITL, RAND, and Overhage studies allowed for the estimation of avoidable services whose savings primarily accrue to healthcare payers.

This analysis estimates that 63% to 73% of total savings, ranging from \$55.7 million to \$90.7 million per year are related to services that could be avoided if information was readily available to support clinicians at the time and point of care in physician offices and emergency departments.

This analysis estimates that between 27% and 37% of total savings, (\$33.3 million per year) represents productivity improvements that will accrue to providers and provider organizations in Oregon. These productivity savings include the time not spent collecting information from other sources, reconciling divergent information, and recreating existing patient history and medication lists. Providers, safety net clinics, and hospitals should also realize a 6% of avoided services savings associated with uncompensated care delivered to uninsured and underinsured patients. Due to data limitations for this analysis, these productivity savings could not be broken down into detailed savings for specific provider organizations.

COMMUNITY-WIDE SAVINGS

The community-wide savings from full rollout of HIE functionality in Oregon range between \$89.1 and \$124.0 million annually.¹⁴ Savings related to avoided services (laboratory and imaging services in the ambulatory and emergency room settings, ambulatory visits, and hospital admissions from the emergency room) range from \$55.7 to \$90.7 million per year (63% to 73% of total annual community-wide savings). Productivity benefits in clinics and practices are estimated at \$33.3 million per year (37% to 27% of total annual community-wide savings). Table 5 shows the break down of the savings by each savings category.

¹³ American Health Information Management Association (AHIMA). State-Level HIE Value and Sustainability Workbook: Approaches for Financing and Bringing Interoperable HIE to Scale. November, 2008.

¹⁴ All savings presented here are gross savings. The costs associated with the widespread adoption of HIE services in Oregon are not included in this analysis.

Table 5: Range of Potential Annual Savings Associated with Widespread Use of HIE Services in Oregon by Savings Category

Estimated Community-wide Savings for Widespread Use of HIE Services in Oregon by Savings Category	Oregon Total (000s)		
	Low	Med	High
SMITH: Avoided Services Ambulatory Care Settings			
Avoidable Visits Caused by Missing Information	\$9,911.2	\$9,911.2	\$9,911.2
Avoidable Laboratory Tests due to Missing Information	\$8,159.4	\$8,159.4	
Avoidable Imaging Studies due to Missing Information	\$23,980.5	\$23,980.5	
SMITH: Avoided Emergency Room Related Services			
Avoidable Admissions Caused by Missing Information	\$1,665.8	\$1,665.8	\$1,665.8
Avoidable Laboratory Tests due to Missing Information	\$3,064.0		
Avoidable Imaging Studies due to Missing Information	\$8,956.0		
CITL – HIE&I			
Savings from Avoidable Outpatient Imaging Studies			\$44,302.9
RAND			
Savings from Avoidable Outpatient Laboratory Tests			\$34,813.5
OVERHAGE			
Reduced Emergency Room Costs - Visits Leading to Inpatient Admissions		\$12,791.3	
Reduced Emergency Room Costs - Outpatient Visits		\$9,237.6	
Total Estimated Avoided Services Savings	\$55,737.0	\$65,745.9	\$90,693.3
PRODUCTIVITY SAVINGS (SMITH)			
Productivity Improvements in Ambulatory Care			
Physician/Staff Productivity Loss Looking for Information	\$6,745.2	\$6,745.2	\$6,745.2
Physician Productivity Impact - Repeated Work	\$17,588.4	\$17,588.4	\$17,588.4
Productivity Improvements in Emergency Room			
Physician/Staff Productivity Loss Looking for Information	\$2,500.6	\$2,500.6	\$2,500.6
Physician Productivity Impact - Repeated Work	\$6,457.2	\$6,457.2	\$6,457.2
Total Estimated Productivity Savings	\$33,331.5	\$33,331.5	\$33,331.5
Total Estimated Savings	\$89,068.5	\$99,077.3	\$124,024.8

SAVINGS BY PAYER CATEGORY

The healthcare payment, utilization, and population data available for this analysis allowed for the estimation of Oregon HIE savings by payer category. In 2009, 49% of the population was covered by some type of health plan (“other plan payer” including commercial insurance plans and self-insured plans), 8% by Kaiser Permanente, 11% of the population was covered by Medicaid, 14% of the population was covered by Medicare, and approximately 18% of the population was uninsured. Savings from avoided services resulting from electronic HIE accrue to these populations based on their relative rates of service utilization and payment rates.

Appendix A includes detailed tables showing savings by each of the studies modeled, the aggregate savings for the state, and the savings associated with the widespread use of HIE in Oregon by payer category. Table 6 shows the estimated savings by payer category (Other Plan Payers, Medicare, Medicaid, Kaiser, and Uninsured).

Table 6: Estimated Annual Avoided Service Savings by Payer Category

Payer Category	Range of Savings by Payer Category (dollars in 000s)		
	Low	Mid	High
Other Plan Payers(1)	\$33,263	\$36,477	\$54,673
Medicare – Medicare Advantage	\$15,711	\$20,364	\$24,548
Medicaid	\$2,922	\$4,418	\$5,163
Kaiser	\$263	\$320	\$628
Uninsured	\$3,578	\$4,167	\$5,682
Total Estimated Annual Savings	\$55,737	\$65,746	\$90,693

(1) Includes insurance plans and self-insured plans as well as VA and some other residual categories.

Savings for avoided services in ambulatory care and ER settings in Oregon broadly accrue based on the population distribution among payer categories and result in reduced payments for these services by the respective health plans. Oregon other payers would realize the highest annual savings associated with avoidable services, ranging from \$33.3 to \$54.7 million annually. Medicare savings range from \$15.7 to \$24.5 million per year. Medicaid program savings from avoided services range from \$2.9 to \$5.1 million per year. Avoided services for uninsured persons range from \$3.6 to \$5.7 million per year. Nearly all the savings for the uninsured accrue to providers since services to the uninsured represent uncompensated care absorbed by healthcare providers.

The distribution of avoided service savings estimates by payer category is presented in Table 7.

Table 7 Distribution of Avoided Service Savings by Payer Category

Payer Category	Range of Savings by Payer Category (dollars in 000s)		
	Low	Mid	High
Other Plan Payers	59.7%	55.5%	60.3%
Medicare – Medicare Advantage	28.2%	31.0%	27.1%
Medicaid	5.2%	6.7%	5.7%
Kaiser	0.5%	0.5%	0.7%
Uninsured	6.4%	6.3%	6.3%
Total Estimated Annual Savings	100.0%	100.0%	100.0%

The \$33.3 million of productivity savings estimated in this analysis accrue to physician practices and clinics, and hospital emergency departments. As providers are more productive, and perhaps can see more patients in any given time or are able to decrease uncompensated care costs; increases in fees for service and capitation rates should be moderated. Both the payers and the purchasers of healthcare will benefit from these savings. The time frame for the realization of benefit across healthcare stakeholders as a result of electronic HIE is not possible to estimate.

Discussion

The savings estimates presented in this analysis likely under-report the total realizable annual savings associated with the electronic HIE in Oregon for the following reasons:

- For the community-wide aggregate electronic HIE savings, the high range of ER estimates include avoidable outpatient laboratory results and imaging studies from CITL and RAND and admission and visit avoidance from Smith et al. These estimates likely underestimate the true cost of avoidable admissions and outpatient visits due to the conservative assumptions used to estimate that only 70% of patients visiting the ER have prior medical information that may be useful in that encounter.
- The CITL and RAND ER estimates do not clearly separate avoidable outpatient laboratory results and imaging service savings in the ER and ambulatory settings. To avoid double counting, these figures were not used to calculate the Oregon HIE savings. As a result, the project savings may underestimate the potential range of savings available to payers and providers for these avoided services.
- A number of potential savings areas are not included in this analysis due to limitations in the reliability of national studies and the availability of data at the time of this analysis. Some notable areas in which savings related to electronic HIE use have been described in the literature that may be applicable to the widespread use of HIE services in Oregon that may increase potential savings associated with HIE.^{15,16,17} These include:
 - the impact of medication lists on generic substitution,
 - the impact of medication lists on overall prescription drug use,
 - reductions in adverse drug events (ADEs),
 - MRSA history notification at the time of ED visits or inpatient admission,^{18,19,20,21}
 - reductions in overall medical errors, and

¹⁵ Wang SJ, Middleton B, et al. "A Cost Benefit Analysis of Electronic Medical Records in Primary Care," *American Journal of Medicine* 2003;114:397-403.

¹⁶ Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S.C., and Shekelle, P.G.: Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. *Annals of Internal Medicine* 144(10):742-752, May 16, 2006.

¹⁷ Alfreds, ST. et al. Facilitating Electronic Health Information Exchange in State Publicly Funded Health Programs: Challenges and Opportunities. Final Report to the State Alliance for eHealth. National Governors Association. April 2008.

¹⁸ Kho AN, Lemmon I, Commiskey M, Wilson SJ, McDonald CJ. Use of a Regional Health Information Exchange to Detect Crossover Patients with MRSA between Urban Hospitals. *Journal of the American Medical Informatics Association* 2008: 15(3) Mar/Apr 2008:212-216.

¹⁹ Evans RS, Wallace CJ, Lloyd JF, Taylor CW, Abouzelof RH, Sumner S, Johnson KV, Wuthrich A, Harbarth S, Samore MH. Rapid Identification of Hospitalized Patients at High Risk for MRSA Carriage. *Journal of the American Informatics Association* 2008: 15(4) Jul/Aug 2008: 506-512.

²⁰ Kaye KS, Engemann JJ, Fulmer EM, Clark CC, Niga EM, Sexton DJ. Favorable Impact of an Infection Control Network on Nosocomial Infection Rates in Community Hospitals. *Infection Control and Hospital Epidemiology* 2006: 27(3) March 2006 228-232.

²¹ General Accountability Office. Health-Care-Associates Infections in Hospitals: An Overview of Reporting Programs and Individual Hospital Initiatives to Reduce Certain Infections. September 2008: GAO Report: GAO-08-808.

- improvements in broad public health monitoring and prevention efforts.

Limitations: There are a number of technical limitations to this analysis. As is the case with any modeling project it is subject to numerous assumptions and judgments. These estimates rely on published savings estimates from other projects since those are the only sources of data readily available. Cost information from these studies, in some cases, is several years old, and therefore inflation estimates needed to be included.

In addition to the technical limitations of modeling, some experts have expressed skepticism about HIT and electronic HIE savings and cost modeling due to the nascence of these technologies, the limited empirical evidence of value published to date, the lack of focus on quality care impacts, and the perception that, if improved quality of care is the goal, savings may be elusive.^{22,23,24}

The savings associated with the community-wide rollout may be impacted by other HIE implementation issues. Some of these issues include:

- **HIT Adoption:** The savings presented in this analysis do not take into account the significant investments needed on the part of providers to make clinical information electronic through the adoption and use of electronic medical records (EMR), computerized provider order entry systems (CPOE), electronic prescribing (eRx), clinical decision support and other HIT tools. The quality and patient safety benefits of these technologies do not necessarily accrue to the providers due to the current healthcare payment system attributes. This mismatch of incentives creates significant barriers to the rapid adoption of advanced HIT systems.
- **Avoided Services are Lost Revenues:** Savings generated when services can be avoided represent a loss of revenue to the providers of those services. While most providers would avoid providing unnecessary services, revenue losses may create a real financial impact on some categories of providers. If providers were to increase rates to offset revenue losses, some of the projected saving may erode. If providers are functioning at or near capacity, revenues from services provided to new or existing patients may replace revenue lost from avoided services.
- **Adoption Timelines:** This study does not consider the timelines for the implementation and adoption of electronic HIE services and HIT systems in provider settings. Many health systems and physician practices are making substantial investments in advanced HIT systems. The widespread adoption of advanced HIT systems may generate a broader set savings than projected in this report.

²² Walker JM. Electronic medical records and health care transformation, Health Affairs, 24:5 September/October 2005, 1118-1120.

²³ Himmelstein DU, Woolhandler S. Hope and hype: predicting the impact of electronic medical records, Health Affairs, 24:5 September/October 2005, 1121-1123.

²⁴ Goodman C, Savings in electronic medical record systems? Do it for the quality, Health Affairs, 24:5 September/October 2005 1124-1126.

- HIT Costs and Financing: This report does not address the costs or financing of Oregon HIE activities or HIT adoption by provider organizations. The impact of the American Recovery and Reinvestment Act (ARRA) including the Medicare and Medicaid meaningful use incentive programs is also not considered but should positively encourage community providers to accelerate HIT adoption including participating in health information exchange services.
- Difficulty Documenting Savings Realization: Savings from avoided services and productivity improvements are widely distributed throughout the health care delivery and payment systems. Measuring the actual realization of savings is difficult to impossible depending on the type of savings. Realized savings also occur in a milieu of many other changes occurring in health care delivery and financing systems.

Regardless of the limitations discussed above, the estimated annual savings associated with widespread adoption and use of HIE services make a compelling argument for ongoing investment in developmental activities to facilitate HIE. Future analysis could be undertaken to determine additional potential savings and benefits associated with electronic HIE including reduced pharmaceutical utilization and medication management, improved patient safety, improved monitoring and control of MRSA and other infections, and advancements in public health monitoring.

Conclusions

The methodology used in this analysis is designed to be conservative and estimate savings based on applying a standardized approach to national studies and community data and characteristics. The analysis shows that the potential savings to the community and Oregon healthcare system are significant.

It is estimated that widespread use of HIE services in Oregon will provide broad annual healthcare savings. The savings estimates are based on avoided laboratory testing, avoided imaging studies, and provider productivity improvements.

- Savings from avoided services are estimated to range from \$55.7 to \$90.7 million per year.
- Savings from improved physician practice productivity are estimated at \$33.3 million per year.
- **Combined savings from avoided services and improved productivity are estimated at \$89.1 to \$124.0 million per year.**

Oregon HIE savings will accrue across all healthcare stakeholders.

- Oregon other plan payers (insurance plans and self-insured plans) may realize 55.5% to 60.3% of annual savings resulting from avoided services. The value of these annual savings range from \$33.3 to \$54.7 million.
- Medicare services, including Medicare Advantage, will accrue 27.1% to 31.0% of the annual avoided service savings, ranging from \$15.7 to \$24.5 million per year.

- Medicaid services, including fully capitated health plans, will accrue 5.2% to 6.7% of the annual avoided service savings, ranging from \$2.9 to \$5.2 million per year.
- Physician practices, clinics and hospitals will accrue 6.3% and 6.4% of the annual avoided services savings related to avoided services provided to the uninsured. These total savings range from \$3.6 to \$5.6 million per year.
- Although not assessed in this analysis, some savings will also accrue to patients for reduced co-pays and deductibles for unnecessary services as well as downstream benefits of reduced costs for plan coverage.
- Physician practices, clinics and hospitals are estimated to realize savings from improved productivity estimated to be \$33.3 million per year.

This analysis only assessed the avoided service and productivity savings associated with the widespread adoption of HIE services in Oregon. This analysis did not assess other potential savings areas that may substantially increase the impact of electronic HIE services in the community. Some notable areas in which savings related to electronic HIE use have been described in the literature that may be applicable to Oregon HIE activities include:

- The impact of medication list and history availability, overall prescription drug use, generic substitution, reductions in adverse drug events (ADEs) and reductions in overall medical errors.
- Improved efficiency in medication reconciliation processes in practices, clinics and hospitals.
- Improved management of individuals with an MRSA (or other high cost communicable disease) history or high-risk along with reduced hospital stays and collateral infections.
- Improved public health monitoring and prevention efforts from general health information sharing.

Appendix: Study Methods and Results

This Appendix describes the savings estimates from the various national and regional studies reviewed, and identifies the components used to develop the Oregon electronic HIE annual savings estimates.

Center for Information Technology Leadership²⁵

The Center for Information Technology Leadership (CITL) was formed in 2002 by Boston-based Partners HealthCare System as a research organization to help guide the healthcare community in making more informed strategic IT investment decisions. Ambulatory Computerized Provider Order Entry (ACPOE) was the first research topic undertaken by CITL. The goal was to determine the value of ACPOE systems in improving quality and reducing costs.

In 2004, CITL examined the potential value of health information exchange and interoperability (HIE&I) in follow up to its 2003 ACPOE valuation study. The HIE&I study examined the financial benefits and costs of HIE&I of health information. Data was gathered through literature review, expert interviews, and software modeling. CITL created four categories for staging the level of electronic information exchange and information interoperability. The four levels specified are:

- Level 1 – Today’s prevailing phone and mail communications;
- Level 2 – Machine-transportable data (standard fax);
- Level 3 – Machine-organizable data (e-mail and electronic messaging);
- Level 4 – Machine-interpretable data (interoperable data exchange with standardized message formats and content).

The study considered the benefits of information flow and interoperability between particular providers and other stakeholders including:

- Outpatient providers and independent laboratories;
- Outpatient providers and radiology centers;
- Outpatient providers and pharmacies;
- Providers and public health departments; and
- Providers and payers.

The Oregon savings analysis uses the Level 4 capabilities in assessing the potential savings that could ultimately be achieved with the widespread adoption of Oregon HIE services. Only savings associated with avoidable laboratory testing and imaging services are included in this analysis.

²⁵ The CITL published reports that formed the basis of this analysis include: Walker J, Pan E, Johnson D, Adler-Milstein J, Bates DW, Middleton B. The Value of Health Care Information Exchange and Interoperability. Health Affairs. January 2005: W5:10-18.

Pan E, Johnston D, Walker J, Adler-Milstein J, Bates DW, Middleton B, The value of healthcare information exchange and interoperability. Center for Information Technology Leadership (HIMSS) report 2004.

Avoidable laboratory testing and imaging services under the HEI&I analyses not only include results from the benefits of ACPOE but also enhanced access to prior test results through health information exchange services. For this analysis we estimated 40% of the potential annual savings to be associated with electronic HIE, 20% of the savings associate with Electronic Medical Record (EMR) use, 20% of the savings associated with ACPOE, and 20% of the savings associated with the Clinical Decision Support System (CDSS). Table A1 shows the calculated total savings and per member per year (pmpy) savings by Oregon payer category based on the CITL methodology.

Table A1: Estimated Annual Avoidable Service Savings with CITL – HIE&I Methodology by Payer Category

Estimated Avoidable Laboratory and Imaging Service Savings CITL HIE&I Methodology (\$000s)						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Total
Savings from Avoidable Outpatient Laboratory Tests	\$14,353.9	\$229.2	\$5,372.2	\$1,172.6	\$1,153.8	\$22,281.7
Savings from Avoidable Outpatient Imaging Studies	\$25,832.1	\$412.5	\$12,316.1	\$2,899.3	\$2,842.8	\$44,302.9
Combined Avoidable Service Savings	\$40,186.0	\$641.7	\$17,688.3	\$4,072.0	\$3,996.6	\$66,584.5
Estimated Annual Avoidable Laboratory and Imaging Service Savings CITL HIE&I Methodology PMPY						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Overall
Savings from Avoidable Outpatient Laboratory Tests	\$7.69	\$0.77	\$10.15	\$2.75	\$1.64	\$5.83
Savings from Avoidable Outpatient Imaging Studies	\$13.84	\$1.38	\$23.26	\$6.79	\$4.05	\$11.59
Combined Avoidable Service Savings	\$21.52	\$2.15	\$33.41	\$9.53	\$5.70	\$17.41

RAND HIT Project²⁶

In 2003 and 2004, the RAND Health Information Technology (HIT) Project team conducted a study to better understand the role and importance of HIT in improving healthcare and inform government actions that could maximize the benefits of HIT use. RAND’s analyses and publications use the terms “Health Information Technology” (HIT) and “Electronic Medical Record Systems” (EMR-S) interchangeably. RAND uses EMR to describe a comprehensive cluster of functionalities including:

- The Electronic Medical Record (EMR) containing current and historical patient information;

²⁶ The findings of RAND HIT Project are reported in a series of publications. This analysis is primarily based on: Richard Hilstead, James Bigelow, Anthony Bower, Federico Girosi, Robin Meili, Richard Scoville, and Roger Taylor, “Can Electronic Medical Record Systems Transform Healthcare? Potential Health Benefits, Savings, and Costs,” Health Affairs, Vol. 24, No. 5, September 14, 2005. Federico Girosi, Robin Meili, and Richard Scoville, Extrapolating Evidence of Health Information Technology Savings and Costs, Santa Monica, Calif.: RAND Corporation, MG-410-HLTH, 2005.

- Clinical Decision Support (CDS) functions providing reminders and best-practice guidance for treatment;
- A Clinical Data Repository (CDR) which stores EMR information; and
- Computerized Physician Order Entry (CPOE) functionality facilitating orders tied to patient-information and -treatment pathways.

RAND conducted an extensive literature review, expert panel interviews, and computer modeling to develop their savings estimates. The estimates developed by RAND look broadly at a number of services. For the Oregon analysis, only the savings associated with avoidable outpatient laboratory testing and imaging studies were included. RAND describes laboratory savings from EMR-S equipped with CPOE functions, clinical decision support (CDS), and interoperability with other providers. These technologies together can avoid unnecessary tests by improving physician access to test results ordered by other providers and alerting physicians to new test orders that may be superfluous. Avoidable radiology and imaging services are described as occurring with increased access to prior study results and improved communication between ordering physicians and radiologists, minimizing repeat or inappropriate studies.

As with the CITL study, it was estimated that 40% of the potential annual savings are associated with electronic HIE, 20% of the savings are associated with EMR use, 20% of the savings are associated with CPOE, and 20% of the savings are associated with the CDS. Table A2 shows the calculated total savings and pmpy savings by Oregon payer category based on the RAND methodology.

Table A2: Estimated Annual Avoidable Service Savings with RAND Methodology by Payer Category

Estimated Annual Avoidable Service Savings with RAND Methodology						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Total
Savings from Avoidable Outpatient Laboratory Tests	\$23,077.1	\$124.4	\$8,538.3	\$1,211.6	\$1,862.1	\$34,813.5
Savings from Avoidable Outpatient Imaging Studies	\$25,791.3	\$202.3	\$12,204.3	\$1,949.8	\$2,862.2	\$43,010.0
Combined Avoidable Service Savings	\$48,868.4	\$326.7	\$20,742.6	\$3,161.5	\$4,724.4	\$77,823.5
Estimated Annual Avoidable Laboratory and Imaging Service Savings RAND Methodology PMPY						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Overall
Savings from Avoidable Outpatient Laboratory Tests	\$12.36	\$0.42	\$16.13	\$2.84	\$2.65	\$9.11
Savings from Avoidable Outpatient Imaging Studies	\$13.81	\$0.68	\$23.05	\$4.57	\$4.08	\$11.25
Combined Avoidable Service Savings	\$26.17	\$1.10	\$39.17	\$7.40	\$6.73	\$20.35

Overhage ER Savings Analysis²⁷

²⁷ Overhage JM, Dexter PR, Perkins SM, Cordell WH, McGoff J, McGraff R, McDonald CJ. A randomized controlled trial of clinical information shared from another institution. Ann Emerg Med. January 2002; 39:14-23.

In 2002, researchers from the Indiana University School of Medicine and the Regenstrief Institute for Health Care published a randomized controlled study of information sharing between a large urban hospital and two hospital emergency departments. This study specifically looked at the impact of information sharing from one large urban hospital computer-based patient record (via printed abstract and online access) to two hospital-based emergency departments (ED) located in the same urban area with a demonstrated history of crossover in patient care. At each of the ED locations, physicians rarely used limited online access to institutional data prior to this study.

By providing ED clinicians access to patient information from the electronic medical record, the study found that patient charges for ED care were decreased by an average of \$26 per encounter, \$13 per encounter for discharged patients and \$123 per encounter for admitted patients. These reductions were based on mean charges.

To apply these savings statewide for Oregon, the charges were inflated to 2009 dollars based on an average inflation rate of 5%. In addition, charges were adjusted to commercial payment rates and Medicare costs. Table A3 shows the calculated total savings and pmpy savings by Oregon payer category based on the Overhage methodology.

Table A3: Estimated Annual Emergency Room Savings Related to HIE: Overhage et al. Methodology by Payer Category

Estimated Annual Emergency Room Savings Related to HIE: Overhage et al. Methodology						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Total
Reduced Emergency Room (ER) Costs						
Inpatient Admissions	\$5,707.7	\$60.4	\$4,861.9	\$1,564.7	\$596.7	\$12,791.3
Outpatient ER Visits	\$5,145.8	\$24.6	\$2,695.7	\$854.1	\$517.4	\$9,237.6
Combined In & Out-Patient Savings	\$10,853.5	\$85.0	\$7,557.6	\$2,418.7	\$1,114.1	\$22,028.9
Estimated PMPY Savings in the ER Related to HIE: Overhage et al. Methodology						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Overall
Reduced Emergency Room (ER) Costs						
Inpatient Admissions	\$3.06	\$0.20	\$9.18	\$3.66	\$0.85	\$3.35
Outpatient ER Visits	\$2.76	\$0.08	\$5.09	\$2.00	\$0.74	\$2.42
Combined In & Out-Patient Savings	\$5.81	\$0.29	\$14.27	\$5.66	\$1.59	\$5.76

Missing Information Savings Analysis (Smith et al.)²⁸

Quantitative data regarding the impact of missing information on the practice of medicine was obtained from a study conducted by Peter Smith et al., based on a Colorado practice-based research network, including 32 primary care clinics and 253

²⁸ Smith PC, Araya-Guerra R, Bublitz C, Parnes B, Dickinson LM, Van Vorst R, Westfall JM, Pace WD, Missing clinical information during primary care visits. JAMA 293(5): 565-571, February 2, 2005.

clinicians participating in the Applied Strategies for Improving Patient Safety medical error reporting study.

Smith reported that 13.6% of primary care visits had missing information. The consequences of missing clinical information included:

- Delays in care: 25.5% of missing information visits;
- Additional laboratory tests: 22.3% of missing information visits;
- Additional visits: 20.9% of missing information visits;
- Additional imaging studies: 10.9% of missing information visits.

Beyond delays in care and additional services that resulted in missing information at the point of care, clinicians documented productivity losses from not having necessary information at the point of care. These productivity losses included additional time spent by physicians and support staff looking for the missing information, communicating it on the telephone with hospitals, specialists, pharmacies, and each other, as well as additional time spent reconciling divergent information.

This information was sufficient for the development of estimates of avoidable ambulatory visits, laboratory tests, imaging studies, inpatient admissions, and productivity loss in Oregon ambulatory care practices and emergency rooms (ERs). Inefficiencies in ambulatory practices from missing information were developed based on time spent unsuccessfully looking for missing information and the additional time physicians spent repeating the collection of the patient's history and medications lists that should have been available. Parameters used to assess the potential savings associated with missing information related to electronic HIE in Oregon include:

- Oregon specific payment rates inflation adjusted to 2009;
- Adjusted missing information rates for specialty and emergency room services based on interviews and research staff input;
 - Specialty visits were assumed to have 60% of the missing information rates as compared to primary care; and
 - 70% of patients receiving services in the ER have prior medical history data somewhere and 90% of this information is not immediately available in the ER.
- Productivity savings based on \$150/hr for physician and \$40/hr for office staff.

Tables A4 and A5 show the calculated total savings and per member per year (pmpy) savings by Oregon payer category based on the Smith methodology.

Table A4: Estimated Annual Savings Impact of Missing Information on Avoidable Services in the Ambulatory and ER Settings: Smith et al. Methodology

Estimated Annual Savings Impact of Missing Information on Avoidable Services in the Ambulatory and ER Settings: Smith Methodology						
Impact of Missing Information in Ambulatory Care Settings	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Total
Avoidable Visits Caused by Missing Information	\$5,188.3	\$63.4	\$2,957.5	\$814.8	\$887.3	\$9,911.2
Avoidable Laboratory Tests due to Missing Information	\$5,488.3	\$31.3	\$1,982.1	\$206.1	\$451.6	\$8,159.4
Avoidable Imaging Studies due to Missing Information	\$14,371.1	\$112.7	\$7,130.7	\$741.4	\$1,624.6	\$23,980.5
Subtotal Impact of Missing Information in Ambulatory Care Settings	\$25,047.6	\$207.4	\$12,070.3	\$1,762.3	\$2,963.5	\$42,051.2
Impact of Missing Information in ER						
Avoidable Admissions Caused by Missing Information	\$576.0	\$27.4	\$736.0	\$236.0	\$89.6	\$1,665.8
Avoidable Laboratory Tests due to Missing Information	\$2,111.2	\$6.1	\$631.9	\$200.7	\$114.2	\$3,064.0
Avoidable Imaging Studies due to Missing Information	\$5,528.3	\$21.9	\$2,273.1	\$722.0	\$410.8	\$8,956.0
Subtotal Impact of Missing Information in the ER	\$8,215.5	\$55.4	\$3,640.9	\$1,159.5	\$614.5	\$13,685.8
Total Avoided Services Savings	\$33,263.0	\$262.8	\$15,711.2	\$2,921.9	\$3,578.1	\$55,737.0

Table A5: Estimated PMPY Savings Impact of Missing Information on Avoidable Services in the Ambulatory and ER Settings: Smith et al. Methodology

Estimated PMPY Savings Impact of Missing Information on Avoidable Services in the Ambulatory and ER Settings: Smith Methodology						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Overall
Impact of Missing Information in Ambulatory Care Practices: Primary Care						
Avoidable Visits Caused by Missing Information	\$2.78	\$0.21	\$5.59	\$1.91	\$1.26	\$2.59
Avoidable Laboratory Tests due to Missing Information	\$2.94	\$0.11	\$3.74	\$0.48	\$0.64	\$2.13
Avoidable Imaging Studies due to Missing Information	\$7.70	\$0.38	\$13.47	\$1.74	\$2.32	\$6.27
Subtotal PMPY Impact of Missing Information in Ambulatory Settings	\$13.42	\$0.70	\$22.80	\$4.13	\$4.22	\$11.00

Table A5 (cont.)

Estimated PMPY Savings Impact of Missing Information on Avoidable Services in the Ambulatory and ER Settings: Smith Methodology						
	Other Plan Payers	Kaiser	Medicare	Medicaid	Uninsured	Overall
Impact of Missing Information in ER						
Avoidable Admissions Caused by Missing Information	\$0.31	\$0.09	\$1.39	\$0.55	\$0.13	\$0.44
Avoidable Laboratory Tests due to Missing Information	\$1.13	\$0.02	\$1.19	\$0.47	\$0.16	\$0.80
Avoidable Imaging Studies due to Missing Information	\$2.96	\$0.07	\$4.29	\$1.69	\$0.59	\$2.34
Subtotal PMPY Impact of Missing Information in the ER	\$4.40	\$0.19	\$6.88	\$2.71	\$0.88	\$3.58
Total Avoided Services Savings	\$17.82	\$0.88	\$29.67	\$6.84	\$5.10	\$14.58

Table A6: Estimated Annual Productivity Benefit Estimates for HIE: Smith Methodology

Estimated Annual Productivity Benefit Estimates for HIE: Smith Methodology		
Ambulatory Care Practices: Primary Care	Total Savings	PMPY
Physician/Staff Productivity Loss Looking for Information	\$6,785.2	\$1.77
Physician Productivity Impact - Repeated Work H&PE/Med Lists	\$17,588.4	\$4.60
Impact of Missing Information in Emergency Department		
Physician/Staff Productivity Loss Looking for Information	\$2,500.6	\$0.65
Physician Productivity Impact - Repeated Work H&PE/Med Lists	\$6,457.2	\$1.69
Total Productivity Benefits	\$33,331.5	\$8.72

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About the Author

DAVID M. WITTER, JR is the principal in Witter & Associates providing consulting support to non-profit organizations and governmental agencies seeking to improve healthcare quality and operational performance through innovative solutions including health information technologies.

Recent projects include

- Oregon 2009 Ambulatory EHR survey analysis and report; Oregon 2009 Health Information Technology Environmental Assessment.
- HealthInfoNet (Maine): avoided services and productivity savings analyses for health information exchange functions using relevant national models and Maine data.
- Oregon Health Record Bank (Medicaid Transformation Grant): program planning, RFP development and project evaluation.
- Oregon statewide benefits analysis of the widespread adoption of advanced health technologies; extensive analysis and report on Oregon 2006 EHR survey.
- Oregon and Metro Portland health information exchange planning including business plan development, cost-benefit and financing assessments, operational and governance plans.

Mr. Witter has over thirty years experience in the leadership, operations and finances of healthcare organizations. Mr. Witter spent six years at the Association of American Medical Colleges (Washington, DC) serving as Vice President of Enterprise (business) Development, Vice President of Information Resources (CIO) and Director of the Clinical - Administrative Data Service. Mr. Witter spent six years as president and CEO of the Academic Medical Center Consortium (Rochester, NY), an organization created by twelve major teaching hospital CEOs to conduct major health services research-based initiatives to improve quality and operations. Mr. Witter spent seventeen years at the Oregon Health Sciences University serving as Interim University President, Vice President for Administration, Director of the Biomedical Information and Communication Center, University Hospital CEO, COO and CFO. Mr. Witter holds bachelor and master degrees in economics.

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²⁹ Alfreds ST, Witter DM. The Impact of Electronic Health Information Exchange (HIE) Services in Maine: Avoidable Service and Productivity Savings Estimates Related to HealthInfoNet Services, November 2008. Available at http://www.umassmed.edu/uploadedFiles/CWM_CHPR/Publications/Clinical_Supports/HINValuation19november2008.pdf. Included as Appendix D (pp. 124-164) in HealthInfoNet Sustainability Stakeholder Process Final Report (approved by Stakeholders on December 15, 2008). Available at http://www.hinfonyet.org/meetings/HealthInfoNet_FinalReport20081215.pdf.