Laboratory System Improvement Program Report

Colorado State Public Health Laboratory

May 24, 2024

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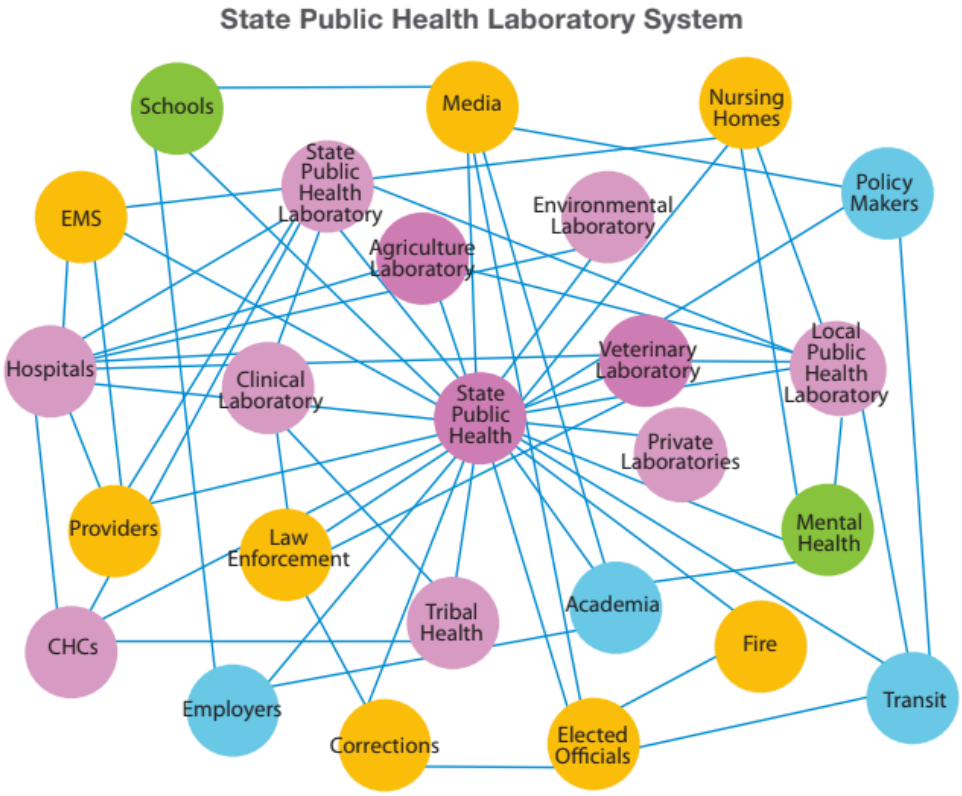
Executive summary

The Colorado State Public Health Laboratory (CSPHL) hosted an event on April 24, 2024 as part of the Laboratory System Improvement Program (L-SIP). It brought together stakeholders of the public health laboratory system to undergo performance evaluation and discuss system improvements. The system consists of all the participants in public health testing, including those who initiate testing and those who ultimately use the test results. The system includes individuals, organizations and agencies that are involved in assuring that laboratory data support the 10 Essential Public Health Services.



At the event, 40 participants from CSPHL, local public health agencies, utilities, animal control, Colorado Department of Public Health and Environment (CDPHE), clinical labs, wastewater treatment facilities, and other partners (Appendix C) came together to discuss the public health laboratory system. Stakeholders rated the system's performance of the 10 Essential Public Health Services, as defined by the Centers for Disease Control (CDC). The services are:

1. Assess and monitor population health status, factors that influence health, and community needs and assets
2. Investigate, diagnose, and address health problems and hazards affecting the population
3. Communicate effectively to inform and educate people about health, factors that influence it, and how to improve it
4. Strengthen, support, and mobilize communities and partnerships to improve health

5. Create, champion, and implement policies, plans, and laws that impact health
6. Utilize legal and regulatory actions designed to improve and protect the public's health
7. Assure an effective system that enables equitable access to the individual services and care needed to be healthy
8. Build and support a diverse and skilled public health workforce
9. Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement
10. Build and maintain a strong organizational infrastructure for public health

Performance was rated on a rubric established by the Association of Public Health Laboratories (APHL). Ratings may be viewed in the results section of this report.

Overall, the public health laboratory system was determined to be functioning at a "significant" level to achieve the essential services. Some areas were identified as moderate, most were identified as significant, and a few were identified as optimal. No scores fell below the moderate rating.

Successes of the system were identified, namely:

- Statewide courier service for sample transportation
- Outbreak response
- Surveillance testing
- Communication among leadership roles

Common themes were identified across the various discussions that were in most need of improvement:

- Education and training
- Communication for the entire public health laboratory system
- Support for rural communities
- Hiring and retaining a qualified workforce
- Utilizing testing capacity of regional labs

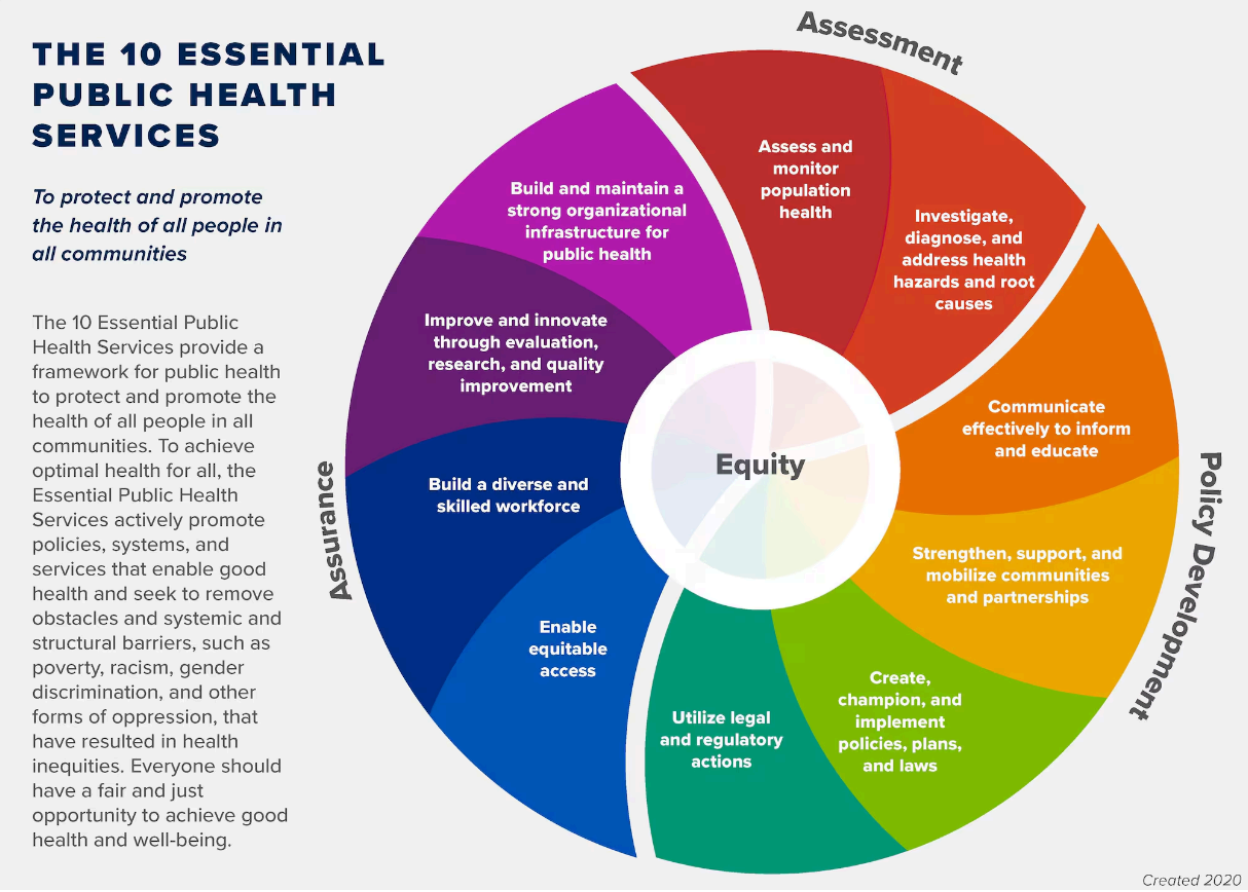
CSPHL will utilize this feedback to guide strategic planning. Overall, the discussion highlighted the desire for a more informed, collaborative, and efficient public health laboratory system through targeted education, training, and communication initiatives. There's a call for more frequent updates, meetings, and seminars to disseminate information within the lab system and explore opportunities for enhanced collaboration among facilities, with more tailored support requested by rural partners. More details on how these improvements can be accomplished are found in the following report.

Introduction

The CSPHL hosted its first kick-off event on April 24, 2024 as part of the Laboratory System Improvement Program. The L-SIP is an initiative of the Association of Public Health Laboratories (APHL). It is intended to bring together stakeholders of the public health laboratory system to undergo performance evaluation, discuss system improvements, and perform periodic evaluation and reassessment.

At the event, 40 participants from CSPHL, local public health agencies, utilities, animal control, Colorado Department of Public Health and Environment (CDPHE), clinical labs, wastewater treatment facilities, and other partners (Appendix C) came together to discuss the performance of the public health laboratory system. This was accomplished by following APHL's guidance and agenda (Appendix A):

- Participants were split into three groups.
- Each group was led by a facilitator from another public health lab.
- Each group rated the system's performance of three Essential Public Health Services, as defined by the Centers for Disease Control (CDC), with one discussed as a whole group:



Results

Scoring guidelines: The L-SIP assessment used the following scoring definitions as provided by APHL.

None	0% or absolutely none of the performance described is met within the public health laboratory system.
Minimal	Greater than zero, but no more than 25%, of the performance described is met within the public health laboratory system.
Moderate	Greater than 25%, but no more than 50%, of the performance described is met within the public health laboratory system.
Significant	Greater than 50%, but no more than 75%, of the performance described is met within the public health laboratory system.
Optimal	Greater than 75% of the performance described is met within the public health laboratory system.

Summary of scores

Essential Service #1	Score
Key Idea 1.1.1	Significant
Key Idea 1.1.2	Optimal
Key Idea 1.1.3	Significant
Essential Service #2	
Key Idea 2.1.1	Significant
Key Idea 2.1.2	Significant
Essential Service #3	
Key Idea 3.1.1	Significant
Key Idea 3.1.2	Moderate
Essential Service #4	
Key Idea 4.1.1	Significant
Key Idea 4.2.1	Significant
Key Idea 4.3.1	Significant
Essential Service #5	
Key Idea 5.1.1	Significant
Essential Service #6	

Key Idea 6.1.1	Optimal
Key Idea 6.1.2	Significant
Essential Service #7	
Key Idea 7.1.1	Moderate
Key Idea 7.1.2	Moderate
Essential Service #8	
Key Idea 8.1.1	Moderate
Key Idea 8.2.1	Moderate
Key Idea 8.2.2	Moderate
Essential Service #9	
Key Idea 9.1.1	Significant
Key Idea 9.2.1	Moderate
Key Idea 9.2.2	Moderate
Essential Service #10	
Key Idea 10.1.1	Significant
Key Idea 10.1.2	Optimal
Key Idea 10.1.3	Moderate

A more detailed breakdown of the scoring, and all applicable notes and feedback, can be found in Comprehensive feedback and scores.

Successes

The discussion highlighted several areas where the public health laboratory system is performing well:

Courier system

- After an L-SIP performed in 2013, the attendees determined that a state-wide courier system for sample transportation was needed for the public health laboratory system to enhance its overall performance.
- The courier system was expanded significantly during the COVID-19 response, and has recently received more stable funding to continue as a permanent resource for the public health laboratory system.

Surveillance testing

- Partners said, “Sample submission with surveillance testing works seamlessly; reporting is done in a timely manner.” In general, partners in disease surveillance felt they receive a lot of support.
- New data systems (Horizon LIMS, LabOnline, EpiTrax) have made reporting quicker and easier to access.

Outbreak response

- CSPHL is able to quickly bring on new testing when needs arise. Mpox was specifically noted as a success between laboratory, epidemiology, and clinical partners.
- When CDPHE has been able to forecast a potential issue, steps are taken to ensure resources are available for an emergency response.

Communication with leaders

- Partners expressed that the monthly call with local public health agency directors is very helpful.
- Communications like HANs and other notices are distributed regularly to appropriate agencies, and important information is generally distributed effectively under the current system.
- The website has an abundance of information, but can be hard to navigate.

Needs and next steps

Common themes were identified in the various break-out group discussions. CSPHL will utilize this feedback to guide strategic planning.

Education and training

Needs identified:

1. Provide education and guidance to stakeholders and partners, particularly regarding awareness of the resources and services available, accessing results, guidance on appropriate sample transportation packaging, and clarity on regulatory processes.
2. Education and cross-training within epidemiology programs are highlighted as areas for improvement, with a particular focus on interpreting lab results. This will involve expanding training opportunities and enhancing communication across the PHL System.
3. Surge capacity of the Colorado State Public Health Laboratory (CSPHL), with more information beyond clinical testing to areas like chemistry and food testing.

Next steps:

1. To enhance outreach efforts, a Laboratory/Epidemiologist roadshow is proposed, aimed at engaging partners and stakeholders directly and providing them with information on services provided by the CSPHL.
2. Create training materials and/or guidance documents for sample submission.

Communication

Needs identified:

1. Improve communication to the general public about public health laboratory services.
2. Close gaps in communication flow, particularly regarding the dissemination of information from top-level executives to lower tiers. Some partners feel that smaller projects are overlooked, and specific communication to relevant groups could be improved. These gaps are felt especially strongly by rural partners.
3. Improve lab and CDPHE website.
4. Clarify the best points of contact for system partners to streamline communication channels.

Next steps:

1. Establish the lab coordinator team as the primary point of contact for CSPHL.
2. Gather feedback on website usability and ensure up-to-date materials.
3. Determine where communication channels already exist that can include information about lab operations, and where new communication channels need to be established.

Rural communities

Needs identified:

1. Challenges arise due to limited non-scheduled courier pickups, leading to delays in timely reporting, particularly in rural areas where pickups occur only once per week.
2. Improve the effectiveness of information dissemination to all areas of the state, particularly addressing gaps in information shared with western slope partners due to their distance from central hubs.
3. Improve distribution, storage, and monitoring of supplies throughout the state.

Next steps:

1. Establish stronger connections with rural facilities, potentially through the creation of a dedicated workgroup focused on assisting rural communities.

Workforce

Needs identified:

1. A lack of staffing and funds leads to increased workload and demand on existing employees. This lack is often combined with extended job vacancies and reliance on term-limited positions, resulting in service deficiencies, burnout, and difficulty attracting qualified candidates due to lower pay and benefits.
2. There is a lack of awareness among students about laboratory career opportunities.

Next steps:

1. Evaluate hiring processes.
2. Integrate lab and epidemiology training.
3. Expand cross-training programs to address skill gaps.

Testing

Needs identified:

1. Regional lab partners' capabilities are potentially underutilized.

Next Steps:

1. Assess the capabilities of laboratories and investigate methods for better sharing of equipment, expertise, and resources among system partners.
2. Create a central database of available resources and facilitate strategic discussions involving relevant stakeholders.

Comprehensive feedback with scores

A. Essential Service #1: Assess and monitor population health Status, factors that influence health, and community needs and assets.

Key Idea 1.1.1: The System identifies infectious disease and environmental sentinel events, monitors trends, and participates in state and federal surveillance systems.

Score: Significant

Strengths:

- Sample submission with surveillance testing works seamlessly; reporting is done in a timely manner.
- Couriers within the metro area are timely.
- Disease surveillance for system partners receives a lot of support from the state.
- For water testing, reporting out through the state is user friendly.
- Epitrax should resolve many issues about data being collected that's not being used.
- Everything is automated for wastewater testing which makes for a seamless experience for stakeholders.
- Courier has been very helpful in urban areas.
- LabOnline gives the ability to process more samples and enables successful reporting.

Opportunities for improvement:

- Rural communities and partners could use some additional support (supplies, courier services, etc.).
- Timely reporting is not always happening due to non-scheduled courier pickups being limited to once per week in some rural areas.
- There are delays in receiving results back from the state.
- Epidemiology data collected is not always necessarily used.
- There is a lack of clarity in who is receiving reports with wastewater testing.

Next steps:

- Provide additional education and guidance to stakeholders and partners on how they can find their results.
- Clarify the best points of contact for system partners.
- Establish stronger connections with rural facilities and create a workgroup focused on assisting rural communities
- Investigate ways to ensure the data that is being collected is used effectively.

Key Idea 1.1.2: The System monitors congenital, inherited and metabolic diseases of newborns and participates in state and federal surveillance systems.

Score: Optimal

Strengths:

- The Newborn Screening Program at the CSPHL received approval from BoH to add new disorders, which aligns with the Recommended Uniform Screening Panel (RUSP).
- Advisory committee meets regularly
- There is active stakeholder engagement around the state and quarterly stakeholder meetings are held to ensure issues are being addressed.
- Newborn Screening (NBS) Program works with Vital records to obtain data for cCMV.
- Data has been translated to be public facing.
- Abnormal: Connect to care model. Partner with Children's Hospital and Rocky Mountain Endocrinology for follow-up testing.

Opportunities for improvement:

- Rural communities could use additional support.
- With the addition of cCMV, there are new opportunities to work with partners within CDPHE on how to monitor cCMV results.

Next steps:

- Focus on additional support for rural communities.

Key Idea 1.1.3: The System has a secure, accountable, and integrated information management system for data storage, analysis, retrieval, reporting, and exchange. Partners collaborate to strengthen electronic surveillance systems.

Score: Significant

Strengths:

- Sustainable funding for LabOnline just passed legislation.
- NBS LIMS system communicates directly with machines.
- NBS is implementing OZNani so that everything can be done electronically.
- System partners are able to request additional tests if privileges are given to them.
- WasteWater LabOnline login and sample submission process has become seamless.

Opportunities for improvement:

- NBS reporting does not have bi-directional communication.
- Additional personnel are not affordable.
- Tuberculosis Program has server issues with Lab Online, with lag time noted.

- Epidemiologists have trouble retrieving whole genome sequencing data.
- LIMS could be useful in helping with surplus supplies and then communicating that information with stakeholders.

Next steps:

- Ensure servers can withhold capacity to reduce potential lag time.
    - Communicate with data teams regarding potential fixes.
    - Create a LabOnline survey for all LabOnline users to periodically check user reviews of system performance.

B. Essential Service 2: Investigate, diagnose and address health problems and hazards affecting the population.

Key Idea 2.1.1: The system assures the effective provision of services at the highest level of quality to assist in the detection, diagnosis and investigation of all significant health problems and hazards.

Score: Significant

Strengths:

- The Lab rises to the occasion and is able to onboard new disorders quickly.
    - The Lab is mindful about looking ahead to plan around what can be useful in the future.
- Rabies lab is easy to work with and working with CDPHE has been seamless.
    - Rural counties send a large number of rabies samples to the Colorado State Public Health Lab and have had great success with sample submission and reporting in a timely manner.
- Courier service is very helpful and is able to resolve issues quickly if/when they arise.
- For STIs, the State Lab is good at troubleshooting issues during the sample submission process; it would be nice to have everything done at CDPHE but partners appreciate the resources CDPHE provides.
- When appropriate outreach is conducted to the State Lab, the response is excellent.
    - Quote: “Lab coordinators have been awesome!”

Opportunities for improvement:

- Lab does not function at the best of its ability when under construction or going through a crisis.
    - Some system partners have noted a delay in reporting for rabies samples while the State Lab Rabies Testing Program has been closed for renovations.

    - Colorado State Public Health Lab (CSPHL) TB Lab has been unavailable for 16-18 months during renovations and samples have needed to be shipped to an outside lab.
    - Some epidemiologists note that labs other than the CSPHL are not as responsive, so they prefer not to work with them.
    - Many agencies would like things done within CDPHE and not sent to other labs due to delays.
- Utilize commercial labs to perform acute testing when appropriate.
- When some tests are completed, it is not reported at a local level and those partners are unable to see the results.
    - It has to go through an internal process at CDPHE in order to see results.
    - These partners had to reach out to CDPHE numerous times to get an idea of what was going on; they felt this shouldn't be the process.
- Water Testing - it is unclear for patients about next steps when an individual has a positive lead test in their blood.
- Timeliness - submitters would like to see results back quicker.
- Genomics Program has limited resources.

Next steps:

- Focus on improved communication, turnaround time with results, availability of resources, and quick resolution of courier issues.
- Transition from acute testing to expanded inclusion with commercial labs.

Key Idea 2.1.2: The System has the necessary capacity and authority in place to rapidly respond to public health events.

Score: Significant

Strengths:

- Emergency Preparedness and Response: When CDPHE identifies an issue about to arise, they look into testing methods beforehand to best prepare the state.
- Communication with epidemiologists has been coordinated well.
    - This allows epidemiologists to give proper follow-up instructions and next steps in a timely manner.
    - Regional field epidemiologists have helped field specimens from the lab.
- Epidemiology: There is funding for regional laboratories throughout the state and CDPHE quickly offers their help and support when requested.
- CSPHL's biosafety point of contact has been helpful.

Opportunities for improvement:

- A city wastewater partner's system doesn't have the authority to require a sample from wastewater utilities, which is limiting.
- Regional partners that have the ability to take on work feel potentially underutilized.
    - It is unclear whether agreements are in place currently that would enable this partnership.
    - This could be limited due to transportation challenges.
- Current methods of sustainability to keep up with the length of time that a crisis can go on (e.g., COVID-19) are not optimal.
- Communication and support for rural communities could be improved.
- Local public health agencies are not fully aware of capacity at the CSPHL.
- Communication surrounding supplies is lacking, specifically with rural partners.
    - Partners are unclear about supply availability, appropriate disposal methods, and distribution throughout the state.
- COOP demobilization is a concern.
- It is unclear who the best point of contact is regarding specific agreements that are in place within the Colorado State Public Health Lab System.
- There is a lag time between reporting results for those who have insurance vs. those who don't, which is unacceptable.

Next steps:

- Explore formation of agreements with neighboring states who may be closer to some rural partners to utilize their support.
    - This could involve potentially sending rabies or other samples to their labs.
    - Supplies could be distributed and stored/monitored throughout the state to increase/improve availability to rural partners.
- Improve communication surrounding supplies (availability, distribution, disposal, inventory management, etc) between CDPHE and all other system partners (especially rural partners).
    - Ensure communication is provided to the correct audience (not just at the director level).
- Provide training regarding CSPHL surge capacity, as well as what the CSPHL does outside of clinical testing (chemistry, food, etc.).

C. Essential Service #3: Communicate effectively to inform and educate people about health, factors that influence it, and how to improve it.

Key Idea 3.1.1: The System develops and disseminates accurate and consistent information to community partners about relevant health issues associated with laboratory services.

Score: Significant

Strengths:

- Monthly Local Public Health Agency (LPHA) directors call is very helpful.
- Communication notices are regularly distributed to LPHAs and hospitals.
- CDPHE maintains communication with clinical stakeholders.
- Newsletters are made available.
- Email notifications are sent out regarding important issues.

Opportunities for improvement:

- Webinars and systemwide meetings to communicate appropriate information across the lab system are currently underutilized.
- There is a lack of clarity/guidance on messaging to media outlets and appropriate talking points.

Next steps:

- Create a Laboratory/Epidemiologist roadshow to conduct additional outreach to partners.
- Make the laboratory coordination team the primary point of contact for the CSPHL.
- Improve messaging to the general public about what their test results mean.

Key Idea 3.1.2: The System creates and provides educational opportunities to community partners.

Score: **Moderate**

Strengths:

- CDPHE has a strong social media presence.
- The CDPHE website is kept up to date and utilizes the appropriate terminology for the general public.

Opportunities for improvement:

- Education to the general public about laboratory services could be improved.
- Ongoing communication regarding what is happening at the CSPHL for LPHAs is somewhat lacking, leading to potential gaps when it comes to the education of the general public.

Next steps:

- CSPHL will work internally with CDPHE communications to create some form of ongoing documentation for the general public and LPHAs about what happens at the lab.
- Lab coordinators have the opportunity to be a primary point of contact to provide education, resources, materials, etc.

D. Essential Service #4: strengthen, support, and mobilize communities and partnerships to improve health.

Key Idea 4.1.1: Partners in the System develop and maintain relationships to formalize and sustain an effective system.

Score: Significant

Strengths:

- System partners work effectively to get collaborative feedback on the system (this event is an example).
- Regular meetings are held with many different stakeholders and partners.
- In practice, most of the lab system works well and the right information is getting to the right people even if there are some potential gaps.

Opportunities for improvement:

- There are some breaks/gaps in communication as it disseminates from top to bottom.
    - Some partners feel that only big projects and overall ideas proliferate, while smaller projects and details slip through the cracks.
- Directed and specific communication to the appropriate groups could be improved.
- Some system partners don't host enough update meetings to share what is being worked on within their organization/agency.
- The connections between state and local agencies are not as strong as they could be due to lack of communication.
- There is a general lack of understanding of the proper communication channels and who the best point of contacts are in given situations.
- System partners at risk of "information overload" due to oversharing or ineffective sharing between partners.
- Meeting minutes for system partner meetings are not readily accessible and available to everyone.
- Websites are effective for internal communications, but not for external system partners.

Next steps:

- Liaisons such as the lab coordination team at the CSPHL will be utilized more to act as the main channel for communication between agencies and organizations.
- Improvements in the flow of communication from the executive/director level on down will be explored throughout the system partners.
- Meeting minutes and recordings should be readily available and accessible online for system partners.

Key Idea 4.2.1: System members communicate in regular, timely, and effective ways to support

collaboration.

Score: Significant

Strengths:

- Important information is distributed effectively under the current system.
- An abundance of useful information is available online for the general public from various levels of the state and local agencies.
- System partners have a strong social media presence.
- System partners use advertising effectively for public messaging when appropriate.

Opportunities for improvement:

- CDPHE's website can be a bit overwhelming with the amount of information present.
    - The amount of information available makes it difficult to navigate and find exactly what one needs.
- State information, such as appropriate contact lists, sometimes isn't shared or updated regularly with local public health agencies.

Next steps:

- CSPHL staff will gather feedback from website users about their experience and investigate potential avenues for improvement.

Key Idea 4.3.1: The Public Health Laboratory System works together to share existing resources and identify new resources to address health issues.

Score: Significant

Strengths:

- Grants are regularly pursued and provide a good short term option for funding and resources.
- Testing services have been very effective overall and have been expanded due to the additional resources provided.
- New outbreaks and concerns are handled effectively and resources are shared well.
    - Mpox response resources were handled well, as an example.
- An abundance of analytical resources and lab connections are made readily available.
- System partners work together well to improve things as a whole.

Opportunities for improvement:

- A lack of resources when it comes to staffing and funds has been noted by some system partners.

    - Some employment positions remain empty, increasing the workload and demand on the other employees.
- Grant opportunities can be limited due to a lack of individuals with grant-writing skills and the available time necessary to complete the grants.
    - Sometimes grant money isn't able to be used due to restrictions such as term limits.

Next steps:

- More sustainable funding opportunities will be researched.

E. Essential Service #5: Create, champion, and implement policies, plans, and law that impact health.

Key Idea 5.1.1: The System obtains input from diverse partners to develop new policies, plans and laws and modify existing ones, using scientific evidence to inform and influence policy.

Score: Significant

Strengths:

- Experts in the system are able to navigate laws and policies effectively.
    - Example: The Tuberculosis Program experienced changes in reporting based on new technology and rapid testing.
        - The typically slow process to update rules happened faster than expected.
- Health Alert Network (HAN) reports are regularly sent out and are effective in their communication.
- Board of Health rule changes provide opportunities to reach out to the public to see how this will affect them.
- Tuberculosis Program and Newborn Screening Board of Health have new additions.
- School testing programs have been effectively put in place and utilized throughout the state.
    - Lead testing has expanded from the state level to the local level.

Opportunities for improvement:

- Data coming out of the public health labs may not be getting to the right groups to be utilized in an ideal way.
- Budgetary restrictions may contribute to funding challenges.
    - An example would be how to handle the funding for lead testing in schools and daycares on a local level.
- Lead testing program has dealt with some issues regarding misinformation.

Next steps:

- Establish better communication from general sources at the CSPHL and the Division of Disease Control and Public Health Response (DCPHR).
- Reach out to local organizations that will take donations to avoid wasting expired items that they may be able to use that the CSPHL system partners cannot.

F. Essential Service #6: Utilize Legal and Regulatory Actions Designed to Improve and Protect the Public's Health.

Key Idea 6.1.1: The System is actively engaged in the review and revision of laws and regulations pertaining to laboratory practice.

Score: Optimal

Strengths:

- The Quality Assurance team performs regular internal and external audits.
- CLIA updates are provided regularly.
- There is a strong stakeholder engagement process through the state.
- The system as a whole works well the majority of the time.
- System partners have a good understanding of laws, rules and regulations.

Opportunity for improvement:

- Many of the new laboratory regulations are restrictive and it feels as though there is a lack of advocacy for public health labs.
- There are concerns about cooperating with external labs who have not been inspected and end up being unvalidated or unlicensed.
- Updated lab reportable procedures and how they can be modified are not shared in the most effective way.
- Necessary updates sometimes take a long time to be approved.
- There seems to be uncertainty about the path to make updates and changes to the public health lab system.

Next steps:

- Put together more frequent updates, meetings, and seminars to disseminate new information and changes happening within the lab system.

Key Idea 6.1.2: The System promotes compliance by all laboratories with regard to applicable laws and regulations.

Score: Significant

Strengths:

- CLIA resources and training materials have been recently made available to system partners, which is helpful.
- State system partners respond quickly and effectively to regulation questions from local agencies.
- Things are generally working well for the most part.

Opportunities for improvement:

- Auditing staff and inspector positions are short-staffed, occasionally leading to delays in compliance and inspections.
    - Positions remain open and there is a lack of retention with CLIA inspectors.
- There is a lack of educational opportunities regarding compliance at the state level.
- Some places aren't keeping up with proficiency testing.
- The lack of inspectors to monitor labs in Colorado is concerning/problematic.
- Employee turnover can lead to breakdowns in communication with inspections.

Next steps:

- Create a task prioritization list to make inspections more effective.
    - Place focus on repeat offenders and work from there.
- Create an outline and/or improve information sharing about the processes required to revise regulations in the state of Colorado.

G. Essential Service #7: Assure an effective system that enables equitable access to the individual services and care needed to be healthy.

Key Idea 7.1.1: The System identifies laboratory service needs and collaborates to fill gaps.

Score: Moderate

Strengths:

- The Newborn Screening Lab at the CSPHL is open 6 days a week to ensure availability.
- System partners have access to test results seven days per week.
- The Laboratory Response Network (LRN)/Bioterrorism Program at the CSPHL makes accommodations to take samples on the weekends.
- Someone is always available for immediate reportables.

Opportunities for improvement:

- There is a lack of guidance/clarity for system partners on how to appropriately package some types of samples (rabies, tularemia, botulism, etc.).
- Some rural areas are limited to one unscheduled pickup per week.
    - Lack of mobile capabilities for sample collection in rural areas.

- Resources outside of the CSPHL are being underutilized.
    - For example, Mesa County and Pueblo County are BSL3 laboratories that can take on samples when the CSPHL is at capacity.

Next steps:

- Improve the guidance surrounding appropriate packaging for transportation of samples through the use of webinars, educational materials, or guidance documents.
- Explore increasing the number of unscheduled courier pickups to some rural areas to two per week.
    - Explore additional mobile options for sample transport in these areas.
- Assess the capabilities of LPHA BSL3 laboratories to test samples when the CSPHL is at capacity.

Key Idea 7.1.2: The System provides timely and accessible quality services.

Score: **Moderate**

Strengths:

- Information is readily available on the CDPHE website.
- Mobile Public Health Clinic Program provides helpful resources for rural areas
- Courier services have improved to be more responsive and expansive throughout the state.

Opportunities for improvement:

- Materials on the website are occasionally out of date.
- Water testing requisition forms are internally updated and the newest requisition forms are not provided to the public or readily accessible.
- There is an unfair advantage when it comes to pricing for water testing at the CSPHL compared to what LPHA labs are able to charge.
    - Pricing of water testing at the CSPHL has not adjusted appropriately with inflation through the years.
- There is a lack of clarity for system partners on what kind of services and resources are available in our PHL System.
- There is a lack of collaboration between CDPHE and LPHAs.
- There is a shortage of personnel available to review results and quickly provide them to the appropriate system partners.

Next steps:

- Review water testing prices at the CSPHL and address with leadership to ensure pricing is fair/appropriate.

    - Survey stakeholders to gather their input.
- Review the CDPHE and CSPHL website to ensure materials are fully up to date and ensure a system is in place to keep materials and information updated on them moving forward.
- Improve communication and collaboration between the CSPHL and other system partners to ensure everyone is aware of the services and resources available in our system.

H. Essential Service #8: Build and support a diverse and skilled public health workforce.

Key Idea 8.1.1: The System maintains an environment to attract and retain diverse and highly qualified staff.

Score: Moderate

Strengths:

- There are strong systems in place at the state and federal level for equitable hiring.

Opportunities for improvement:

- There is high variability with the systems and procedures in place for hiring throughout the PHL System, with some great and others lacking.
- There are currently fewer permanent positions and more term-limited positions available, which might not be attractive to job seekers.
    - This can lead to less qualified candidates applying for these positions.
    - Temporary and term-limited positions may not have benefits, leading to high turnover.
    - It is difficult to empower term-limited staff.
- Extended job vacancies and difficulty filling/maintaining positions have led to some service deficiencies and burnout with current employees.
- Pay isn't as good as comparable industry jobs (example: lack of bonuses).
- Exit interviews are not required, which makes it difficult to evaluate and improve the position for future candidates.
- It can be difficult to find job postings in smaller communities.
- There is a lack of integration between different departments for job opportunities.

Next steps:

- Evaluate and improve hiring processes throughout the system.
- Integrate lab and epidemiology training for lab technician roles.

Key Idea 8.2.1: The System works to assure a competent workforce by encouraging and supporting staff development through training, education, coaching and mentoring.

Score: Moderate

Strengths:

- Management is supportive and provides training opportunities when available.
- Many webinars, conferences and other training opportunities are hosted and made available.
- Tuition reimbursement helps attract educated professionals.
- Certifications are offered with some training programs.
- Student internship rotations are regularly utilized.
    - This helps educate students on the opportunities and types of jobs available in the PHL System.
- Technical trainings are robust and have high standards.
- The CSPHL offers tours of the lab to students and other individuals in health/science related fields.
- The Quality Assurance training offered utilizes helpful presentations and protocols.

Opportunities for improvement:

- There is currently a lack of training materials and information on system services and limitations.
- Student internships take a lot of time and resources to manage.
- There is a lack of emphasis on education and cross-training in the epidemiology programs within the system (e.g., training on interpretation of lab results).

Next steps:

- Explore options to incentivize students into entry lab positions through actions such as tuition reimbursement, apprentice programs, certificates, and scholarships.
- Expand cross-training programs for epidemiologists.
- Improve communication across the PHL System and expand the available training opportunities further.

Key Idea 8.2.2: The System identifies and addresses current and future workforce shortage issues.

Score: Moderate

Strengths:

- Continuing education for current employees is occasionally partially or fully funded, which is very helpful.
- Career fairs at high schools showing the different career pathways in laboratory science positions are a good way to attract future employees.

- Internal training and collaboration are in a good place.

Opportunities for improvement:

- Barriers exist between the lab and epidemiology, which limits flexibility and collaboration.
- Collaboration with outside partners could be improved.
- There is a lack of a large state laboratory organization.
    - It seems like collaboration only occurs on a smaller scale currently.
- Not as many outside training programs are offered to smaller local agencies that aren't CDPHE.
- There is a shortage of lab technicians in the PHL System due to ineffective recruitment for the role.
- There is a lack of a laboratory science presence at job fairs.
- Students aren't well informed about laboratory position opportunities.

Next steps:

- Increase educational outreach to students and raise more awareness of laboratory career paths.
- Improve the recruitment and staffing process.
- Examine how to reduce the barriers in place between laboratory staff and epidemiologists.

I. Essential Service #9: Improve and innovate public health functions through ongoing evaluation, research, and continuous quality improvement.

Key Idea 9.1.1: The effectiveness, accessibility and quality of the individual- and population-based laboratory services provided throughout the state is regularly evaluated.

Score: Significant

Strengths:

- The courier system throughout the state is very successful.
- Good relationships exist with the CSPHL and lab system partners.
- The CSPHL has looked into improving the network to better communicate with other organizations within the system.
- CDPHE water quality inspections are thorough and well done.
- Interactions with CSPHL Rabies Lab and other system partners are going well.

Opportunities for improvement:

- The effectiveness of information reaching all areas of the state needs improvement.

    - Example: Gaps in information shared can occur with western slope partners due to distance from the central hubs in the state.
- There is a current lack of feedback on how to improve the lab system network.
    - It is unclear whether the appropriate individuals are receiving the customer satisfaction survey sent out by the CSPHL (example: Water Quality customer satisfaction is not reviewed or graded and is mainly focused on internal discussions).
- There is limited accessibility when it comes to the sample submission process and data transmission/sharing.
- The use of faxing for rabies results is an outdated system that needs improvement.

Next steps:

- Look into methods to strengthen the collaboration and communication throughout the PHL System and ensure gaps are addressed.

Key Idea 9.2.1: The System has adequate expertise and capacity to plan research and innovation activities.

Score: **Moderate**

Strengths:

- The CSPHL and APHL are working on making connections between organizations to increase awareness.

Opportunities for improvement:

- There are gaps in communication when it comes to what is being done in newer fields (e.g., genomics).
    - There are also gaps regarding what is happening at the federal level with the CDC.
- Information shared with the public is lacking.
- Menu options for testing at the CSPHL could be improved.
- There are funding and capacity challenges which are difficult to address, as there isn't a set system in place for the entire system.
- Organic ideas and research seem to be happening mainly on an individual or smaller scale.
- There is a lack of opportunities to meet with other facilities and system partners to enable increased interaction and idea sharing.
- There are challenges on where to find the resources, even if the capacity is available.

Next steps:

- Investigate ways to improve communication throughout the system and to the general public about what is occurring at the local, state and federal levels.

- Explore the expansion of opportunities for facilities to interact and meet more directly to promote idea sharing and collaboration.

Key Idea 9.2.2: The System promotes research and innovative solutions.

Score: Moderate

Strengths:

- The Western Slope and the CSPHL have a good relationship/system in place.
- The Lab Coordination team with the CSPHL is heavily involved in training and communication with system partners.
- The Newborn Screening Program at the CSPHL performs a lot of active outreach to system partners.
- The Wastewater Program with the CSPHL performs a lot of outreach, primarily to out-of-state organizations.

Opportunities for improvement:

- The Genomics Program at the CSPHL has somewhat limited communication to state system partners, which could be improved.
- There are some gaps in information regarding what instruments and expertise exist within each lab/facility.
    - System partners aren't always aware of which tests each facility can run based on this knowledge.

Next steps:

- Encourage increased collaboration and communication between the Genomics Program and state and local system partners.
- Investigate methods for system partners to better share the equipment, instrumentation and expertise that they have access to so that partners are aware of what kind of testing can be done at each facility.

J. Essential Service #10: Build and maintain a strong organizational infrastructure for public health.

Key Idea 10.1.1: The System is composed of different entities that work together effectively on public health activities and are transparent and accountable to the community it serves.

Score: Significant

Strengths:

- The Water Quality Program at the CSPHL provides resources to system partners.
- The CSPHL has worked successfully with the CSU veterinary lab to perform rabies testing for system partners while the CSPHL Rabies Lab is undergoing renovations.
- The CSPHL has coordinated with a New Mexico lab to continue testing tuberculosis samples while the CSPHL Tuberculosis Lab has undergone renovations.
    - Regional support from system partners with this process has been very successful.
- There is a strong relationship between the Epidemiology teams, stakeholders, and other system partners to communicate results effectively.

Opportunities for improvement:

- There isn't a centralized database of resources, which can lead to potential gaps or areas that are lacking.
- The intent behind communication to assist with new and current resources could be better among system partners.
- There should be more discussions of strategic methods with full transparency.
- There is not a clear system in place on how to navigate agreements between system partners that may be lacking (e.g., results not being reported).
- Agreements between system partners and stakeholders are not communicated as effectively as they could be.
- The System needs to do a better job of touching base again with stakeholders to ensure the way data and results are being released and provided are still the best ways.

Next steps:

- Investigate the creation of a central database of resources available to system partners to ensure all areas of the system are covered appropriately.
- Facilitate a discussion of strategic methods and ensure that the correct people are participating in these conversations.
- Investigate options to better track agreements that are in place with system partners.
- Explore options to reach out to stakeholders effectively to gather the appropriate feedback about services being performed.

Key Idea 10.1.2: The System's leadership acts ethically and strategically and communicates proactively to the public through different mechanisms.

Score: Optimal

Strengths:

- CDPHE sends out regular vaccination reminders to the public, which are very effective.
- Health Alert Network (HAN) broadcasts are very effective in sharing pertinent information to the appropriate individuals who can then inform the public.

- The system in place is equitable and robust enough to ensure that the correct information being released to the public.

Opportunities for improvement:

- System partners are occasionally unable to explain everything to the public and must have uncomfortable conversations which are not easy.
- System faces challenges when it comes to counteracting misinformation.
- It can be challenging to figure out who to reach out to and there is a fear that people are missed.
- Uncomfortable conversation is how things change.
- It can be difficult to ensure everyone has the appropriate resources to provide the appropriate information.

Next steps:

- Focus on continued public awareness and community outreach.

Key Idea 10.1.3: The System has the necessary resources (e.g. financial, technological, physical (facilities), human) to perform and sustain public health activities.

Score: **Moderate**

Strengths:

- The CSPHL has undergone expansion due to CDC funding.
- Funding from the CDC for the COVID-19 pandemic was flexible and able to assist with other budgets.

Opportunities for improvement:

- It is not always clear how funding is allocated.
- CDC funding for TB is limited.
- There is a fair amount of job turnover within the system.
- The system does not always appropriately adjust for changes in fiscal options.
- Funding can sometimes be limited by caveats or restrictions.

Next steps:

- Explore options to increase funding to system partners and ensure that the appropriate individuals are involved in decision making regarding the use of funds.
- Further expand and explore APHL internship opportunities for the PHL system.
- Emphasize messaging and communication to younger individuals.

Condensed Summary of L-SIP Assessment Scores

Essential Service #1	Score
Key Idea 1.1.1	Significant
Key Idea 1.1.2	Optimal
Key Idea 1.1.3	Significant
Essential Service #2	
Key Idea 2.1.1	Significant
Key Idea 2.1.2	Significant
Essential Service #3	
Key Idea 3.1.1	Significant
Key Idea 3.1.2	Moderate
Essential Service #4	
Key Idea 4.1.1	Significant
Key Idea 4.2.1	Significant
Key Idea 4.3.1	Significant
Essential Service #5	
Key Idea 5.1.1	Significant
Essential Service #6	
Key Idea 6.1.1	Optimal
Key Idea 6.1.2	Significant
Essential Service #7	
Key Idea 7.1.1	Moderate
Key Idea 7.1.2	Moderate
Essential Service #8	
Key Idea 8.1.1	Moderate
Key Idea 8.2.1	Moderate
Key Idea 8.2.2	Moderate
Essential Service #9	
Key Idea 9.1.1	Significant
Key Idea 9.2.1	Moderate
Key Idea 9.2.2	Moderate
Essential Service #10	
Key Idea 10.1.1	Significant
Key Idea 10.1.2	Optimal
Key Idea 10.1.3	Moderate

Appendix and other materials

Appendix A: L-SIP assessment day agenda

Registration and Breakfast (Provided)	**8:00**
Welcome and introductions	**8:30**
Overview of the assessment day	**8:55**
Plenary: Essential Service (ES) #2- Investigate, diagnose, and address health problems and hazards	**9:15**
Break	**10:15**
Breakouts: • **Group A- ES #1- Monitor health** • **Group B- ES #9- Evaluation, research, and continuous quality improvement** • **Group C- ES #8- Workforce**	**10:30**
Lunch (Provided)	**11:30**
Breakouts: • **Group A- ES #7- Assure an effective system that enables equitable access** • **Group B- ES #10- Infrastructure** • **Group C- ES #4- Strengthen, support, and mobilize communities and partnerships**	**12:30**
Break	**1:30**
Breakouts: • **Group A- ES #3- Inform and educate people about health** • **Group B- ES #5- Create, champion, and implement policies, plans, and laws that impact health** • **Group C- ES #6- Utilize legal and regulatory actions**	**1:40**
Break	**2:40**
Summary	**2:45**
Next Steps, Final Remarks and Evaluation	**4:15**
Adjourn	**4:30**

Appendix B: Summary of participant evaluations scores

Utility of meeting	Poor		Good		Superb	
	1	2	3	4	5	Average Score
Stated objectives of meeting were met			2	16	12	4.3
Dialogue was useful			2	9	19	4.6
I support the efforts being made			1	8	21	4.7
Next steps are clear		1	6	11	12	4.1
Meeting was a good use of my time		1	5	10	14	4.2
Meeting arrangements	**Poor**		**Good**		**Superb**	
	1	2	3	4	5	
Advance notice of the meeting		2	3	6	19	4.4
Meeting room accommodations			5	5	20	4.5
Advance materials for meeting were useful	2	4	5	6	12	3.8
Advance materials were received with time to review	2	4	1	9	13	3.9
Flow of meeting	**Poor**		**Good**		**Superb**	
	1	2	3	4	5	
Started on time		1	2	5	22	4.6
Clear objectives for meeting			1	8	21	4.7
Agenda followed or appropriately amended			1	5	24	4.8
Facilitation was effective				8	22	4.7
The "right" people were at the meeting		2	8	10	9	3.9
Overall	**Yes**	**No**				
Would you participate in this process again?	29	1				
Was this a helpful tool and process?	29					

Participant evaluation remarks

"I felt a good cross section of stakeholders were brought in to provide feedback. This helped identify issues that affect rural and small communities disproportionately to larger areas."

"Group conversations created a lot of great dialog and some great insight."

"This far exceeded my expectations! I learned important information about the state lab but also about the other partner orgs. I enjoyed meeting new players in the public health world."

Appendix C: Participant list

Lab partner/organization name	Name	Email
CDPHE Wastewater Unit	Aleigha Wellbrock	aleigha.wellbrock@state.co.us
CDPHE Sequencing Unit	Alex Rossheim	alexandria.rossheim@state.co.us
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CDPHE Lab Coordination	Cathy Doty	cathy.doty@state.co.us
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Middle Park Health	Chylena Cosper	ccosper@middleparkhealth.org
CDPHE Office of Emergency Preparedness and Response	Corinne Reid	corinne.reid@state.co.us
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Douglas County Health Department	Fallon Simmons	fsimmons@douglas.co.us
CDPHE Office of STI/HIV/VH	Garrett Rose	Garrett.rose@state.co.us
CDPHE Communicable Disease Branch	Ginger Stringer	ginger.stringer@state.co.us
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East Cherry Creek Valley Water and Sanitation	Jonnie Messenger	jmessenger@eccv.org
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We would like to sincerely thank all of our public health laboratory system partners who were able to join us for this L-SIP assessment. Their participation and feedback is immensely valuable and we greatly appreciate their time and energy.

Additionally, we would like to thank the following individuals who joined us from other public health laboratories around the country to serve as facilitators for the assessment:

Kathryn Wangsness - Arizona State Public Health Laboratory

Seth Eastman - Wyoming Public Health Laboratory

Tara Cameron - Philadelphia Public Health Laboratory

Renita Debrito - Philadelphia Public Health Laboratory

Azza Abdin - Philadelphia Public Health Laboratory

Bernadette Matthis - Philadelphia Public Health Laboratory

Lastly, we would like to thank Tina Su with APHL for all of her guidance and help throughout the assessment process.