

Benefit Document

Laboratory Specimen Receipt and Tracking Process

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Executive Summary of the Initiative and Benefits

The goal of this initiative is to streamline various processes in the Oregon State Public Health Laboratory (OSPHL). OSPHL provides testing of medical specimens for local Health Departments, hospitals and clinics primarily for communicable diseases such as chlamydia, HIV, flu and swine flu, tuberculosis and other illnesses such as salmonella poisoning. Streamlining lab processes will reduce turnaround time for test results, thus speeding medical decision making by clinicians and helping prevent the spread of disease through faster communication of accurate information. Streamlining also provides for increased lab testing capacity and more manageable staff workloads, allowing FTE redeployment to other critical program needs. This initiative was split into three independent events, with the first focusing on OSPHL's specimen receipt process, the second (joint with the Dept. of Environmental Quality Lab) on accrediting outside labs for environmental work and the third is currently planned to be OSPHL specimen processing in the Virology and Microbiology labs. This document covers only the first event; the other two events will each have their own separate benefits documentation.

At the time of the event, OSPHL could not track specific specimens until they were processed in one of the Lab's Sections because specimens were not individually inventoried at point of receipt by the OSPHL Operations section. This caused issues with quality control and problem resolution, such as mislabeled or unlabeled specimens. Additionally, many of the specimens were delivered by the U.S. Postal Service, which imposes additional packaging regulations and can add to the transit time until specimen receipt at OSPHL.

To address these issues, and also improve turnaround time and overall customer service, a RPI event team designed a new specimen receipt process to make optimum use of a previously-planned courier system¹. The courier picks up specimens from local health departments and other clinics and delivers them directly to OSPHL. The team set standards for the courier and redesigned test requisition forms to include barcode labels that are applied to specimens and tracked through an enhanced IT system. The team also added a shipping manifest to track specimens from point of receipt by the courier from a medical facility. The courier system reduces transit time for specimens to OSPHL and also reduces packaging requirements for both OSPHL and its partners. Specimen barcoding and implementation of a shipping manifest reduces various types of specimen

¹ Although the courier system was previously planned, the final decision to implement it had not been made prior to the RPI event. The event developed the processes used in planning, implementing and operating the courier system thus the costs and benefits of the courier system are included in this document.

errors and more quickly identifies any errors that might still exist. Full implementation of the new process was on hold for several months due to Request for Proposal requirements by DAS and DOJ. The courier was finally implemented in August 2009.

The primary purpose of the courier system is to improve customer service and it is meeting this goal. Since implementing the courier, 7.7% of specimens (about 635 monthly) are received one day sooner than under the old process, providing quicker test results to clinicians. Additionally, the error rate for mislabeled or unlabeled specimens was reduced from 0.22% to 0.05% or from about 16 errors per month to 4. 75% of courier clients report being satisfied with the new process and Oregon improved its rating on a national Emergency Health Preparedness scale, meeting 8 of 10 key indicators.

The cost of the courier is estimated at \$180,000 annually for OSPHL and there was a one-time capital expense of \$2,700 for barcode scanners. These costs are partially offset by an estimated \$7,138 reduction in direct OSPHL costs for shipping empty specimen cans to clinicians, which amounts to about 4% of the contract cost. OSPHL staff touch-time benefits from the new process are estimated at about 190 hours annually (0.09 FTE, redeployable) with a value of \$5,844. The courier is also estimated to save local health districts and other courier clients about \$57,630 in specimen shipping costs. In the judgment of the OSPHL Director, the benefits of faster turnaround time, reduced errors, maintaining specimen integrity and increased customer satisfaction are worth the costs incurred in implementing and providing the courier service.

Redeployment Plan

The estimated \$7,138 savings from shipping empty specimen cans will be reinvested as a partial offset to the courier contract cost.

The 0.09 FTE of staff time savings (value of \$5,844) is in the OSPHL Operations section and has been redeployed within the section to specimen kit preparation and improved inventory tracking.

The \$57,630 annual savings to our external partners is not included in this redeployment plan.

Improvement Summary

- **Added a courier** to improve transit and turnaround time and allow the Lab to assume responsibility for the specimens when they are picked up from the clinic instead of when they arrive as OSPHL. The courier also eliminates additional packaging required when sending through the mail.
- **Developed a standardized test requisition form** that includes Lab section identification and pre-printed bar codes that are placed on individual specimens and tracked with an updated IT solution. This tracking system maintains compliance with federal regulatory requirements.
- **Created a shipping manifest** that standardizes the process for clinicians to submit specimens to OSPHL. The manifest process includes a matching barcode and essential patient information for each specimen

submitted. The manifest also includes the submitter name and date, preparer name and date, and specimen state.

- **Enhanced error identification** through the barcode tracking on specimens and manifests, allowing both clinicians and OSPHL staff to more rapidly identify and correct errors.
- **Reduced use of specimen shipping cans** which are required only when sending specimens through the U.S. Mail. This reduces staff touch-time for the extra processing required by the cans and also reduces costs for shipping empty cans to clinics for reuse.

Benefit/Outcome Description

PHD expects the following outcomes:

Cost Savings/Productivity²:

- The net annual cost to OSHPL for the courier services is estimated at \$175,562 from September 2009 through August 2010 and \$172,862 in following years to provide the courier service:
 - The cost of the courier service is \$15,000 per month, or \$180,000 annually.
 - There was a one-time cost of \$2,700 to purchase nine barcode scanners, which will be amortized over the first year of benefits tracking.
 - We project a 75% decrease in the cost to OSPHL for shipping empty specimen cans to health services providers of \$7,138 per year, resulting in an offset of 4.0% of the courier contract.
- There is an 87% decrease in the amount of staff time spent processing incoming specimen cans to 190 hours annually (.09 FTE redeployable, value of \$5,844), exceeding the reduction target of 75%.
- The courier decreases shipping costs borne by local health districts and other clinicians, since they do not have to pay postage for sending specimens to OSPHL. This savings is estimated at \$4,800 a month across the 57 clinics served by the courier for an annual savings of \$57,360. This is a substantial benefit to our partners, allowing them to reinvest county and nonprofit operating budget dollars into other program needs³.

Service:

- OSPHL receives 7.7% of all chlamydia specimens (about 386 specimens monthly) one day sooner than under the old process, resulting in faster test results. This same percentage should apply to other specimens, since the courier transports all specimen types. Thus approximately 635 test results a month

² There were no significant capital expenditures for this event, aside from the listed purchase of barcode scanners and ongoing courier costs. The staff time needed to develop and implement the event and solutions was not tracked at the time (there was no suggestion that we do so then) and is unable to be easily estimated at this point. The new test requisition forms were a redesign of existing forms and the new forms were not implemented until after existing stock was depleted. The new manifest is simply a Word template which was emailed to our partners.

³ There may be some minor touch-time savings to our partners because of reduced packaging requirements when using the courier, but it would be difficult and time-consuming to measure this.

are received one day sooner in the new process. This speeds medical decision making by clinicians and helps prevent the spread of disease through faster communication of accurate informationⁱ.

- There is a 50% reduction in specimen cycle time from the OSPHL Operations section to the Lab section (from 4.0 minutes to 2.0 minutes) exceeding the original RPI target of 20% improvement. Although the Operations cycle time improvement is a very small part of the overall cycle time (specimen collection at clinic to receipt of test results) it does indicate improved process flow through the Operations section.
- 62% of local health districts and other clinics report that the courier service has improved the turn-around time of patient test results in a December 2009 courier customer survey.

Quality:

- The new process reduced the number of missing test requisitions, missing specimens, unlabeled or mislabeled specimens or wrong specimen kits from 0.22% to 0.5% or from about 16 errors per month to 4. This improvement directly supports more effective and timely medical decision making.
- There is improved maintenance of the desired specimen state (temperature, etc.), reducing the possibility of insufficient specimen quality to perform accurate testing.
- The new process meets updated accreditation and regulatory requirements by tracking specimens from the point of pickup.
- 75% of local health districts and other clinics served by the courier responded with a rating of 4 or 5 to the following satisfaction question on a December 2009 courier customer survey: "On a scale of 1 - 5 (5 being the highest), how would you rate the courier service's positive effect on your facility operations?"
- Oregon improved its rating on a national Emergency Health Preparedness scale by providing 24/7 lab service in emergency situations. Oregon now meets 8 out of 10 key indicators (up from 7 out of 10 in 2008) in ratings by the *Trust for America's Health* and *Robert Wood Johnson Foundation*ⁱⁱ.

People:

- OSPHL supports clinicians in providing timely and appropriate treatment to patients by providing accurate test results more quickly, which should reduce the direct impact of the illnesses.
- Clinicians can also implement disease prevention protocols more quickly, including partner notification for sexually-transmissible infections (STIs). The Centers for Disease Control and Prevention (CDC) recommends partners of patients with STIs be notified as soon as possible and that this notification and treatment is expected to reduce STI transmission and incidence, and associated health care costs.^{i, iii}
- Although not directly measured for this event, anecdotal information supports improved partner relationships:
 - Between OSPHL and its partners by providing faster turnaround services and increased client satisfaction; and
 - Within local public health networks as private clinicians have more frequent contact with their local public health offices when bringing specimens there for delivery to OSPHL.

Baseline Information

Baseline data were collected for cycle time, touch-time and error rates as listed below:

- Cycle time was measured using information from existing OSPHL databases. These systems capture information on each specimen including (among other things) the date the specimen was taken from the patient by the clinician and the date the specimen was received at OSPHL. The difference between these two dates is the specimen cycle time from the patient to receipt at OSPHL and is a target for improvement by the new process. Chlamydia is the single largest specimen type affected by the courier service and was used for cycle time data. The baseline period was August through November 2008 and the average number of days from specimen collection until receipt at OSPHL was 1.6 days.
- Touch-time baselines were calculated for specimen can processing:
 - The specimen can count baseline was collected from existing incoming specimen logs and counted for the six months prior to the courier implementation, from February through July 2009. The total count was divided by six yielding an average monthly can count of 2,009.
 - Specimen can touch-time time was calculated at .5421 minutes per can by taking video of OSPHL staff during actual can handling and taking the average of: 1) Additional time required for staff to remove specimens and requisitions from cans and make them available for further processing; and 2) Time needed for examining, sorting, storing and packaging cans for reuse.
- Error rates were calculated using information from existing OSPHL databases. The RPI team determined that the error types expected to be improved by the new process are: Missing test requisitions; missing specimens; unlabeled specimens; mislabeled specimens; and wrong specimen kits, such as sending a chlamydia sample with an HIV test requisition form. The baseline period was January through October 2008 and there were 229 of the above error types out of 101,786 total specimens received, for an error rate of 0.22%.

There were no baseline measurements made of customer service, due to limited preparation time prior to the event.

Logic Description

Cost Savings/Productivity

The primary purpose of the RPI was to improve quality and customer service by implementing a courier service. The event was designed to minimize added costs, but not produce overall cost savings. By using a courier OSPHL adds direct costs for the courier contract. This is partially offset by savings from reducing OSPHL costs for sending specimen cans (required when sending specimens through the U.S. Mail) to clinicians. In addition, the courier reduces or eliminates shipping costs borne by local health districts and other clinics to send specimens to OSPHL because they are picked up by the courier. The table below shows those costs and savings separate for OSPHL and its partners. Detailed calculations are in the attached data spreadsheet.



Benefit Documentation

Direct Costs / Savings to OSPHL	Annual Cost / Benefit
Courier contract expense to OSPHL	\$180,000
One-time capital purchase of 9 barcode scanners, amortized through first year	\$2,700
Specimen can shipping cost savings to OSPHL	(\$7,138)
Net Estimated Annual Cost, OSPHL: August '09 – July '10	\$175,562
Net Estimated Annual Cost, OSPHL: Ongoing	\$172,862
Direct Savings to OSPHL Partners	
Specimen shipping cost savings to local health districts and other clinics ⁴	(\$57,630)

Assumptions:

- Courier contract invoices will remain constant at \$15,000 monthly.
- OSPHL specimen can shipping cost savings will continue improving to the target of \$7,138 from the monthly average savings to date of \$4,554 by continued monitoring of the metric and making process adjustments where appropriate.

In addition to the direct costs and savings to OSPHL and its partners, OSPHL will also realize staff time savings due to touch-time reductions in the specimen receipt process. This is due to a reduction in the use of specimen cans, which were required in the old process using the U.S. Mail⁵.

Specimen cans add additional time in the OSPHL Operations and Lab sections for removing specimens and requisitions from the cans for further processing and processing the empty cans for reuse. As noted in the baseline section, touch time was measured at .5421 minutes of staff time for each specimen can. Therefore annual specimen can touch-time is calculated by: (Monthly cans handled) x (average handling time per can *or* .5421 minutes) x 12 (months) / 60 (to convert minutes to hours). Savings are the difference between time under the new process and the baseline. These are shown in the table below.

OSPHL Touch-Time Savings	Monthly Count	Estimated Annual Hours / \$	FTE
Specimen can processing – Baseline	2009	218	.10
Specimen can processing – Actual (Oct-Dec '09 average)	260	28	.01
Net specimen can processing estimated savings, time	(1749)	(190)	(.09)
Net specimen can processing estimated savings, \$		(\$5,844)	

⁴ Shipping savings for local health districts and other clinics was calculated from a survey conducted in December 2009. Specific calculations are in the data spreadsheet and averaged \$4,802.50 per month or \$57,360 annually.

⁵ The RPI team also tracked error resolution processing time, to see if there might be touch-time savings there. There were very minor savings, estimated at about 16 minutes per month. Because the benefit is very small, continued tracking and reporting would likely exceed the benefit value, so it will not be included in the expected benefits or metric tracking. See the data spreadsheet for specific calculations on this item.

Assumptions:

- Touch-time savings are calculated at \$30.82/hour, from the McKinsey fully loaded figure for DHS: \$64,105 divided by 2,080 hours annually.
- FTE calculations are based on 2,080 work hours annually.

Service

The courier service provides overall faster specimen delivery to OSPHL because items delivered by courier tend to arrive in the same or next day, compared to next day or later when sent through the U.S. Mail. Because specimens are received more quickly at OSPHL, they can be analyzed and results reported more quickly.

Detailed calculations are included in the attached spreadsheet but on average, 7.7% of all chlamydia specimens are received at OSPHL one day sooner after implementing the courier service. Because the courier delivers all specimen types, this same percentage should apply to other specimen types, for an estimate of 635 specimens per month received 1 day sooner.

Specimen Types	Monthly specimen count	Specimens received 1 day sooner
Chlamydia	4987	386
All specimens, including chlamydia (estimated)	8205	635

The RPI team also expected 20% faster processing of specimens through the Operations section, which is the time from specimen receipt at the OSPHL facility in Hillsboro until delivery to the appropriate OSPHL Lab section. This faster cycle time results from having less packaging to handle than when shipments arrive through the U.S. Mail. Specifically, there is a reduction in disposable shipping packs⁶ that required opening, removing all contents and then discarding, as well as the reduction in handling specimen cans, as detailed in the cost savings section.

OSPHL Operations Section Cycle Time, Average Per Shipment	Time in Mins.
Baseline Measure (Nov. '08)	4.0
Actual Measure (Oct-Dec '09)	2.0
Percent Reduction (20% target)	(50%)

⁶ Although not tracked (because it was expected to be a small amount) there are some touch-time savings from reduced use of the disposable shipping packs, which needed to be autoclaved and then disposed of. Additionally the disposable bags were replaced with reusable shipping containers, reducing environmental impact.

Quality

The RPI team expected to reduce several types of errors by: a) Redesigning of the test requisition form to include barcode labels that are peeled off and applied directly to the specimen containers; and b) Adding a shipping manifest using additional specimen peel-off barcode labels. These changes help clinicians ensure that all specimens shipped to OSPHL are labeled and have a matching requisition form. This was expected to result in a reduction in the following types of specimen errors:

- Missing test requisitions;
- Missing specimens;
- Unlabeled specimens;
- Mislabeled specimens; and
- Wrong specimen kit (i.e. sending a chlamydia sample with an HIV test requisition form).

Specimen Error Reduction	Specimens with errors	Total specimen count	Error %
Baseline (Jan-Oct '08)	229	101,786	0.22%
Actual (Dec '09); RPI target of .05%	4	7,428	0.05%

People

When specimens are delivered more quickly to OSPHL, the Lab can perform the analysis and provide test results to clinicians more readily, as documented in the Service section. This allows clinicians to more quickly treat individual patients as well as implement disease transmission protocols in cases of communicable illnesses. Faster treatment should also reduce amount of time that individuals are ill, thus reducing personal and social costs (sick leave used, nonproductive work days, health care expenditures, etc.) due to direct illness.

Since most testing under this RPI is for sexually-transmitted infections, faster reporting of test results should allow for quicker partner notification and treatment, which is expected to reduce further STI transmission and incidence and associated individual and social health care costs.^{i, iii}

There are no metrics identified to specifically track people benefits from this event.

Sustainability Plan (June 1, 2009 though May 31, 2010)

The RPI team lead completes a tracking log each month containing the total number of specimens received, the specimen error rate, the specimen can count and outgoing specimen can shipping costs. The lead monitors these metrics and works with the appropriate OSPHL section to make adjustments to the process or perform user intervention as needed to ensure continued progress towards metric targets.

Ongoing Metrics

On a monthly basis, the RPI Team lead reports the total number of specimens received, the specimen error rate, the specimen can count and the specimen can shipping costs to the PHD Transformation Team, who will forward those metrics to PMO.

- The total number of specimens can be multiplied by 7.7% to calculate the number of specimens received one day sooner with the new process.
- The specimen error rate can be compared to previous months.
- The specimen can count can be multiplied by .5421 (minutes per can) then divided by 60 to calculate the hours saved in specimen can handling for the month. This can be multiplied by \$30.82 (McKinsey hourly figure) to calculate the value of the time saved.
- The actual monthly specimen can shipping cost can be subtracted from the baseline cost of \$793 to calculate the monthly savings.

Annualized Projection Amount

- The annualized project cost of the courier contract is \$180,000.
- There is a one time cost of \$2,700 for barcode scanners amortized across the first reporting year.
- The annualized projected dollar savings for specimen can shipping costs are \$7,138.
- The annualized projected dollar amount for specimen can touch-time savings is \$5,844.

Attachments:

- Data Spreadsheet
- Reinvestment Plan
- Business Case

References:

Surveys – customer/client: Included in data spreadsheet.

Reports – internal/external: Included in end-notes below.

Web links: See end-notes below.

ⁱ *Recommendations for Partner Services Programs for HIV Infection, Syphilis, Gonorrhea and Chlamydia Infection*, Morbidity and Mortality Weekly Report, November 7, 2008, Volume 57, Number RR-9. Available at www.cdc.gov/mmwr/.

ⁱⁱ *Ready or Not? Protecting the Public's Health from Diseases, Disasters, and Bioterrorism* report, available at www.healthyamericans.org or www.rwfj.org.

ⁱⁱⁱ *Expedited Partner Therapy for Chlamydia and Gonorrhea*, CD Summary, December 8, 2009, Volume 58, Number 24, available at www.oregon.gov/DHS/ph/cdsummary/.