

**MN E-HEALTH REPORT:  
2011 Minnesota Clinical Laboratory Survey  
of Readiness and Needs for Electronic  
Health Information Exchange**



December 2011



# Introduction

Electronic health records (EHRs) and other health information technology (HIT) are essential to improving the affordability, accessibility, and quality of health care and support healthier communities. The Minnesota Department of Health (MDH), in partnership with the Minnesota e-Health Initiative, is responsible for assessing e-health in a variety of settings. This vital information is needed to:

- MEASURE Minnesota status on achieving state and national goals to accelerate adoption and use of electronic health records and other HIT and to achieve interoperability of health information;
- IDENTIFY gaps and barriers to enable effective strategies and efficient use of resources; and
- Help INFORM programs and decisions at the local, state and federal levels of government and support community collaborative efforts.

## MN E-Health Report: Clinical Laboratories 2011

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# Highlights

This is a comprehensive summary of 137 Minnesota clinical laboratories which includes the status, gaps, and barriers and the use of a laboratory information system (LIS) for exchange of standards-based electronic orders and results delivery for 2010. The electronic exchange of structured lab orders and results is essential to achieve the benefits for EHRs and HIT.

## HIGHLIGHTS INCLUDE:

- 97% of the laboratories have an LIS (pg. 7) and 94% of these laboratories use a commercial LIS (pg. 9)
- 66% are able to use HL7 messaging standard with v2.3.1 being the most used version (pg. 15)
- 4% are known to use both LOINC and SNOMED in exchange of lab reports (pg. 20). Within the next 3 years, 63% plan to use LOINC while 20% plan to use SNOMED (pg.21)
- 13% use electronic methods to send reportable lab results to MDH (pg. 24).
- Workforce and services to help map local codes or text to standard codes are in the greatest need (pg. 27).

Despite a 97% adoption rate of LIS and 66% of labs with ability to use HL7, there remains a huge gap on the use of LOINC and SNOMED codes in exchange of lab reports with limited plan for adoption and use of these standards.

# MN Clinical Labs Survey Participants (N=151)

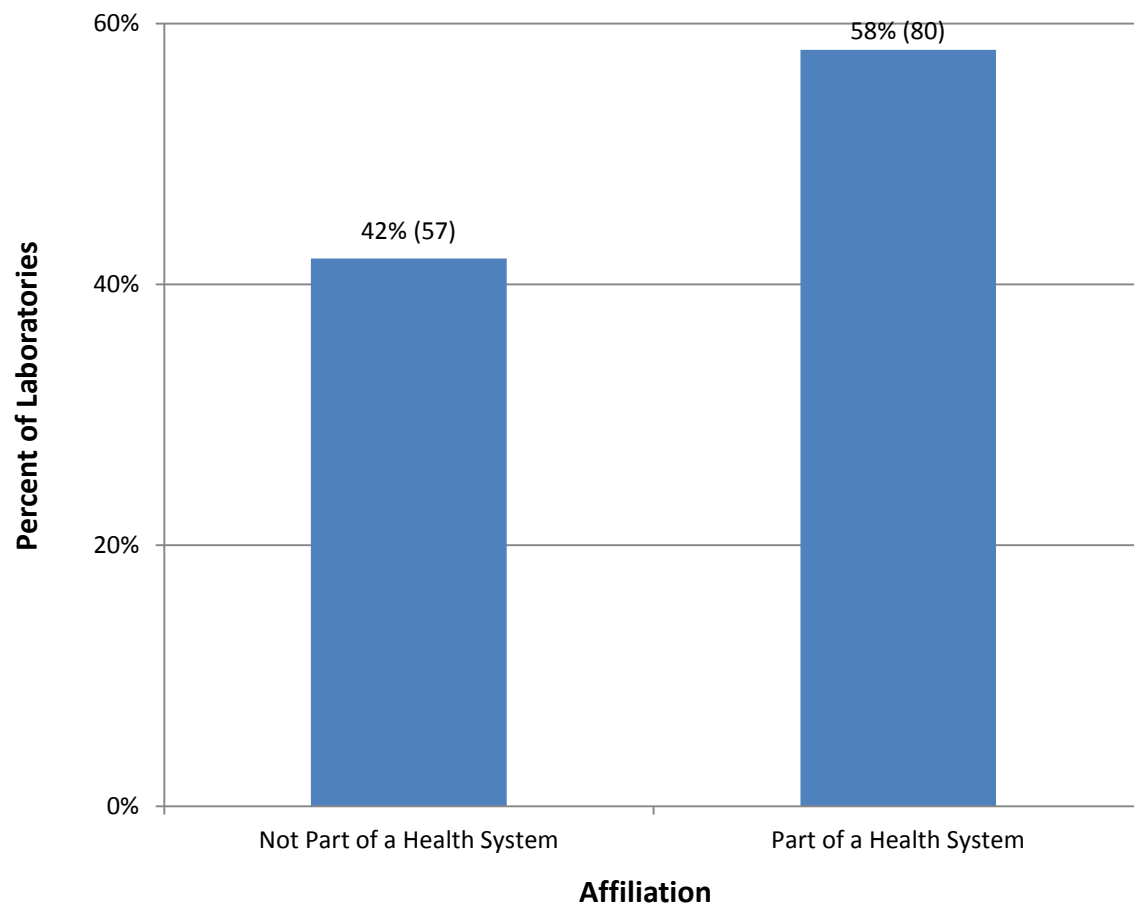
		<b>Number</b>
Have Labs	Hospitals with clinical lab onsite	126
	Large clinic lab	5
	Public health lab	1
	Reference lab	5
Without Labs	Hospitals with no clinical lab onsite (exclude from the analysis)	14
<b>Total</b>		<b>151</b>

## MN E-Health Report: Clinical Laboratories 2011 Characteristics

<b>Facilities</b>	<b>Number</b>
Responded	151
Have labs	137
Without labs	14

Analysis of this survey is based on 137 clinical laboratories.

# MN Clinical Labs Affiliation with a Health System (N=137)



## MN E-Health Report: Clinical Laboratories 2011 Characteristics

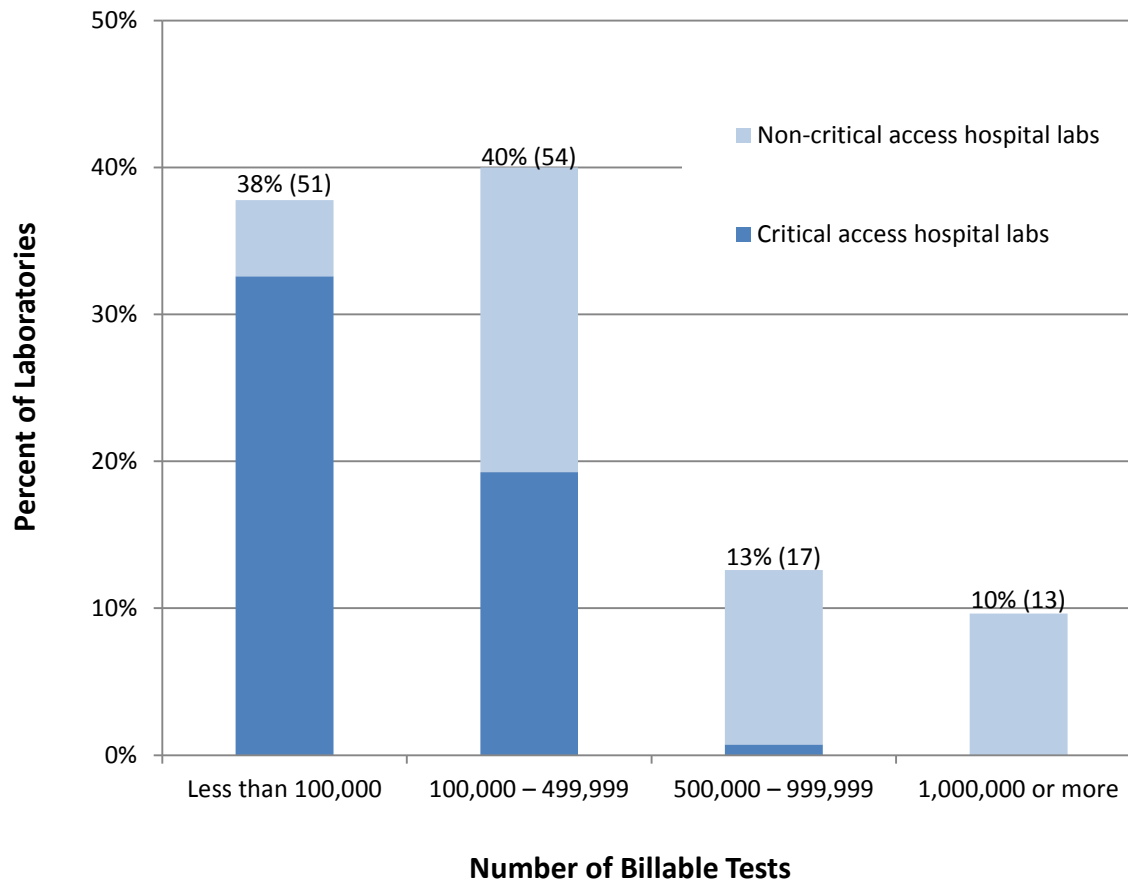
Fifty-eight percent of the clinical laboratories (80) are part of a health system. Forty-nine of those are part of five health systems:

- Mayo (13)
- Sanford (12)
- Allina (10)
- Fairview (8)
- Essentia (6)

# The Number of Billable Tests by MN Clinical Labs in 2010 (N=135\*)

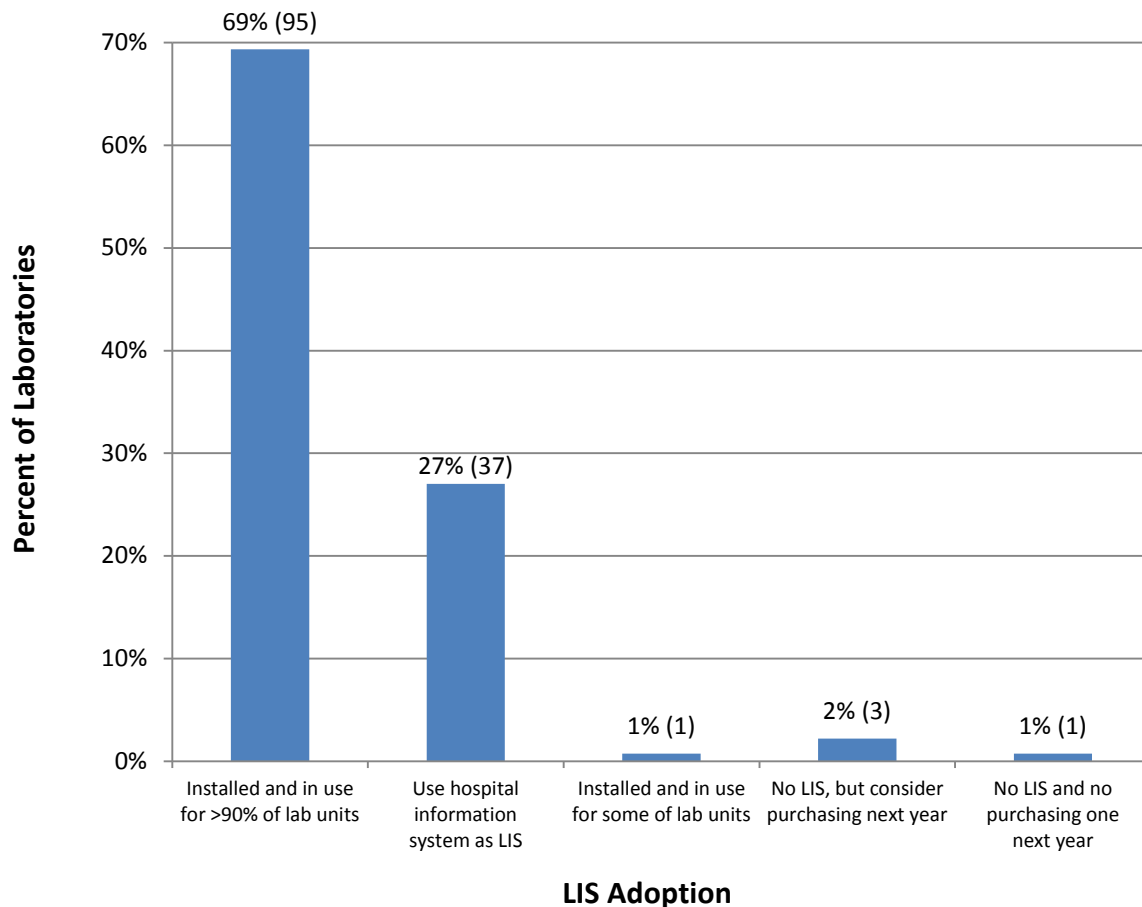
Ten percent of the clinical laboratories (13) performed one million or more billable tests in 2010. Seventy-eight percent of the laboratories (105) performed 500,000 or less of billable tests.

Critical access hospital labs account for 68% of all the labs with <500,000 tests.



\*3 hospital laboratories reported a combined number of billable tests  
Source: Minnesota Department of Health, Office of Health Information Technology,  
MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)  
Response Rate: 93% (151 of 163)

# LIS Adoption Rate of MN Clinical Labs (N=137)



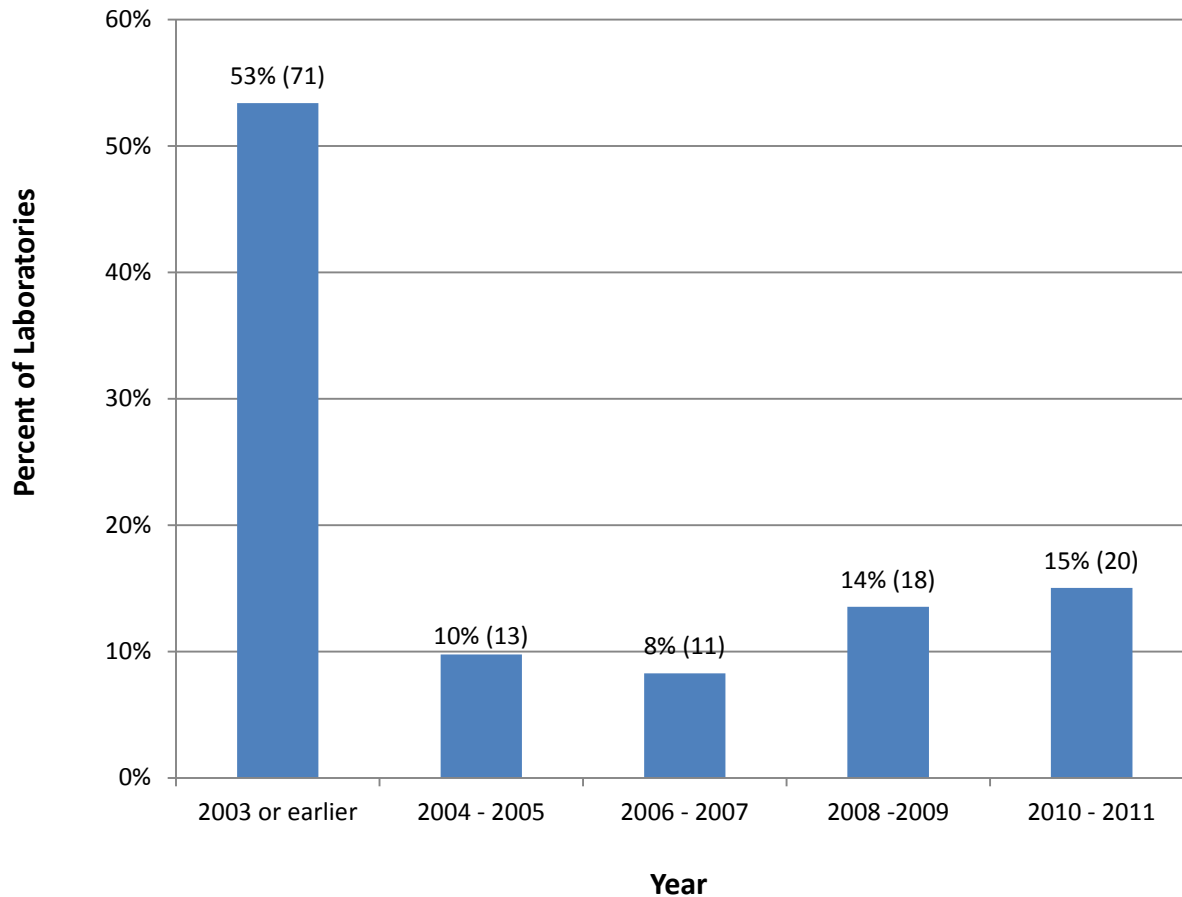
## MN E-Health Report: Clinical Laboratories 2011 Adoption

Three percent (4) of the clinical laboratories have no laboratory information system (LIS).

### Definition

A computerized clinical laboratory information system (LIS) is a software system used in a clinical laboratory to computerize laboratory business processes such as test processing, test scheduling, specimen and sample tracking, inventory control, reporting, quality control and quality assurance management, and statistical analysis and surveillance.

# The Year MN Clinical Labs Started Using Their Current LIS (N=133)



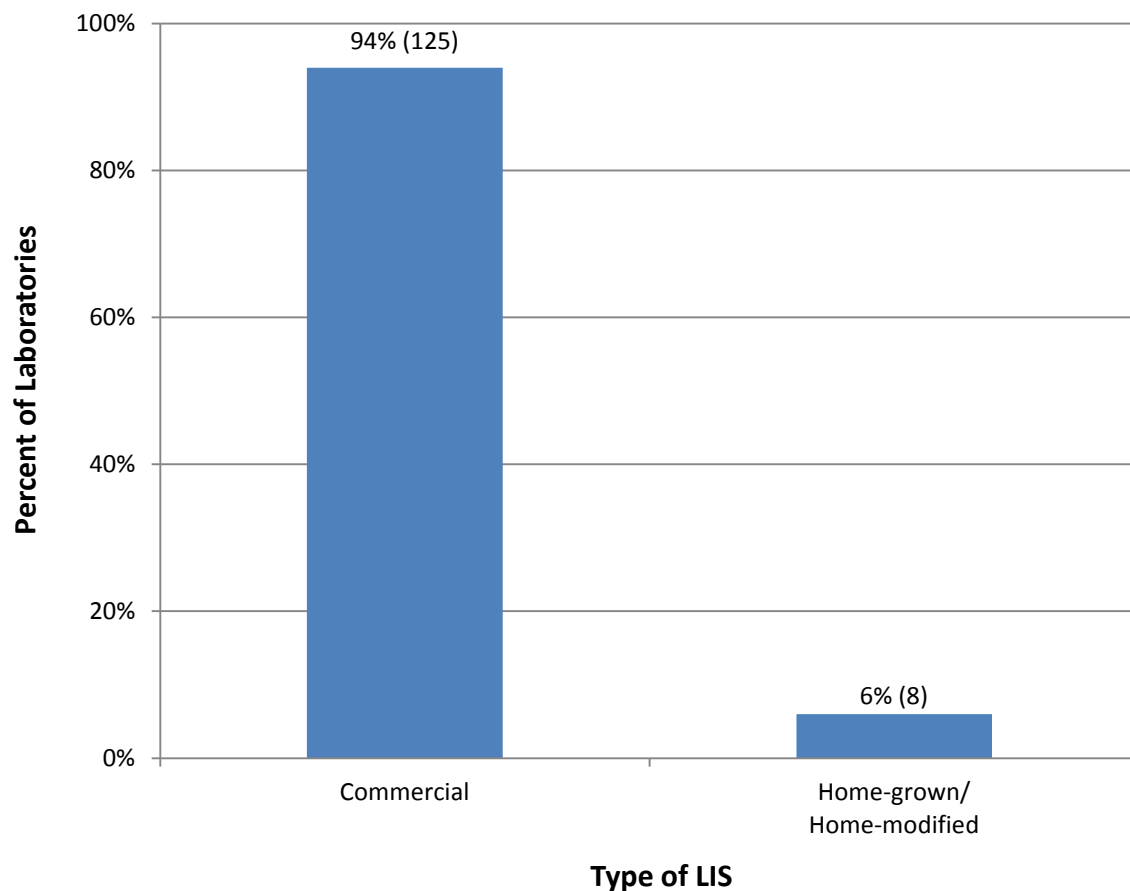
## MN E-Health Report: Clinical Laboratories 2011 Adoption

Fifty-three percent of the clinical laboratories (71) have started using their current laboratory information system (LIS) since 2003 or earlier.



# Type of the LIS Used by MN Clinical Labs (N=133)

Ninety-four percent of the clinical laboratories (125) use a commercial laboratory information system (LIS).



# Top LIS Vendors Used by MN Clinical Labs (N=125)

Vendor Name	Percent & Number
MEDITECH	22% (28)
Sunquest	14% (17)
GE Healthcare	11% (14)
Healthland	11% (14)
Cerner	10% (13)
Others	31% (39)
<b>Total</b>	<b>100% (125)</b>

## MN E-Health Report: Clinical Laboratories 2011 Adoption

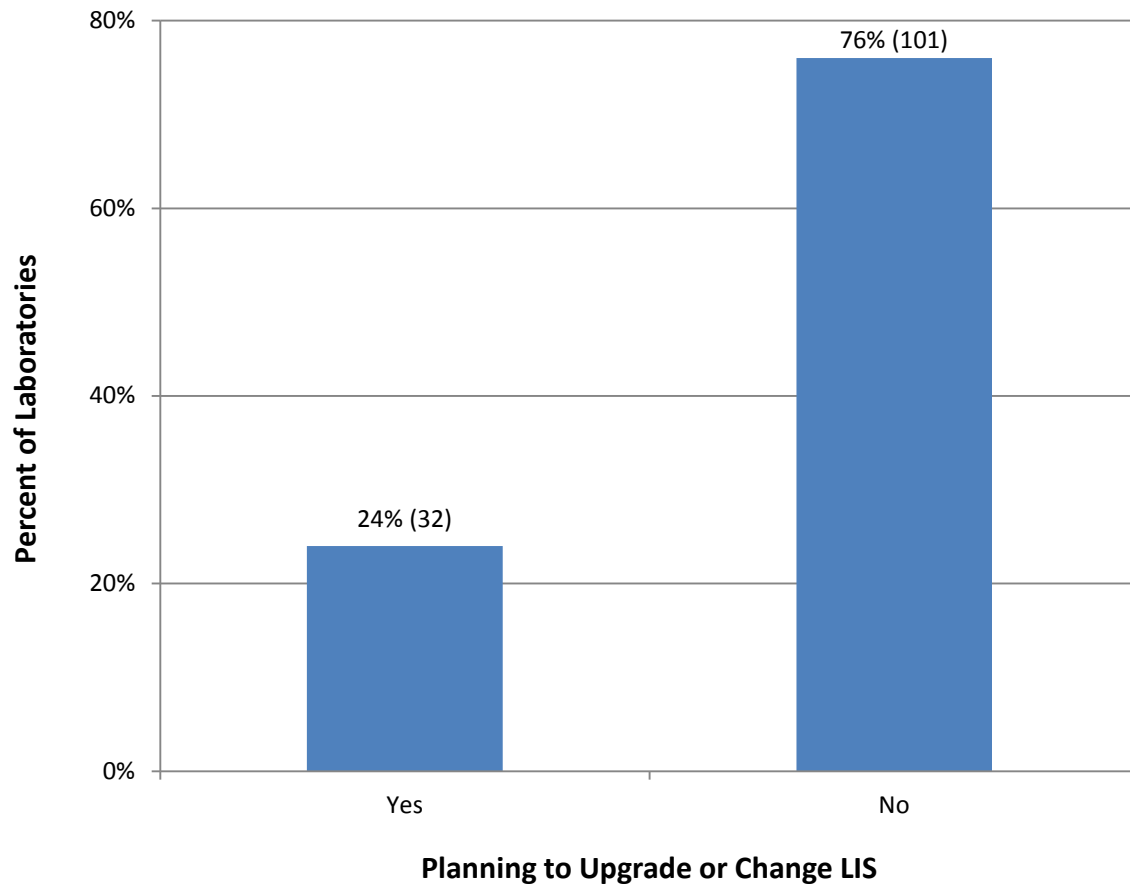
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The most common LIS vendors are:

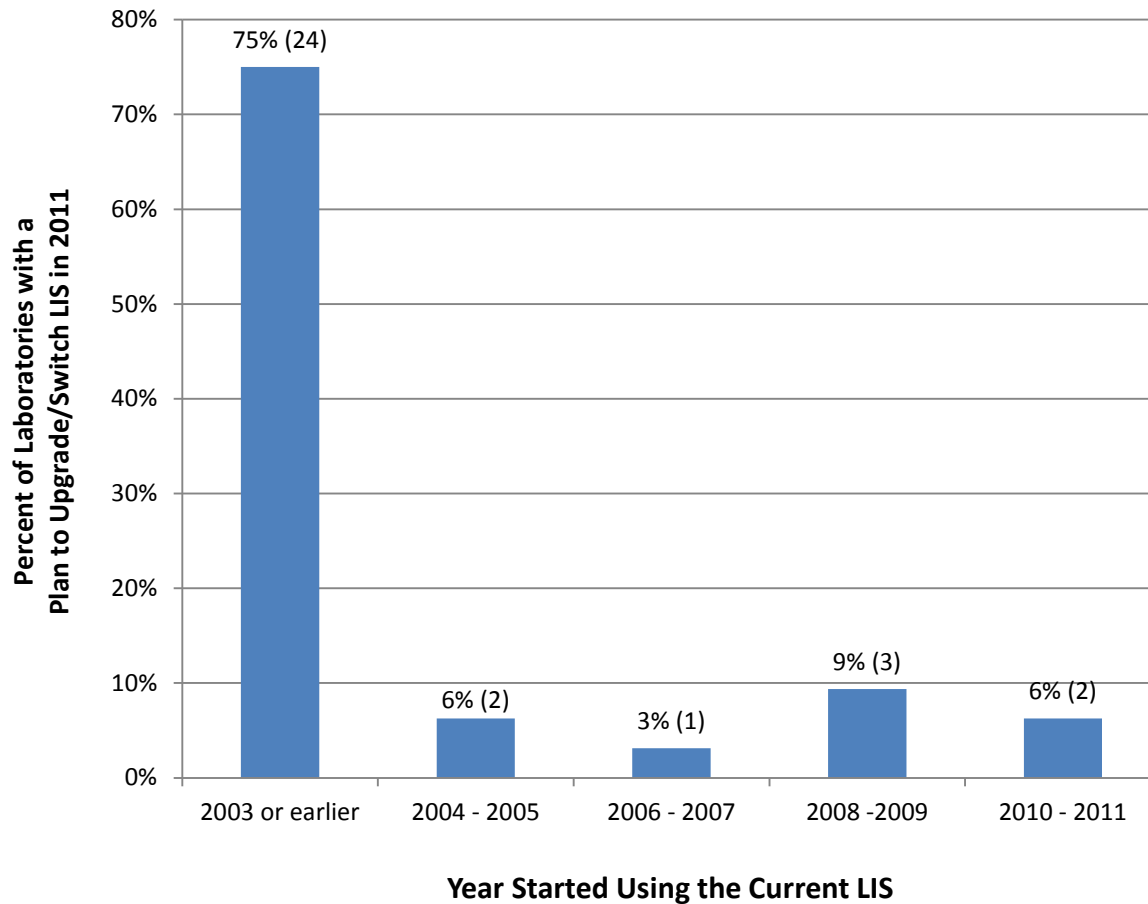
- MEDITECH
- Sunquest
- GE Healthcare
- Healthland
- Cerner

# Number of MN Clinical Labs Planning to Upgrade or Change to another LIS in 2011 (N=133)

About a quarter of the clinical laboratories (32) plan to upgrade or change to another LIS in 2011.



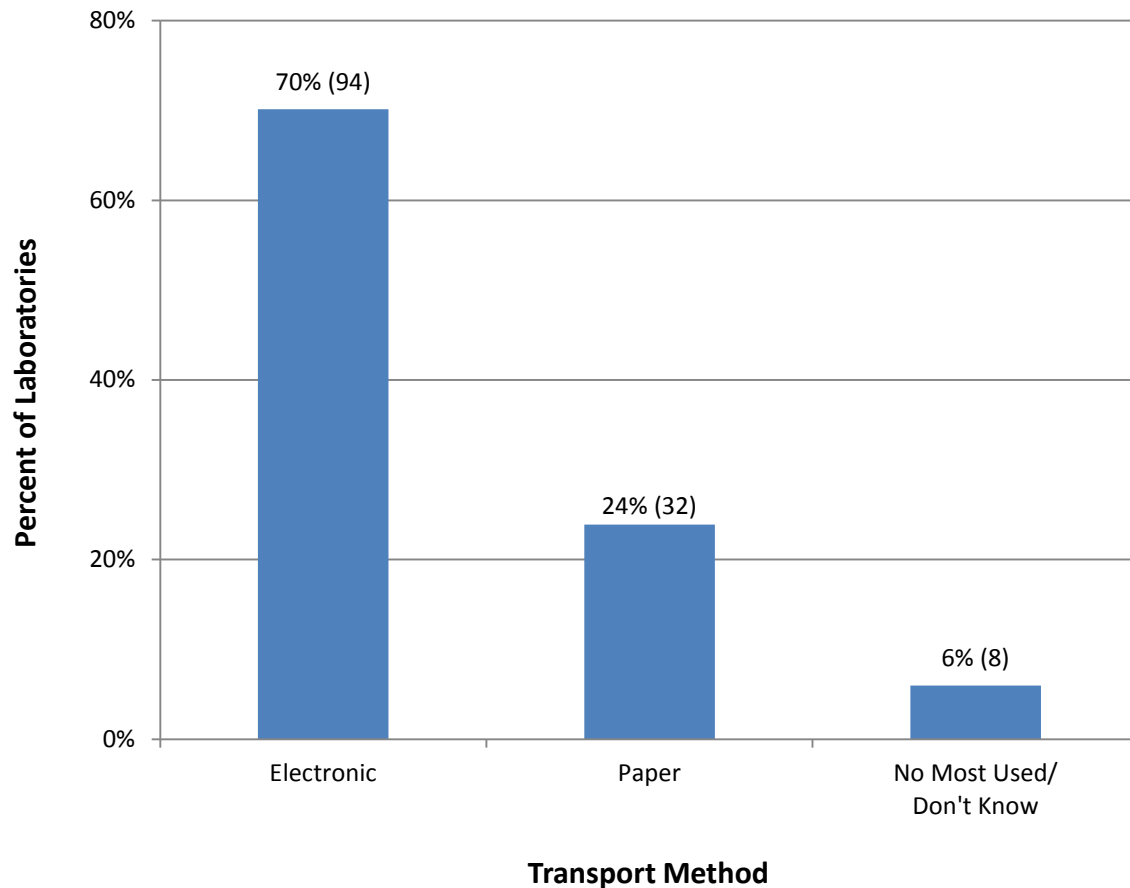
# MN Clinical Labs with a Plan to Upgrade or Change to another LIS by Year Started Using the LIS (N=32)



Seventy-five percent of the clinical laboratories (24) with a plan to upgrade or change to another laboratory information system (LIS) in 2011 have used their current LIS since 2003 or earlier.

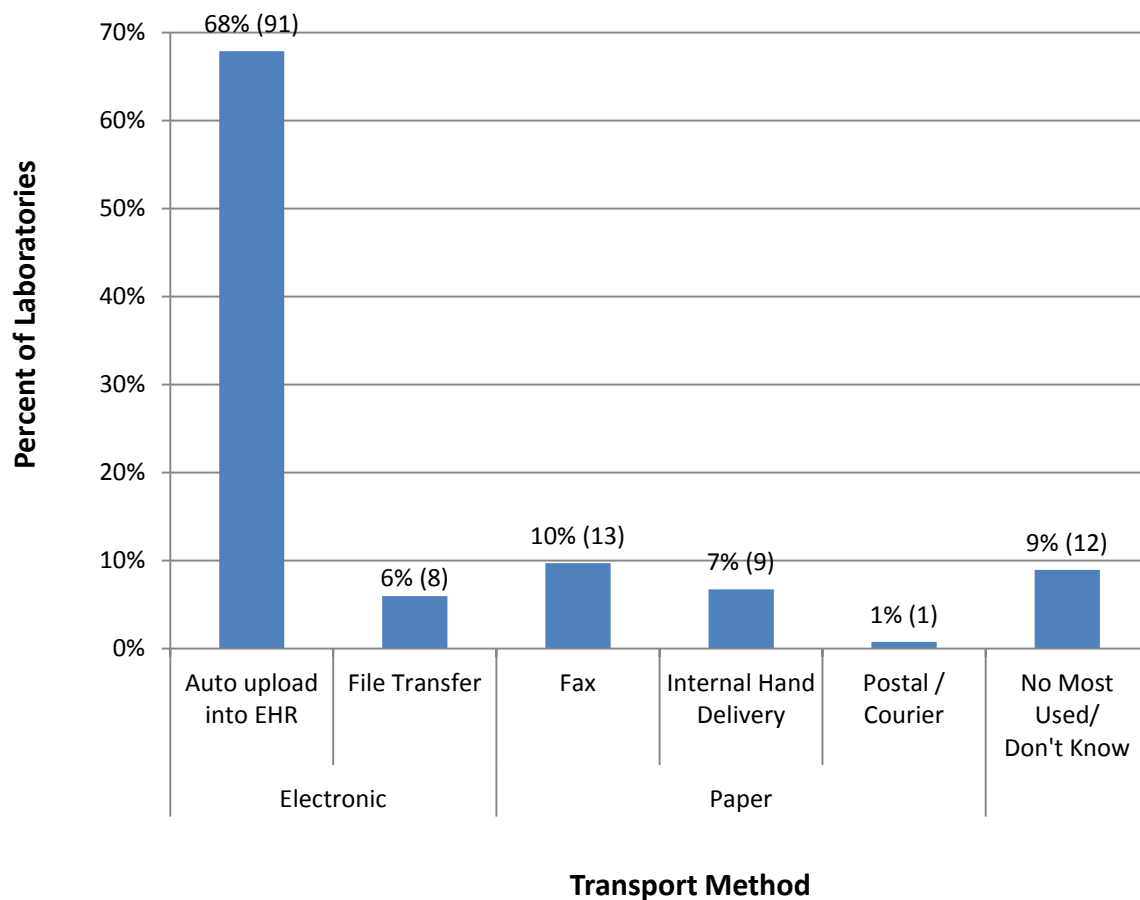
# Transport Method<sup>†</sup> Most Used by Each MN Clinical Lab to Receive Test Orders in 2010 (N=134\*)

Electronic method was the most used transport method (70%, 94 labs) to receive test orders in 2010.



<sup>†</sup>the method that a laboratory used the most and this method must be used more than 50% of the time.  
\*5 laboratories did not use any method more than 50% of the time (no most used) and 3 missing/don't know  
Source: Minnesota Department of Health, Office of Health Information Technology,  
MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)  
Response Rate: 93% (151 of 163)

# Transport Method<sup>†</sup> Most Used by Each MN Clinical Lab to Send Lab Results in 2010 (N=134\*)



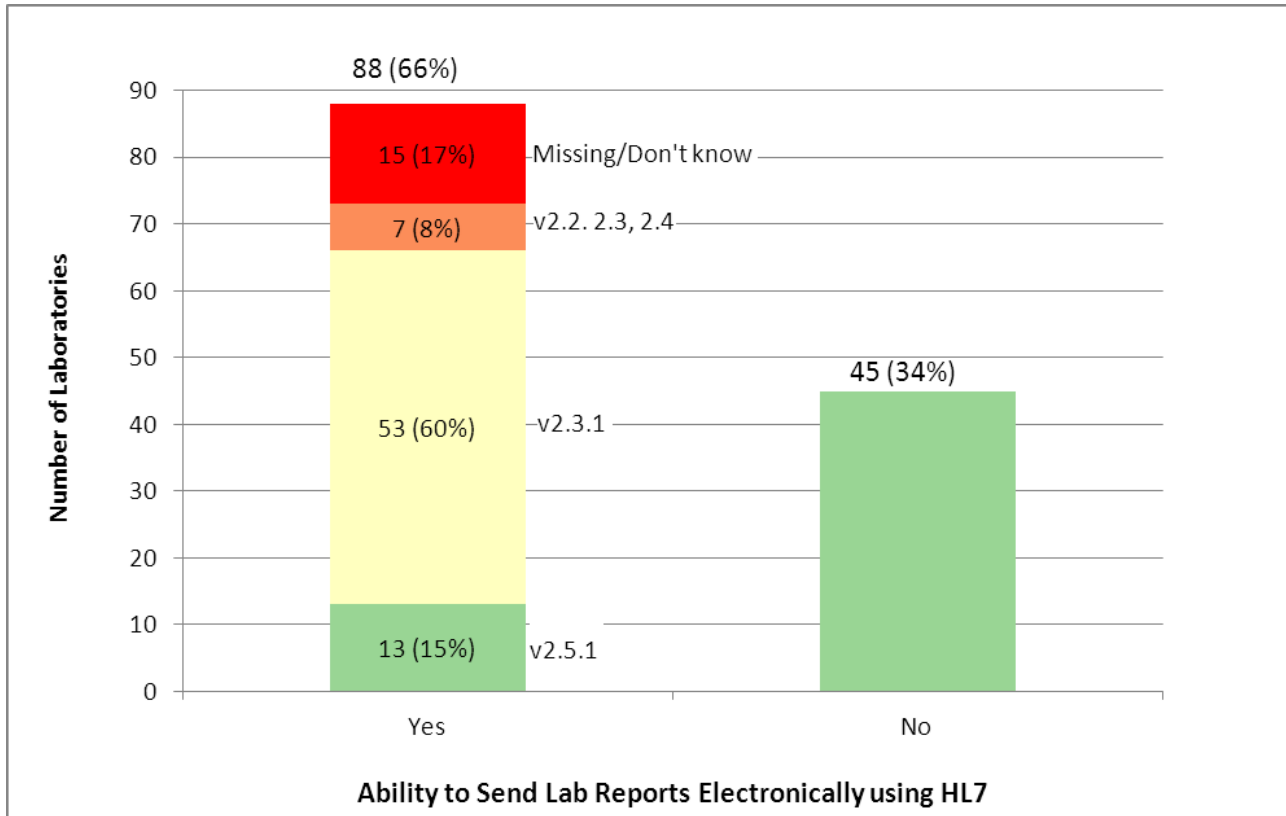
## MN E-Health Report: Clinical Laboratories 2011 Exchange

Electronic methods were the most used transport method (74%, 99 labs) to send lab results in 2010.

Auto upload into EHR = Automatically upload of lab results into providers' Electronic Health Record (EHR) systems

<sup>†</sup>the method that a laboratory used the most and this method must be used more than 50% of the time.  
 \*11 laboratories did not use any method more than 50% of the time (no most used) and 1 missing/don't know  
 Source: Minnesota Department of Health, Office of Health Information Technology,  
 MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)  
 Response Rate: 93% (151 of 163)

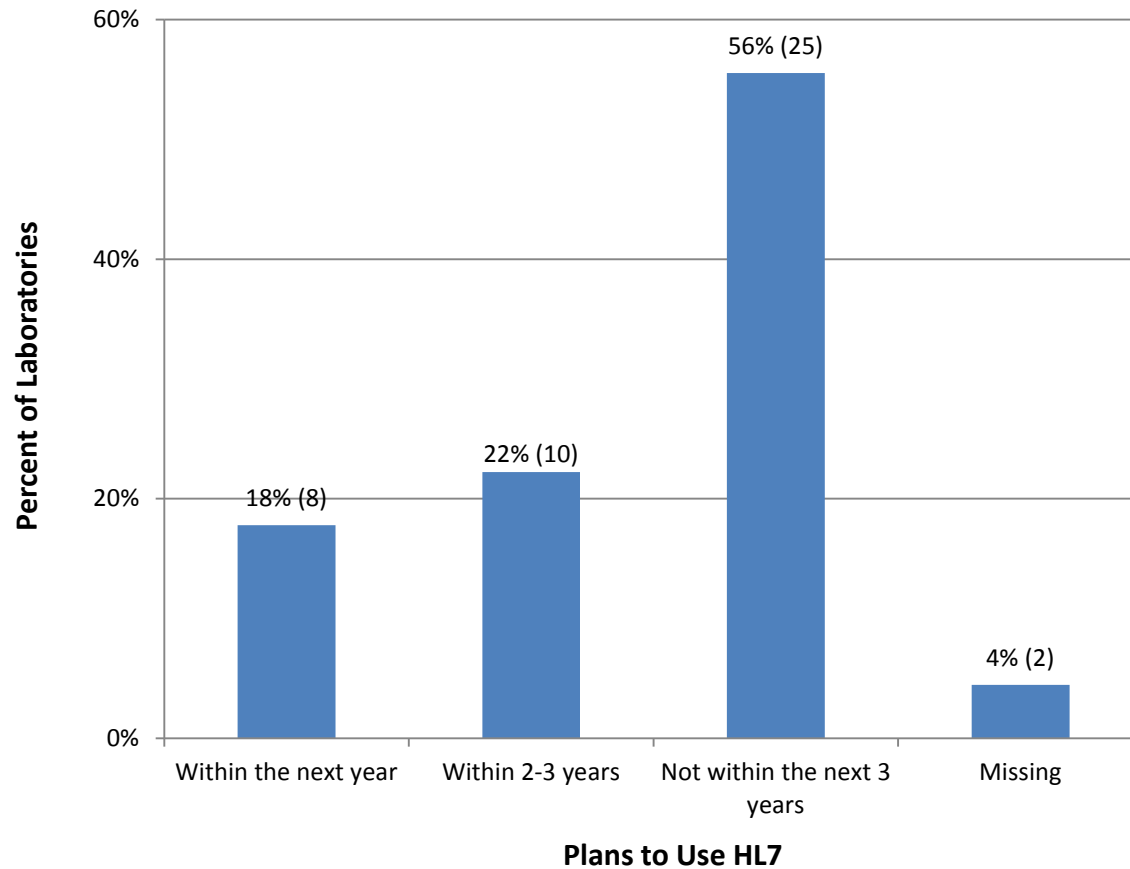
# MN Clinical Labs Ability to Send Lab Reports Electronically using HL7 (N=133)



Two-third (88) of the clinical laboratories are able to send lab reports electronically using HL7 with v2.3.1 being the most used version.

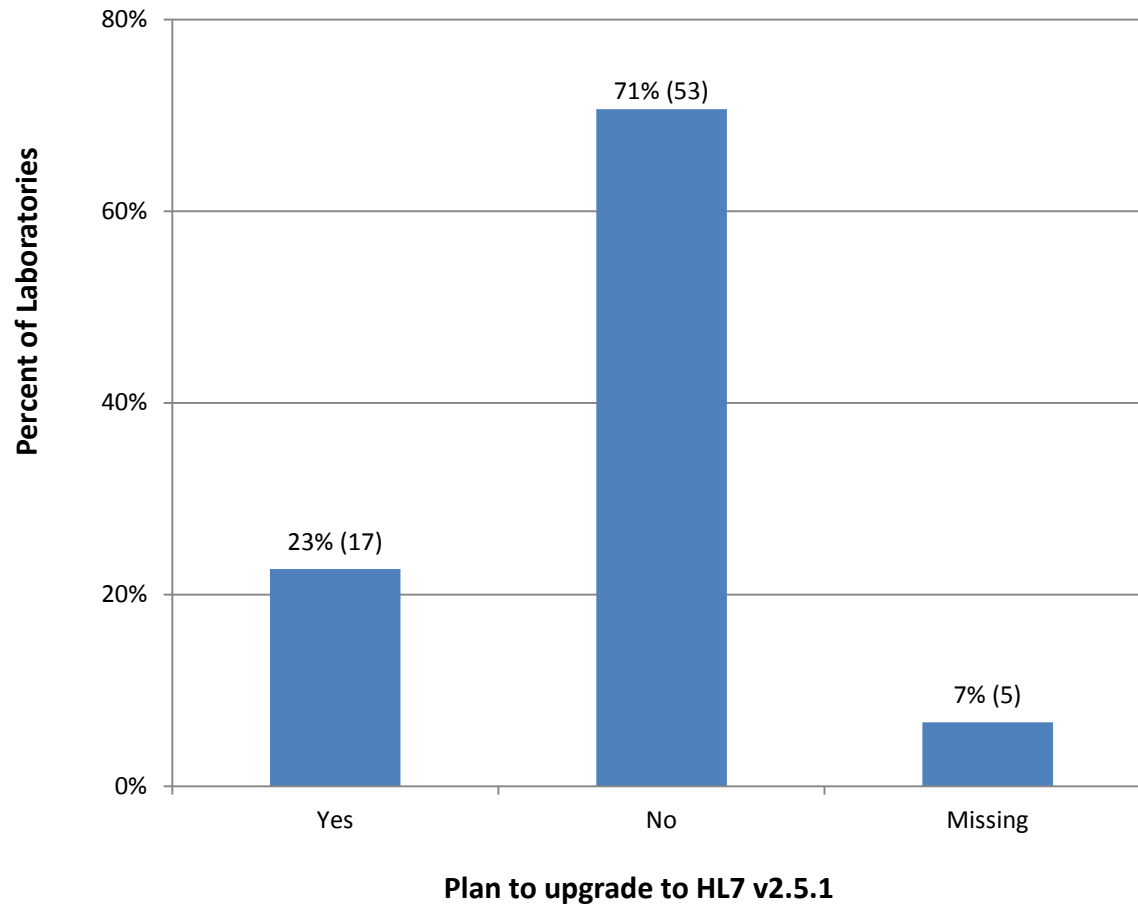
# Plans to Use HL7 to Send Lab Reports for MN Clinical Labs Not Using HL7 (N=45)

Of the 45 clinical laboratories not using HL7 to send lab reports, 40% of these laboratories (18) plan to use HL7 within the next 3 years.



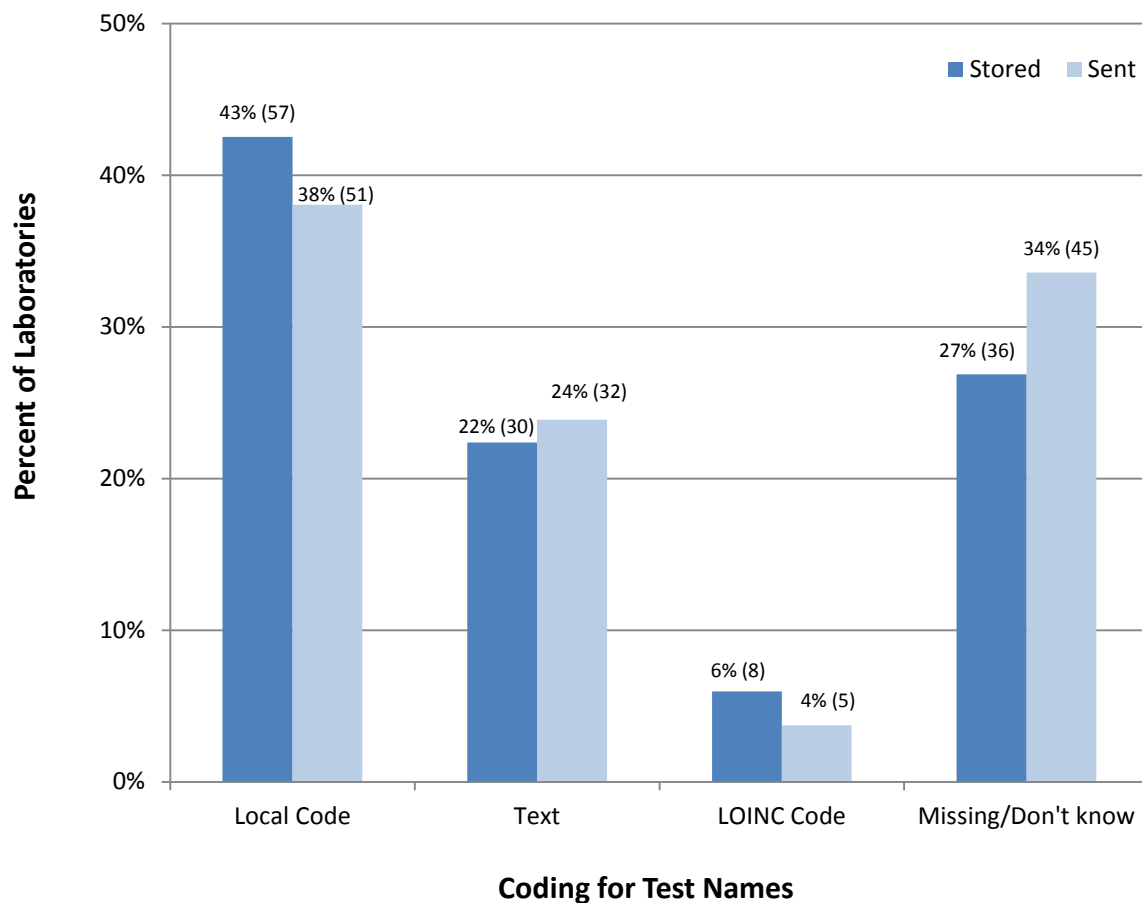


# Plans to Upgrade HL7 for MN Clinical Labs Not Using v2.5.1 (N=75)



Of the clinical laboratories not using HL7 v2.5.1, 23% (17) plan to upgrade to HL7 v2.5.1.

# Codes<sup>†</sup> Most Used by Each MN Clinical Lab to Store and Send Test Names in 2010 (N=134\*)



LOINC codes were the least used coding for test names. About one-thirds of the clinical laboratories may not have sufficient knowledge to answer how they store and send test names.

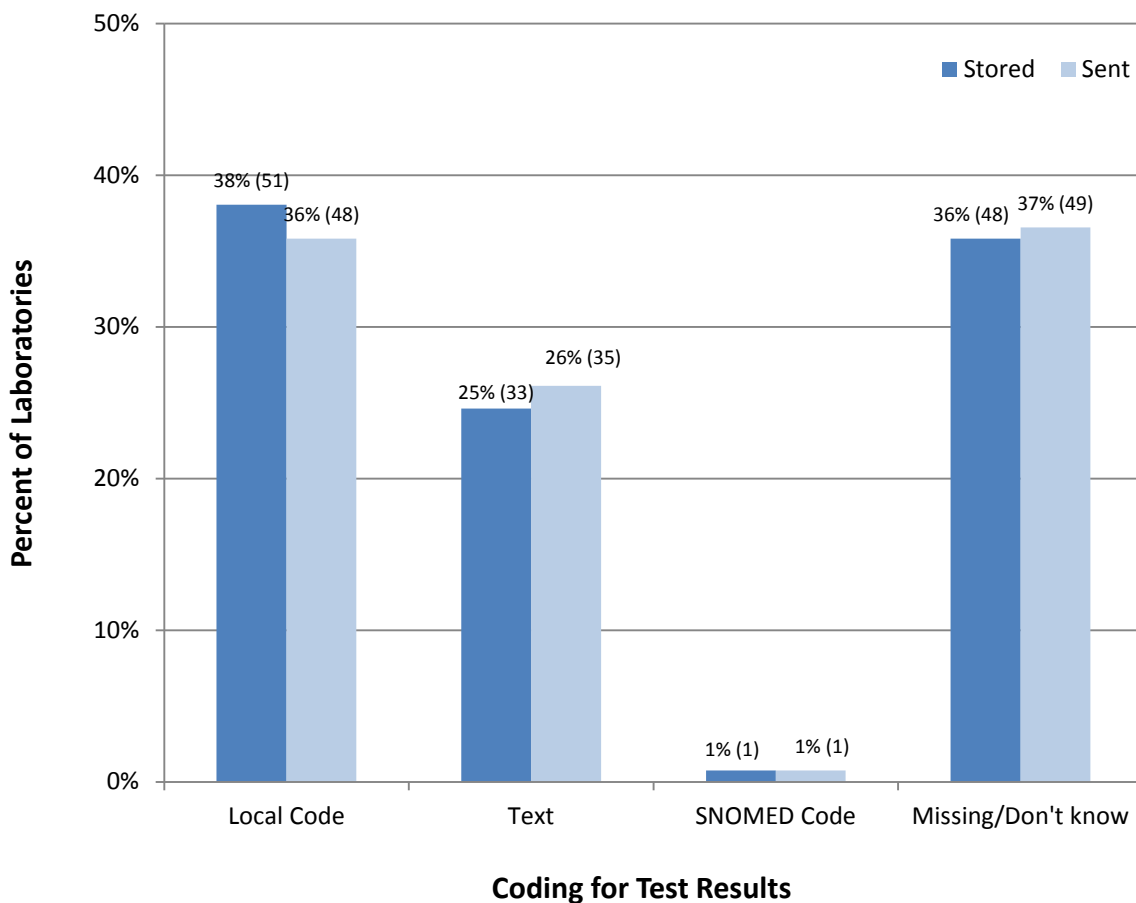
<sup>†</sup>the code that a laboratory used the most and this code must be used more than 50% of the time.

\*2 laboratories used charge codes to store test names and 1 laboratory used charge codes to send test names; 1 laboratory did not use any coding more than 50% of the time (no most used)

Source: Minnesota Department of Health, Office of Health Information Technology, MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)

Response Rate: 93% (151 of 163)

# Codes<sup>†</sup> Most Used by Each MN Clinical Lab to Store and Send Test Results in 2010 (N=134\*)



SNOMED codes were the least used coding for test results. About 37% of the clinical laboratories may not have sufficient knowledge to answer how their laboratory information system (LIS) store/send test results on lab report.

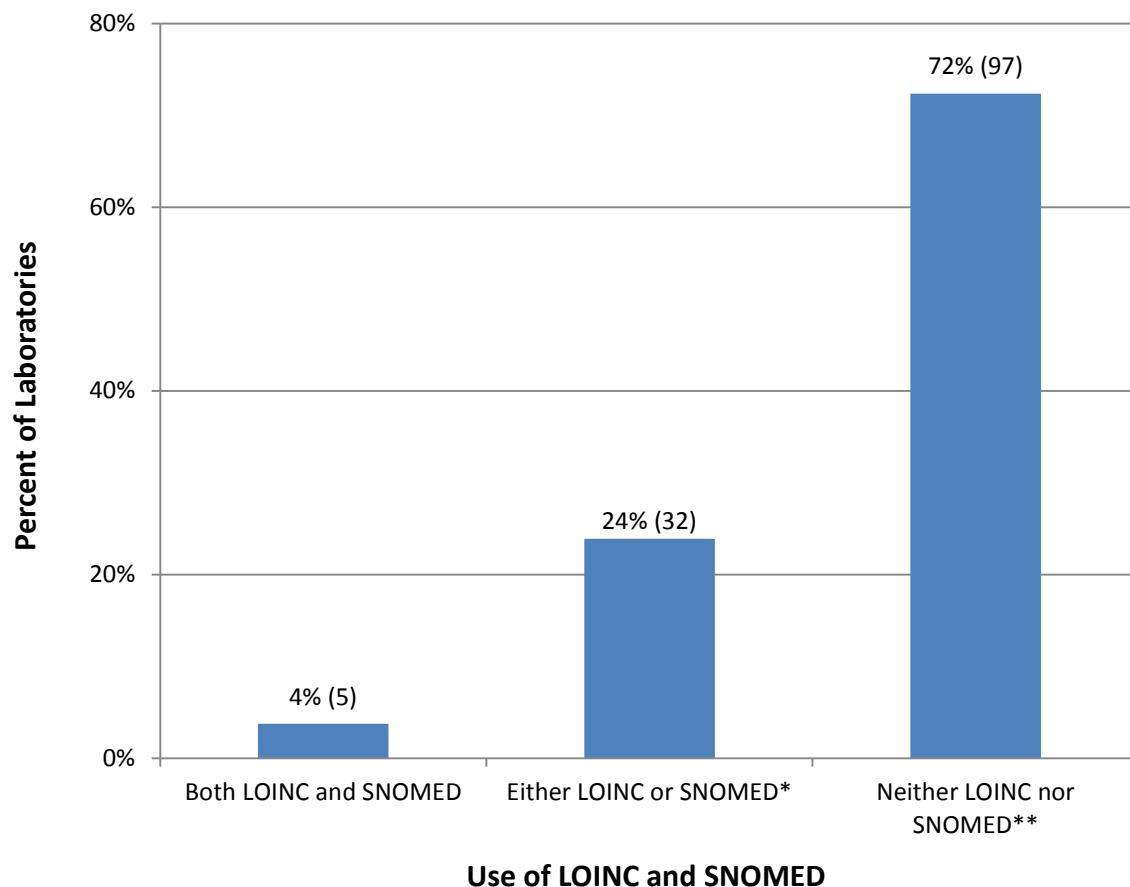
<sup>†</sup>the code that a laboratory used the most and this code must be used more than 50% of the time.

\*1 laboratory used CPT codes to store/send test results

# MN Clinical Labs Using either LOINC or SNOMED Codes on Lab Reports in 2010 (N=134)

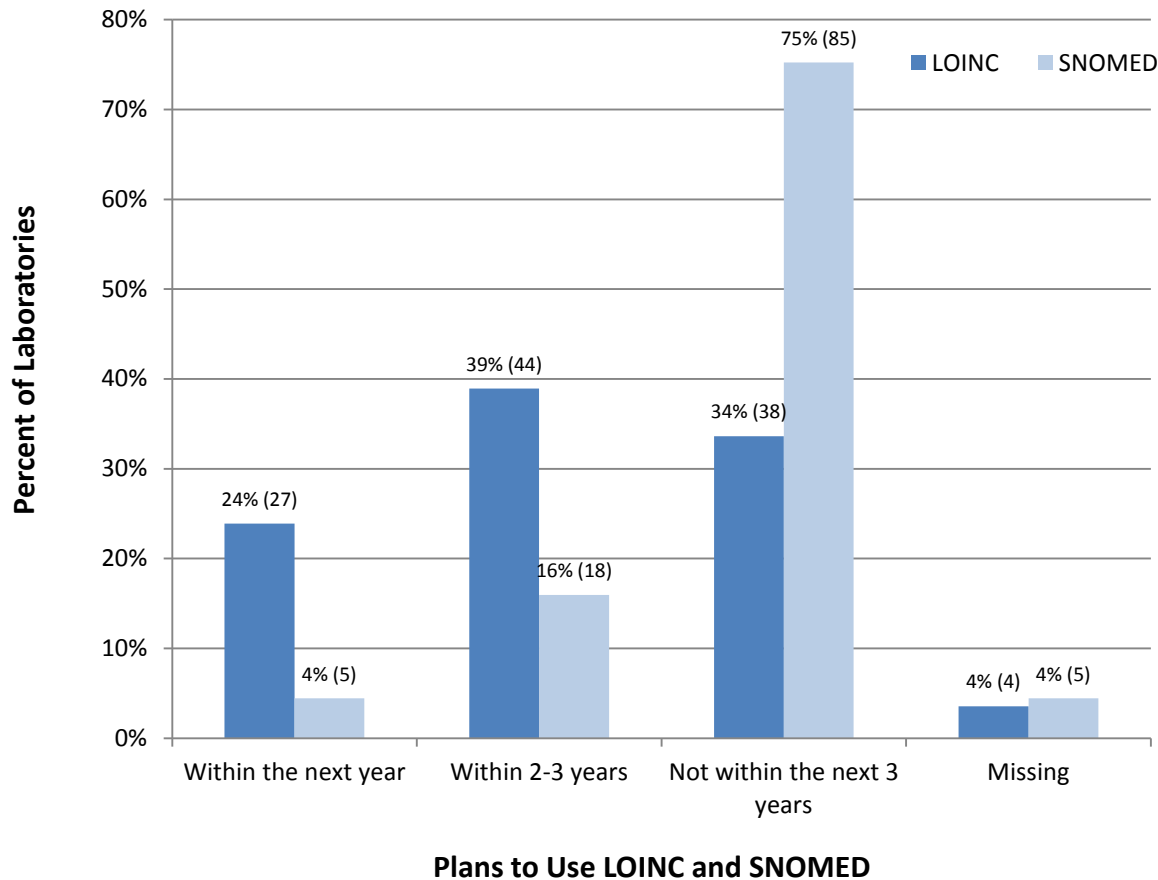
MN E-Health Report:  
Clinical Laboratories 2011  
Exchange

For clinical laboratories reporting using either LOINC or SNOMED codes on lab reports, five laboratories (4%) are using both LOINC and SNOMED. Seventy-two percent of the clinical laboratories (97) are not using LOINC or SNOMED.



\*16 laboratories using only LOINC and 16 using only SNOMED; \*\*include missing/don't know  
Source: Minnesota Department of Health, Office of Health Information Technology,  
MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)  
Response Rate: 93% (151 of 163)

# MN Clinical Labs Plans to Use LOINC and SNOMED Codes (N=113)

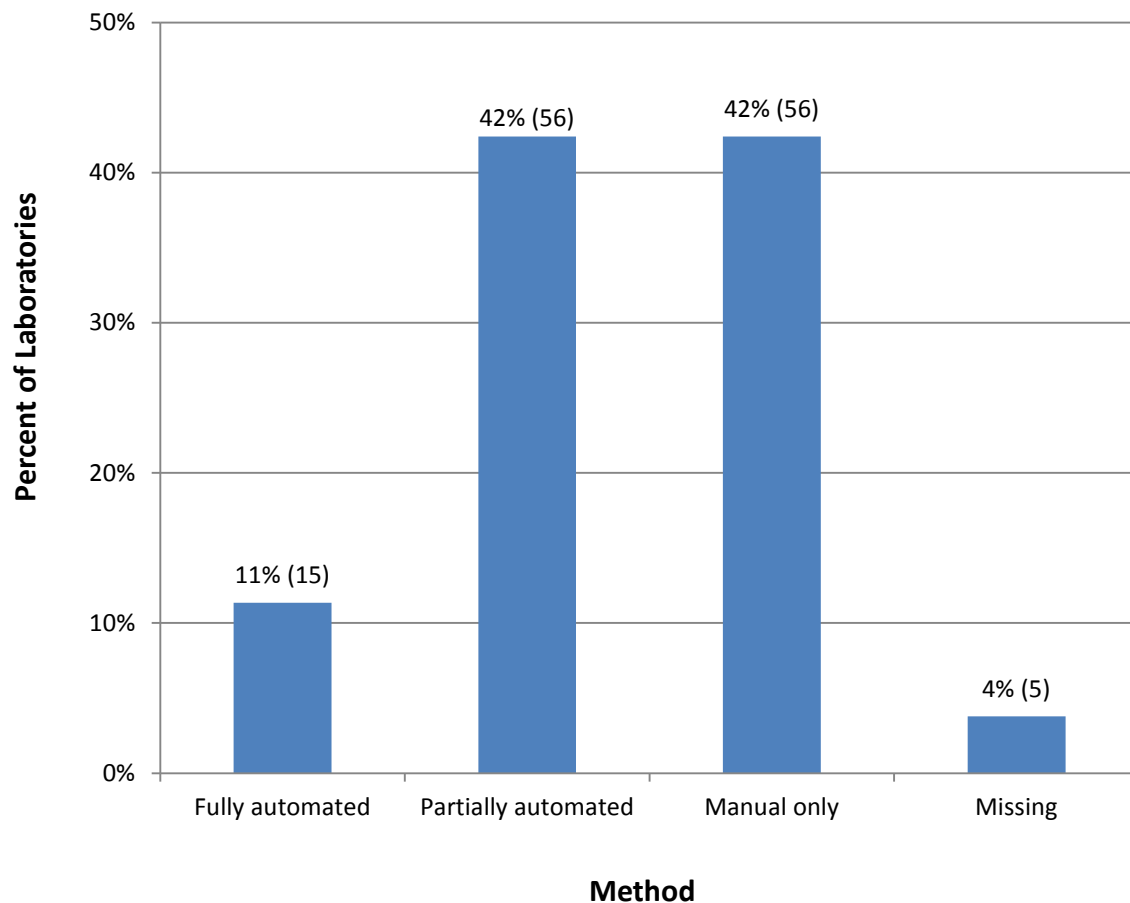


Within the next 3 years, 63% of the clinical laboratories (71) plan to use LOINC while 20% (23) plan to use SNOMED.

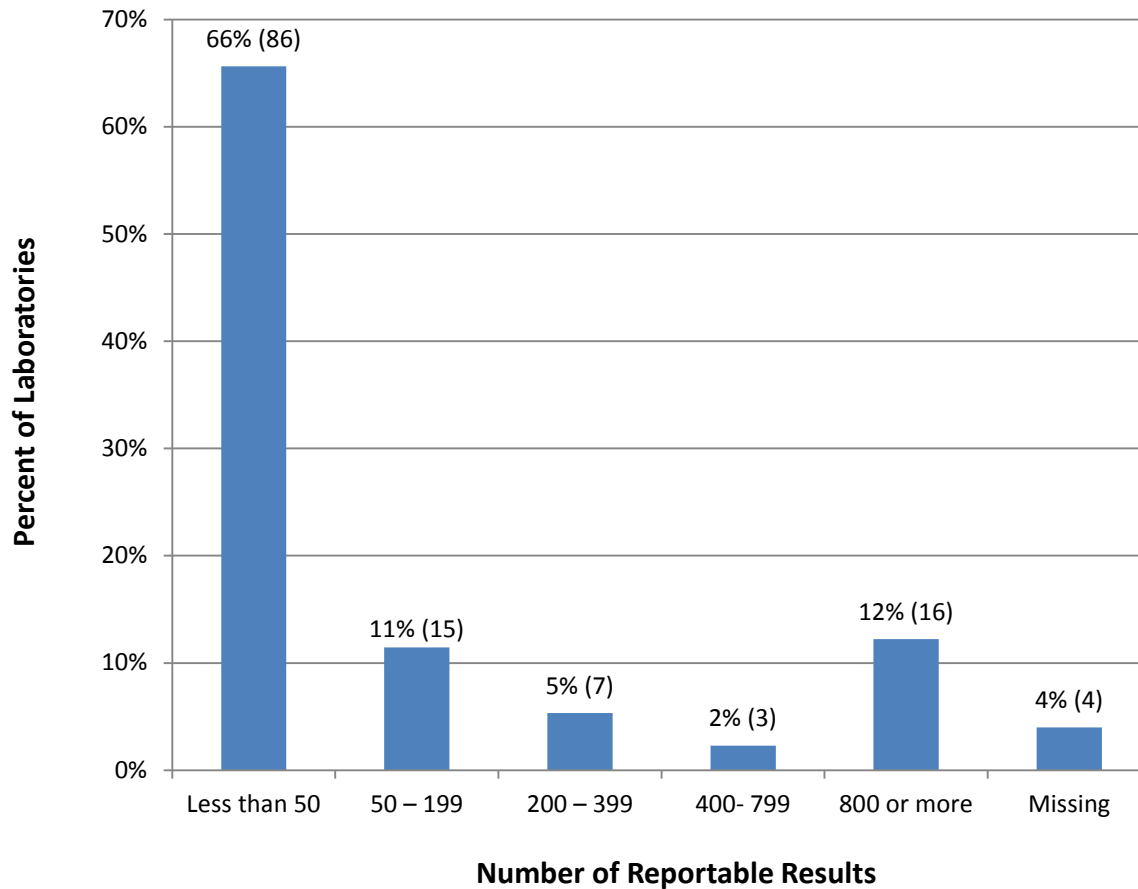
# Method Used by MN Clinical Labs to Identify Minnesota Reportable Lab Results (N=132)

MN E-Health Report:  
Clinical Laboratories 2011  
MN Reportable Lab Results

Eleven percent of the clinical laboratories (15) use fully automated processes to identify Minnesota reportable lab results. For more information on Minnesota reportable lab results go to <http://www.health.state.mn.us/divs/idepc/dtopics/reportable/disease.html>



# Number of Minnesota Reportable Lab Results Identified by MN Clinical Labs in 2010 (N=131\*)



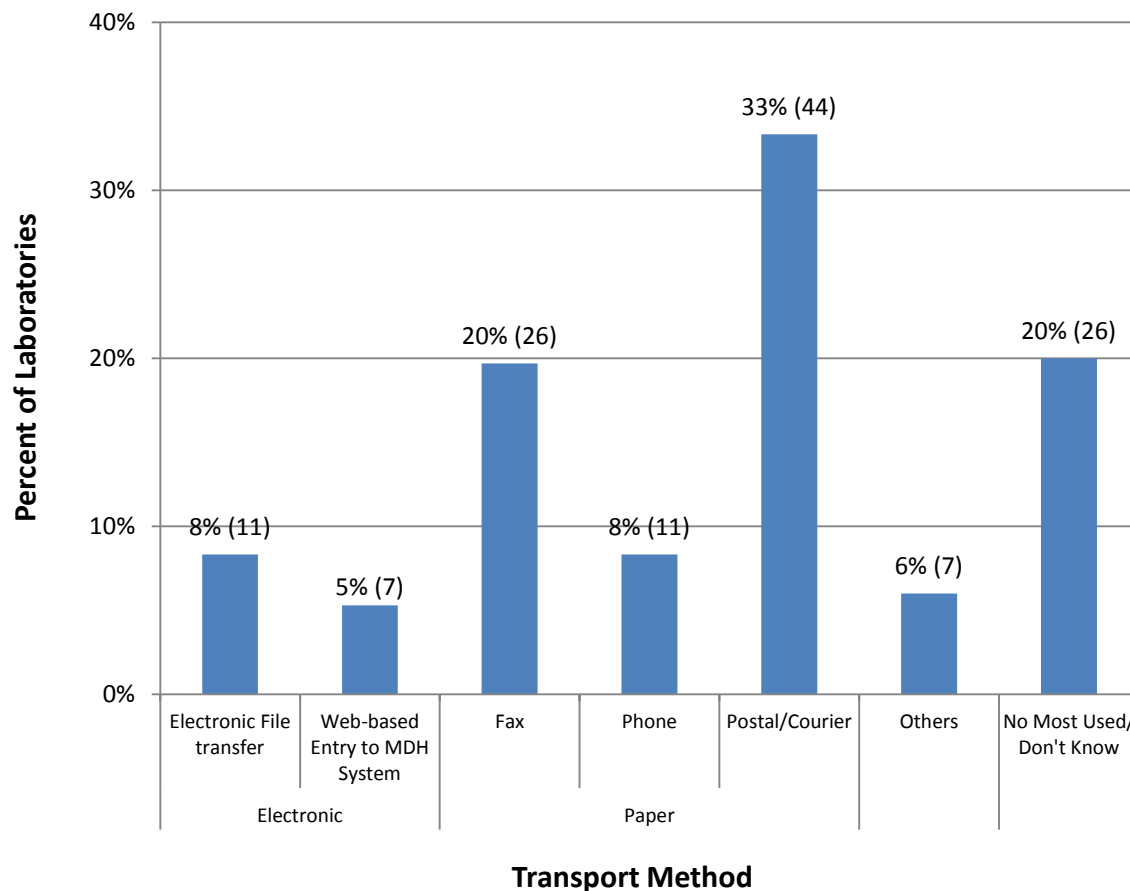
Twelve percent of the clinical laboratories (16) identified 800 or more Minnesota reportable lab results in 2010. Two-thirds (86) identified less than 50 in 2010. Of these 86, 73% (63) are critical access hospital labs.

\*2 hospital laboratories reported a combined number of reportable results  
Source: Minnesota Department of Health, Office of Health Information Technology,  
MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)  
Response Rate: 93% (151 of 163)

# Transport Method<sup>†</sup> Most Used by Each MN Clinical Lab to Send Reportable Lab Results to MDH in 2010 (N=132\*)

MN E-Health Report:  
Clinical Laboratories 2011  
MN Reportable Lab Results

Thirteen percent of clinical laboratories (18) used electronic methods to send reportable lab results to MDH.



<sup>†</sup>the method that a laboratory used the most and this method must be used more than 50% of the time.

\*6 laboratories specified their reference laboratory reported MN reportable lab results on their behalves; 1 laboratory indicated using email;

14 laboratories did not use any method more than 50% of the time (no most used); 12 missing/don't know

Source: Minnesota Department of Health, Office of Health Information Technology,

MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)

Response Rate: 93% (151 of 163)

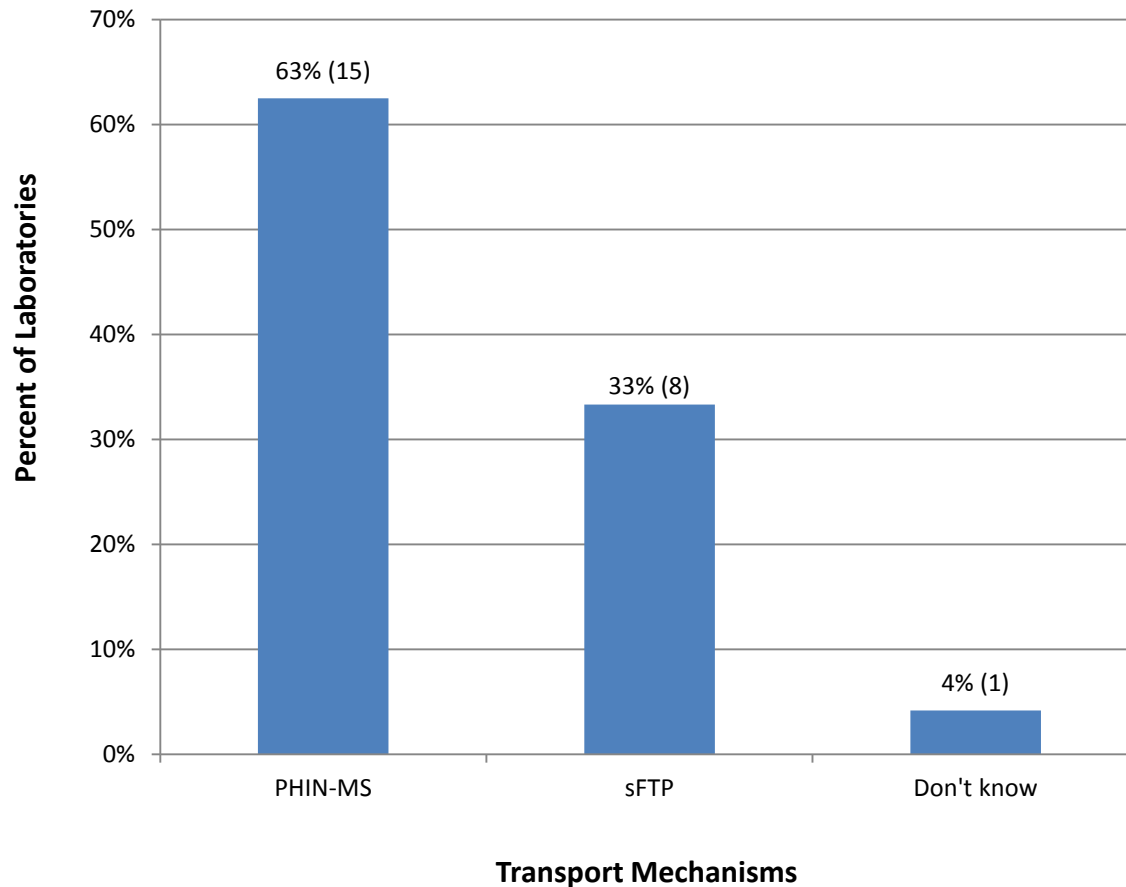


# Transport Mechanisms for MN Clinical Labs Using Electronic File Transfer to Send Reportable Lab Results to MDH (N=24)

MN E-Health Report:  
Clinical Laboratories 2011  
MN Reportable Lab Results

Of 24 clinical laboratories using electronic file transfer to send reportable lab results to MDH, 63% (15) use PHIN-MS.

PHIN-MS = Public Health Information Network Messaging System  
sFTP = secure File Transfer Protocol



# Top Challenges to Implementing Standards-Based Electronic Orders and Results Delivery Identified by MN Clinical Labs (N=133\*)

Exchange Challenges	Percent & Number
Competing priorities	49% (65)
Lack of funding to implement/build/upgrade LIS	32% (43)
Lack of access to technical support or expertise	25% (33)
Unclear value on investment or return on investment	23% (31)
Insufficient information on exchange options available	14% (19)
LIS does not support LOINC, SNOMED codes	9% (12)
Capabilities of others to receive electronic data unknown or not as proficient as our organization	8% (10)

The most common challenges to standards-based electronic orders and results delivery are:

- Competing priorities
- Lack of funding to implement/build/upgrade LIS
- Lack of access to technical support or expertise

# LIS-Related Workforce Needs of MN Clinical Labs (N=133\*)

Workforce Needs	Percent & Number
Workforce and services to map test names and test results to LOINC and SNOMED codes	34% (45)
Laboratory persons who bridge knowledge between IT and lab (laboratory informaticians)	30% (40)
People to help modernize an LIS to enable standards-based exchange of electronic orders and results delivery	17% (23)
Computer/IT personnel	17% (23)
A person to lead the implementation/upgrade of the LIS	14% (19)
People to train staff on how to use the LIS	14% (18)
People to help design, customize, and/or maintain an LIS for use in our clinical laboratory	12% (16)

Clinical laboratories' greatest workforce needs are to have workforce and services to map test names and test results to LOINC and SNOMED codes, and to have laboratory informaticians to bridge knowledge between IT and lab. Twenty-eight laboratories (21%) indicated no workforce needs.

\*4 laboratories did not answer; 28 laboratories had no workforce needs.  
Source: Minnesota Department of Health, Office of Health Information Technology,  
MN Clinical Laboratory Survey of Readiness and Needs for Electronic Health Information Exchange (2011)  
Response Rate: 93% (151 of 163)

## Appendix | Methods

MDH Office of Health Information Technology and MDH Public Health Laboratory (PHL) partnered to develop and implement a survey tool to assess clinical laboratories in Minnesota. An advisory group with 10 members representing laboratory, hospital, epidemiology, and public health from inside and outside MDH was established to provide comments and guidance throughout the study from January – October 2011.

A clinical laboratory was defined as a facility where moderate or high complexity tests are performed on human specimens for health assessment of a patient.

A computerized clinical laboratory information system (LIS) was defined as a software system used in a clinical laboratory to computerize laboratory business processes such as test processing, test scheduling, specimen and sample tracking, inventory control, reporting, quality control and quality assurance management, and statistical analysis and surveillance.

163 facilities selected were all Minnesota licensed hospitals (152), MDH PHL and a large county public health laboratory, reference laboratories (4), and large clinic laboratories (5). Six of these facilities of varying size were subsequently selected to pilot test the survey tool.

An invitation email with link to both paper and online surveys was sent to lab directors/managers/supervisors from the database managed by MDH PHL. Before participants completed the survey online, they were encouraged to print the survey, review the content, and consult with IT staff or software vendor regarding some of the technical questions.

The survey was administered online during May to August 2011. Four follow-up emails sent approximately every two weeks as well as phone calls were used as methods to increase the response rate.

# Appendix | Methods (cont.)

## 2011 Minnesota Clinical Laboratory Survey Response Rate

Number of Facilities	Number of Respondents	Response Rate
163	151	93%

Fourteen hospitals including all nine community behavioral health hospitals responded that they did not have a clinical laboratory onsite and were excluded from the analysis.

The analysis was based on 137 clinical laboratories. Three of these laboratories completed only a lab characteristic section while one completed all except for sections of Minnesota reportable lab results, challenges, and workforce needs.

Definition of most used methods and most used codes for each MN clinical lab (pages# 13, 14, 18, 19, and 24) was defined as the method that a laboratory used the most and this method must be used more than 50% of the time.

## Classification of questions related to transport methods and coding standards used by each MN clinical lab

In these questions, laboratories were asked to specify a proportion used by each method or each coding standard.

A proportion was categorized by

- None
- < 10%
- 10 – 29%
- 30 – 49%
- 50 – 69%
- 70 – 89%
- ≥ 90%

Proportions of all the methods or coding standards used should add up to around 100%. Laboratories that the proportions added up to less than 70% were classified as missing/don't know.

# Appendix | Acknowledgements



The author wishes to acknowledge:

## **Advisory Group Members**

- Patricia Bertschinger
- Kathy Como-Sabetti
- Donald Connelly
- Kathy Hansen
- Lisa Haugen
- Anne Schloegel
- Asa Schmit
- Mark Sonneborn
- Tamara Winden
- Patina Zarccone-Gagne

## **Project Team Members**

- Jennifer Adams
- Chris Brueske
- Kari Guida
- Vipat Kuruchittham\*
- Martin LaVenture
- Paulette Schlichter
- Paula (Snippes) Vagnone
- Carrie Wolf
- Matthew Zerby

\*Vipat (Pat) Kuruchittham was a lead on this survey of clinical laboratories. He was the first CDC Public Health Informatics Field Fellow assigned to the Office of Health Information Technology, Minnesota Department of Health, from December 2011 – 2012.

# Appendix | Definitions, Resources

Terms used in the report are defined in the e-Health glossary found at:

[www.health.state.mn.us/e-health/glossary.html](http://www.health.state.mn.us/e-health/glossary.html)

More information on e-health assessment and activities in Minnesota can be found at:

[www.health.state.mn.us/e-health/assessment.html](http://www.health.state.mn.us/e-health/assessment.html)

