Strengthening Laboratory Quality and Workforce Capacity: What Works?

Lucy A. Perrone, MSPH, PhD
Project, Director, Laboratory Quality Improvement in Cambodia
International Training & Education Center for Health (I-TECH)
Assistant Professor, Department of Global Health, School of Public Health
Adjunct Assistant Professor, Department of Laboratory Medicine, School of Medicine
University of Washington, Seattle, WA, USA
perronel@uw.edu

UW Medicine
SCHOOL OF MEDICINE

SCHOOL OF PUBLIC HEALTH
UNIVERSITY of WASHINGTON

DEPARTMENT OF GLOBAL HEALTH
UNIVERSITY of WASHINGTON

I-TECH
International
Training & Education
Center for Health

Laboratories are an integral part of the health system

Policy and Strategic Planning

complex testing

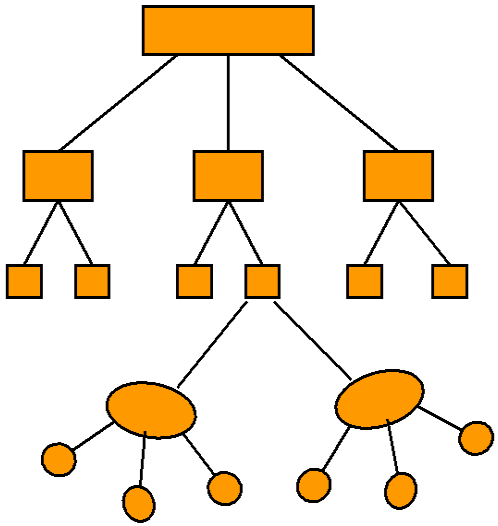
National Reference Laboratory

Regional Reference Laboratories

Referral Hospitals

Primary Hospital

Health Centers



Senior Health Scientists

Specialists
Senior Technologists
Program Officers

Doctors
Nurse Practitioners
Medical Assistants

Clinical Service Support

simple integrated testing

Health data

Laboratory Quality Management and ISO 15189

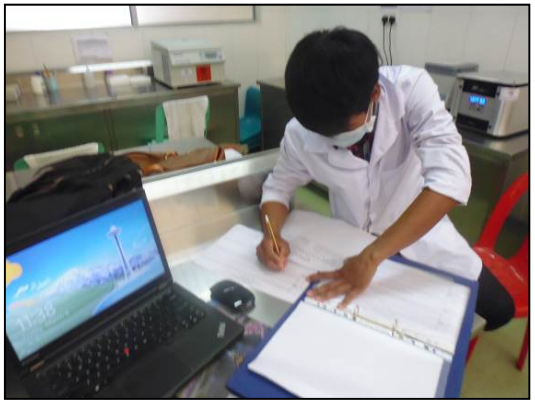
~60-80% of patient management decisions are based on clinical laboratory/diagnostic testing

ISO 15189 is the international standard for medical laboratory quality. Helps assure quality and competence in laboratories for accurate and reliable testing.

Improving quality management is critical to improving healthcare.

Challenges for Laboratory Managers

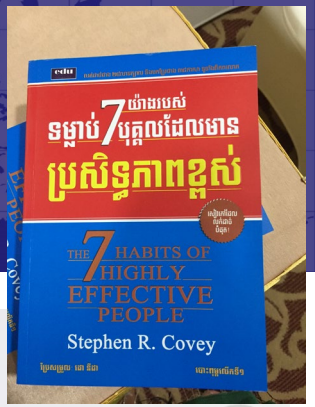
- Inadequate financial resources
- Inadequate network support- Absent functional linkages between labs
- Difficulties assuring consistent quality of reagents and equipment function
- Procurement challenges
- Limited HR capacity and high turnover of staff
- Staff competency and work ethic
- Infrastructure challenges like Inconsistent electricity and poor water quality
- Inadequate training in management of lab operations



How can I-TECH help the MoH?

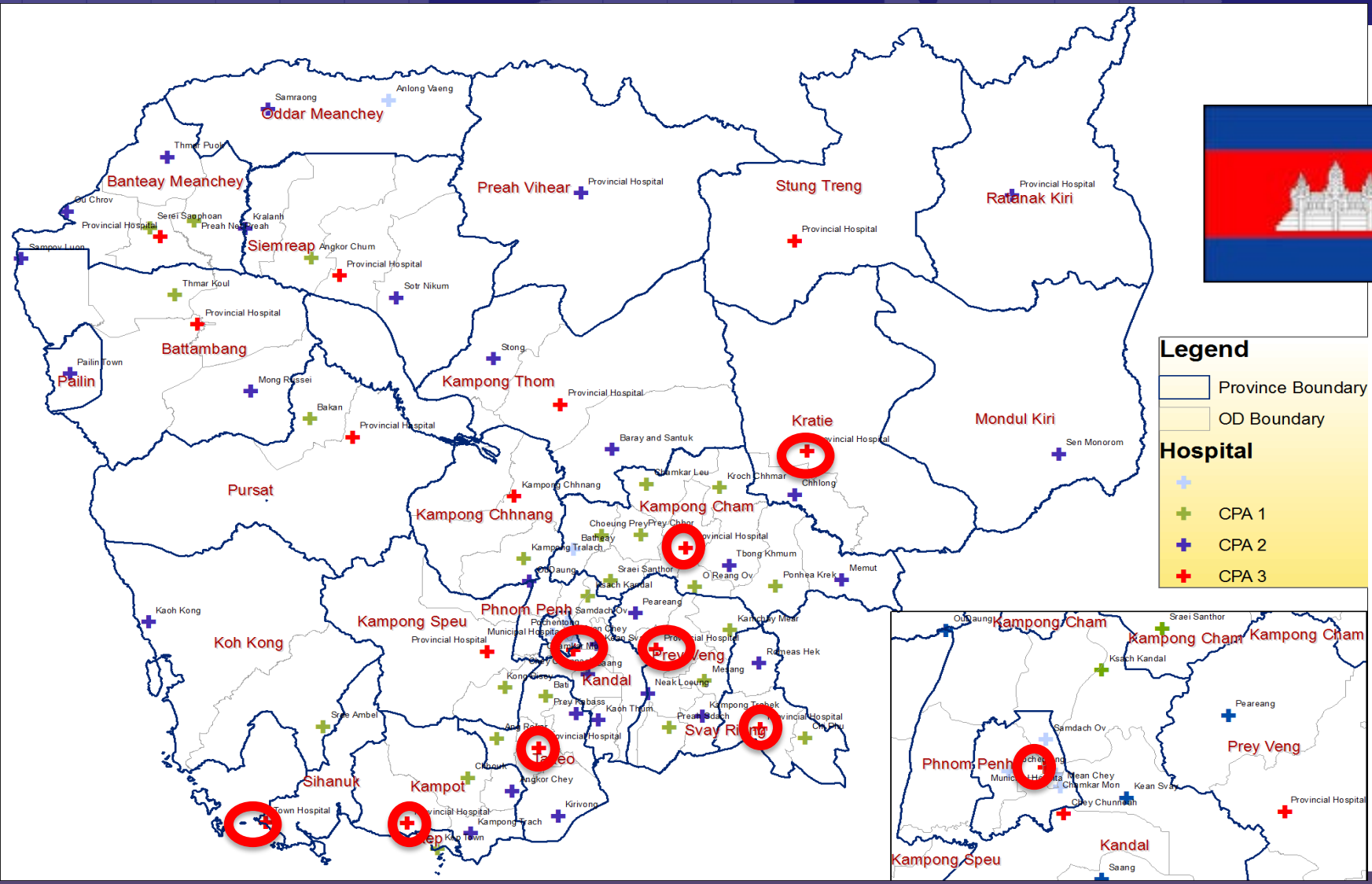
- Where to start?
- How to start?
- Who?
- What?
- When?
- What works?

Successful organizations start with effective people



1. ***Be Proactive*** (Achieve extraordinary results by consistently executing their resourcefulness and initiative to break through barriers.)
2. ***Begin with the End in Mind*** (Develop an outcome-oriented mindset in every activity they engage in—projects, meetings, presentations, contributions, etc.)
3. ***Put First Things First*** (Eliminate energy and time-wasting tendencies by focusing and executing on the team's wildly important goals with a weekly planning cadence.
4. ***Think Win-Win*** (Lead teams that are motivated to perform superbly through a shared expectation and accountability process.)
5. ***Seek First to Understand, Then to Be Understood*** (Create an atmosphere of helpful give-and-take by taking the time to fully understand issues, and give candid and accurate feedback.)
6. ***Synergize*** (Demonstrate innovative problem-solving skills by seeking out differences and new and better alternatives.)
7. ***Sharpen the Saw*** (Actualize the highest and best contribution of everyone on a team by unlocking the total strength, passion, capability, and spirit of each individual.)

Be strategic



“Create a vision”: Conducted two ISO 15189 Study Tours

How do adults learn? (Andragogy)

- **Need to know:** Adults need to know the reason for learning something.
- **Experience:** (including error) provides the basis for learning activities.
- **Self-concept:** Adults need to be responsible for their decisions on education; involvement in the planning and evaluation of their instruction.
- **Readiness:** Adults are most interested in learning subjects having immediate relevance to their work and/or personal lives.
- **Orientation:** Adult learning is problem-centered rather than content-oriented.
- **Motivation:** Adults respond better to internal versus external motivators.

Seven Principles of Adult Learning

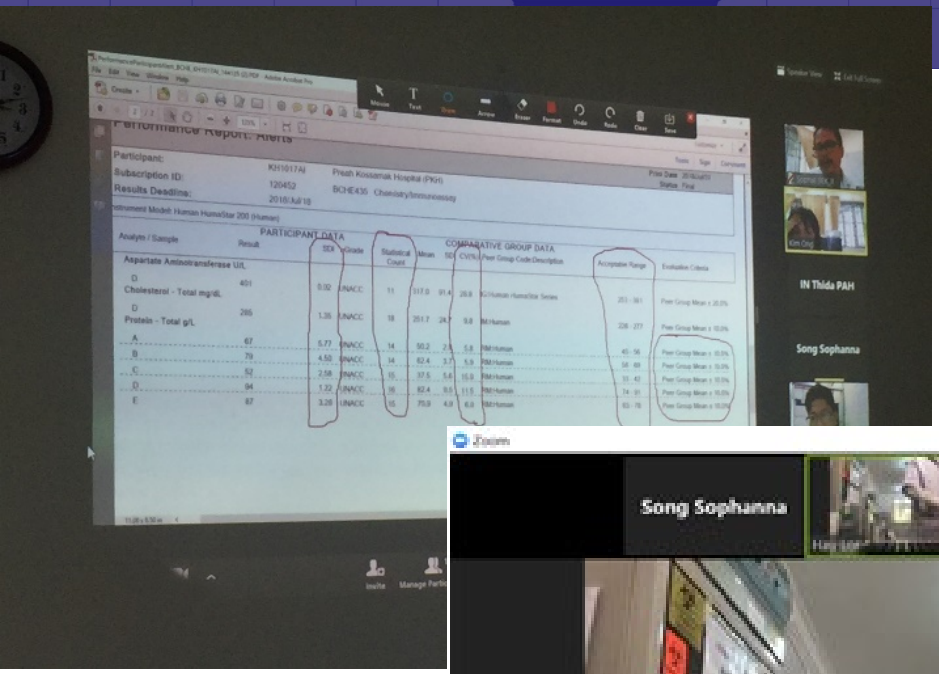
1. Adults must want to learn
2. Adults will learn only what they feel they need to learn
3. Adults learn by doing
4. Adult learning focuses on problem solving
5. Experience affects adult learning
6. Adults learn best in an informal situation
7. Adults want guidance and consideration as equal partners in the process

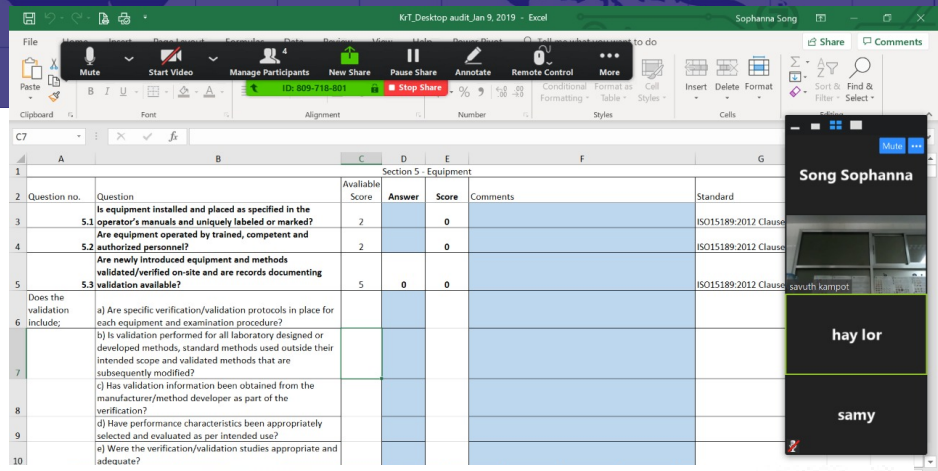
What is Laboratory Mentoring?

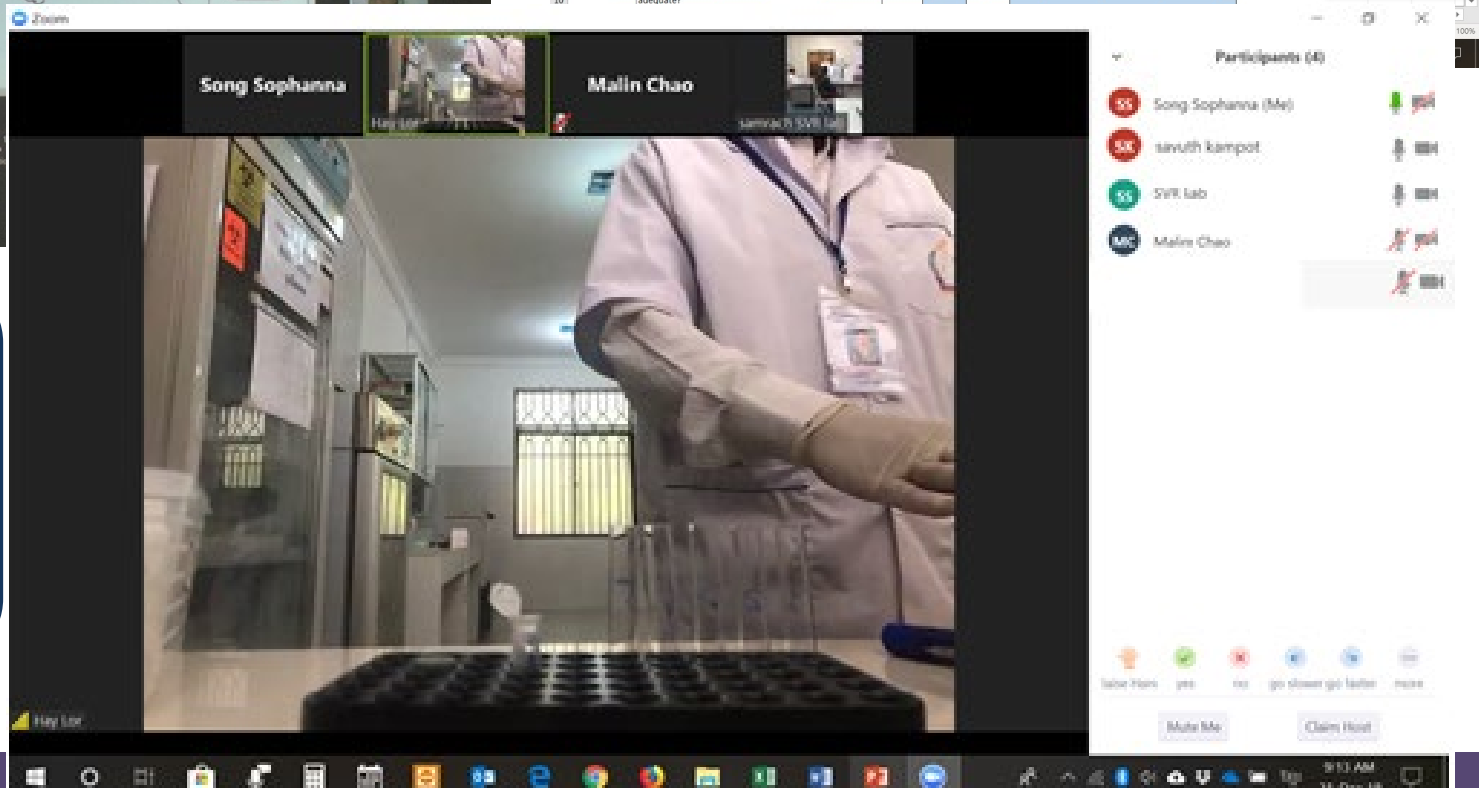
"a sustained, collaborative relationship in which an experienced practitioner guides improvement in the quality of services delivered by laboratory workers and the laboratories where they work"

“Seek first to understand, then be understood”

Tele- mentoring



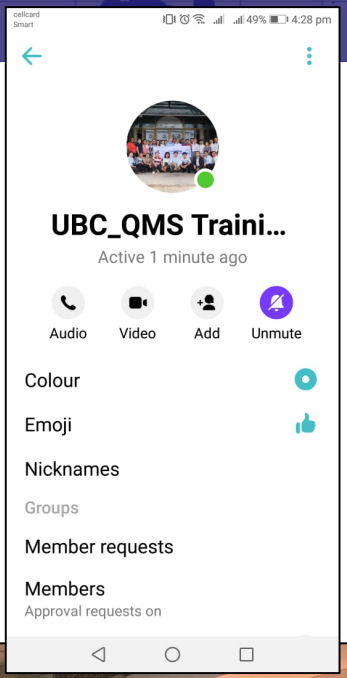




High variation in video conference participation time between laboratories

We have conducted 9 regional on-site workshops on specific lab QM issues in the past year

We have conducted a 9 month-long job-specific training for Quality Assurance Officers

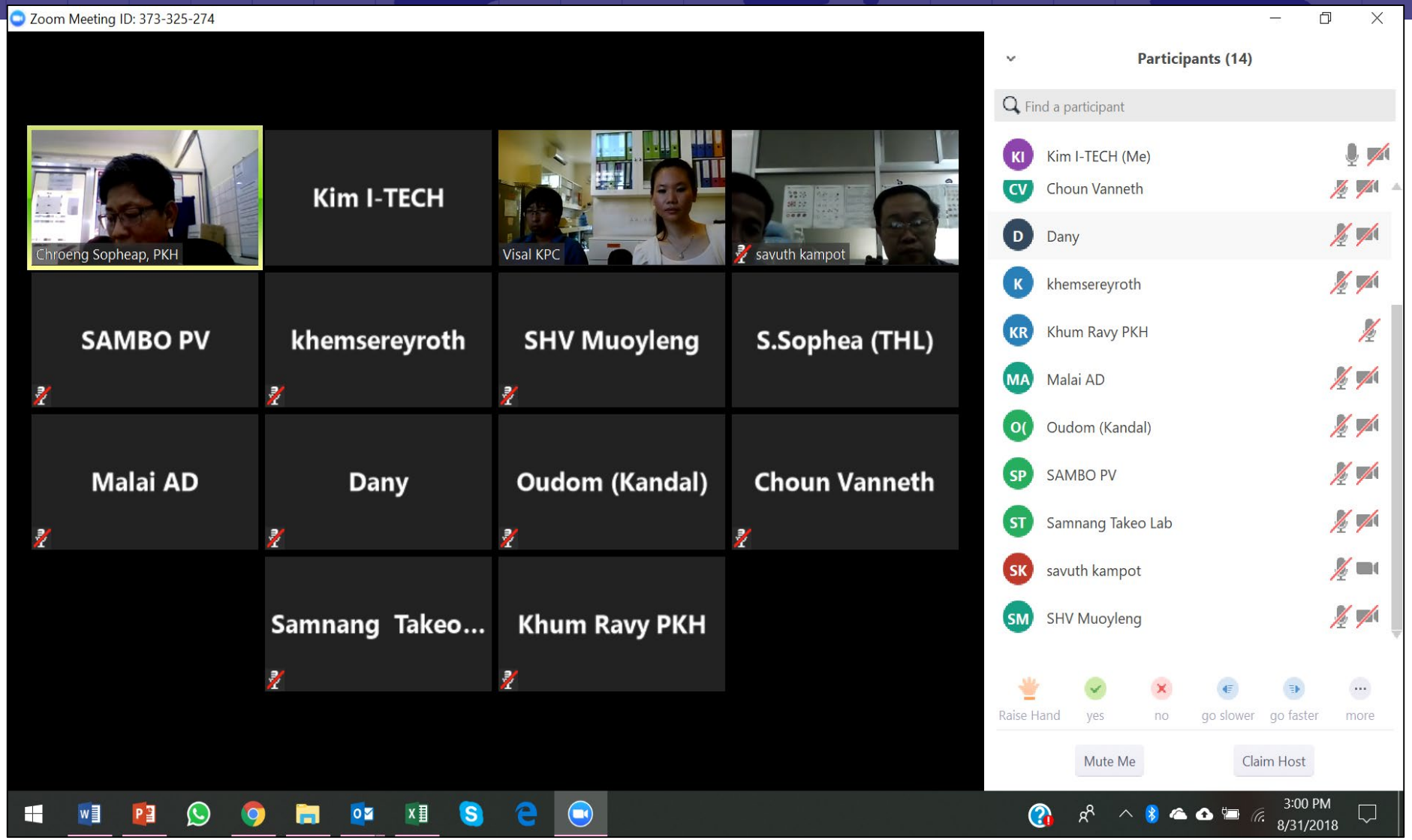


Delivered two workshops on Leadership

- Laboratories need technical expertise *plus* effective management to succeed
- Complex, people-oriented systems require effective management
- Training and guidelines don't address all critical issues. Having "all the tools" is simply not enough

To learn more visit: www.go2itech.org/laboratory-systems

“Synergize/ collaborate”: Establishment of a new QAO network



KINGDOM OF CAMBODIA

NATION-RELIGION-KING

Ministry of Health

Cambodia Laboratory Quality Management System (CamLQMS)

Checklist for Accreditation

For Clinical and Public Health Laboratories

Bureau of Medical Laboratory Services: Department of Hospital Services

Version 1: January 2018

AUDIT SCORING

Cambodia Laboratory Quality Management System (CamLQMS) Checklist contains 12 main sections (a total of 117 questions for a total of 275 points. Each item has been awarded a point value of 2, 3, or 5 points—based upon relative importance and/or complexity. Responses to all questions must be, "yes", "partial", or "no".

- Items marked *"yes"* receive the corresponding point value (2, 3, or 5 points). **All elements of a question must be present in order to indicate "yes" for a given item and thus award the corresponding points.**

  NOTE: items that include "tick lists" must receive all "yes" and/or "n/a" responses to be marked "yes" for the overarching item.
- Items marked *"partial"* receive 1 point.
- Items marked *"no"* receive 0 points.

When marking "partial" or "no", notes should be written in the comments field to explain why the laboratory did not fulfil this item to assist the laboratory with addressing these areas of identified need following the audit.

Where the checklist question does not apply, indicate as NA. Subtract the sum of the scores of all questions marked NA and subtract that sum of NAs from the total of 275. Since denominator has changed, the level status is then determined using % score.

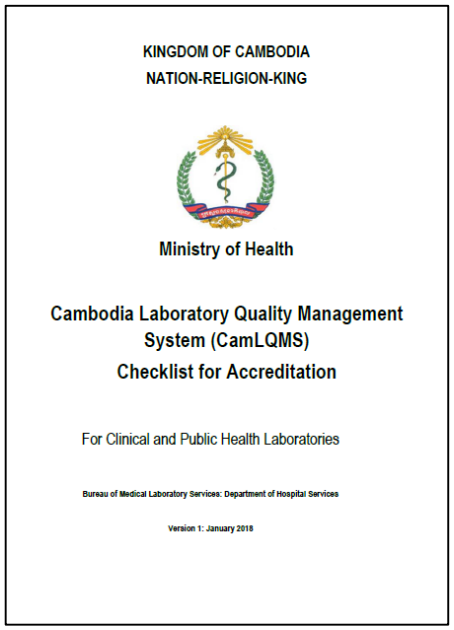
Audit Score Sheet

Section	*Total Points*
Section 1: Documents & Records	**28**
Section 2: Management Reviews	**14**
Section 3: Organization & Personnel	**22**
Section 4: Client Management & Customer Service	**10**
Section 5: Equipment	**35**
Section 6: Evaluation and Audits	**15**
Section 7: Purchasing & Inventory	**24**
Section 8: Process Control	**32**
Section 9: Information Management	**21**
Section 10: Identification of Non Conformities, Corrective and Preventive Actions	**19**
Section 11: Occurrence/Incident Management & Process Improvement	**12**
Section 12: Facilities and Biosafety	**43**
TOTAL SCORE	**275**

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
(0 – 150 pts)	(151 – 177 pts)	(178 – 205 pts)	(206 – 232 pts)	(233 – 260 pts)	(261 – 275 pts)
< 55%	*55 – 64%*	*65 – 74%*	*75 – 84%*	*85 – 94%*	*≥95%*

Trained a new cadre of quality auditors

Session 1: January 16, 2019
Session 2: January 30, 2019
Session 3: February 20, 2019
Session 4: February 26, 2019
Session 5: March 13, 2019



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Steps to performing a quality audit

Conducted two rounds of lab audits (Dec 2017- Jan 2018, March-Apr 2019)

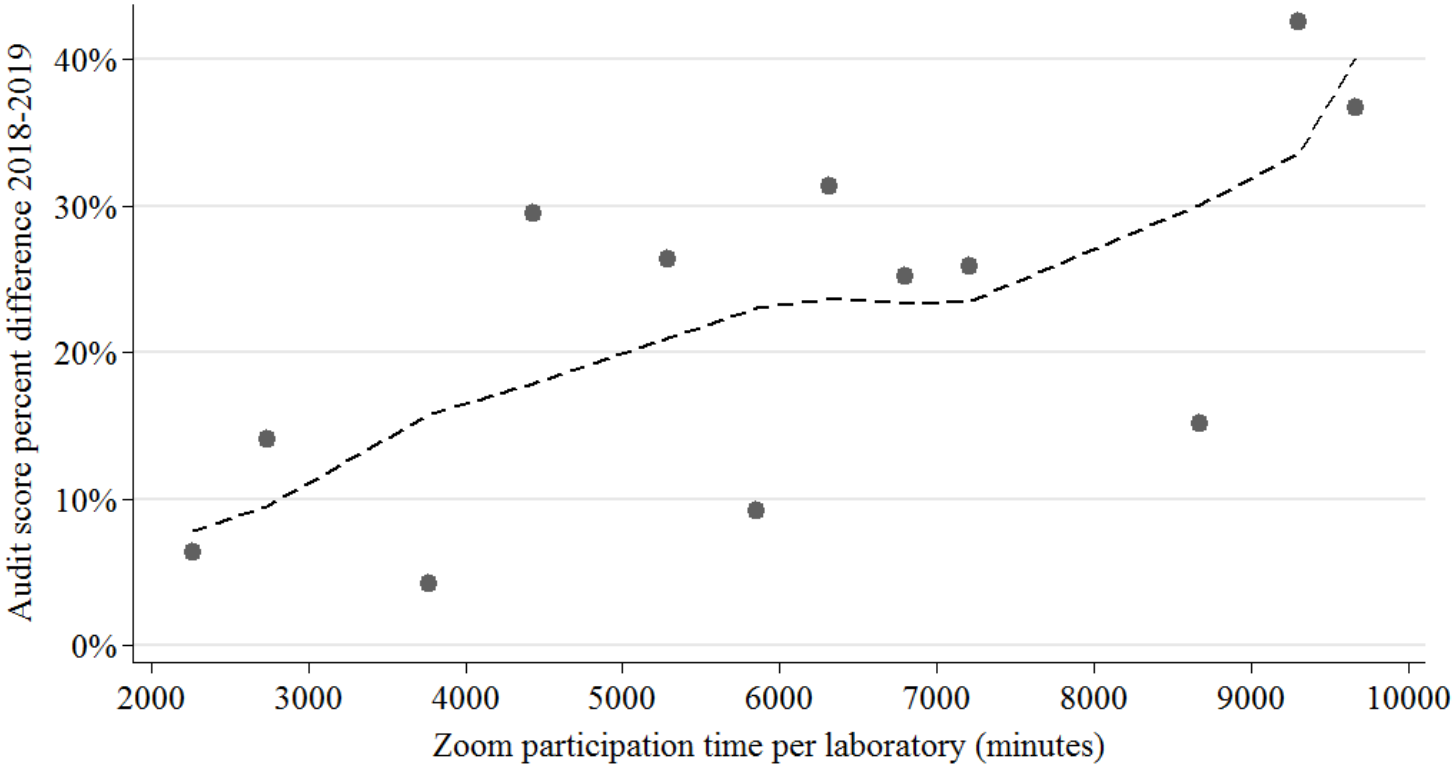
- Section 1: Documents & Records
- Section 2: Management Reviews
- Section 3: Organization & Personnel
- Section 4: Client Management & Customer Service
- Section 5: Equipment
- Section 6: Evaluation and Audits
- Section 7: Purchasing & Inventory
- Section 8: Process Control
- Section 9: Information Management
- Section 10: Identification of NCs ,Corrective and Preventive Actions
- Section 11: Occurrence/Incident Management & Process Impvmt
- Section 12: Facilities & Safety

Conducted 3 National LQMS Review Meetings in the past 5 years

Inputs vs. audit scores. What works?

	Number of completed trainings of intended participants (total participants)	Mentor days on site per laboratory	Video conference participation time (minutes)	Audit score percent difference
Labs	19 (25)	9	3766	4%
	21 (26)	10	5855	9%
	24 (25)	10	2742	14%
	23 (25)	10	6320	31%
	25 (29)	13	9302	43%
	24 (37)	13	9664	37%
	23 (24)	9	6800	25%
	21 (27)	13	5290	26%
	28 (36)	13	7210	26%
	22 (24)	8	4434	29%
	22 (26)	10	8675	15%
	22 (26)	12	2263	6%
Group mean ± SD	23± 2 (28±4)	11±2	6027±2454	22%±12%

What is the impact of remote/zoom mentoring on audit scores?

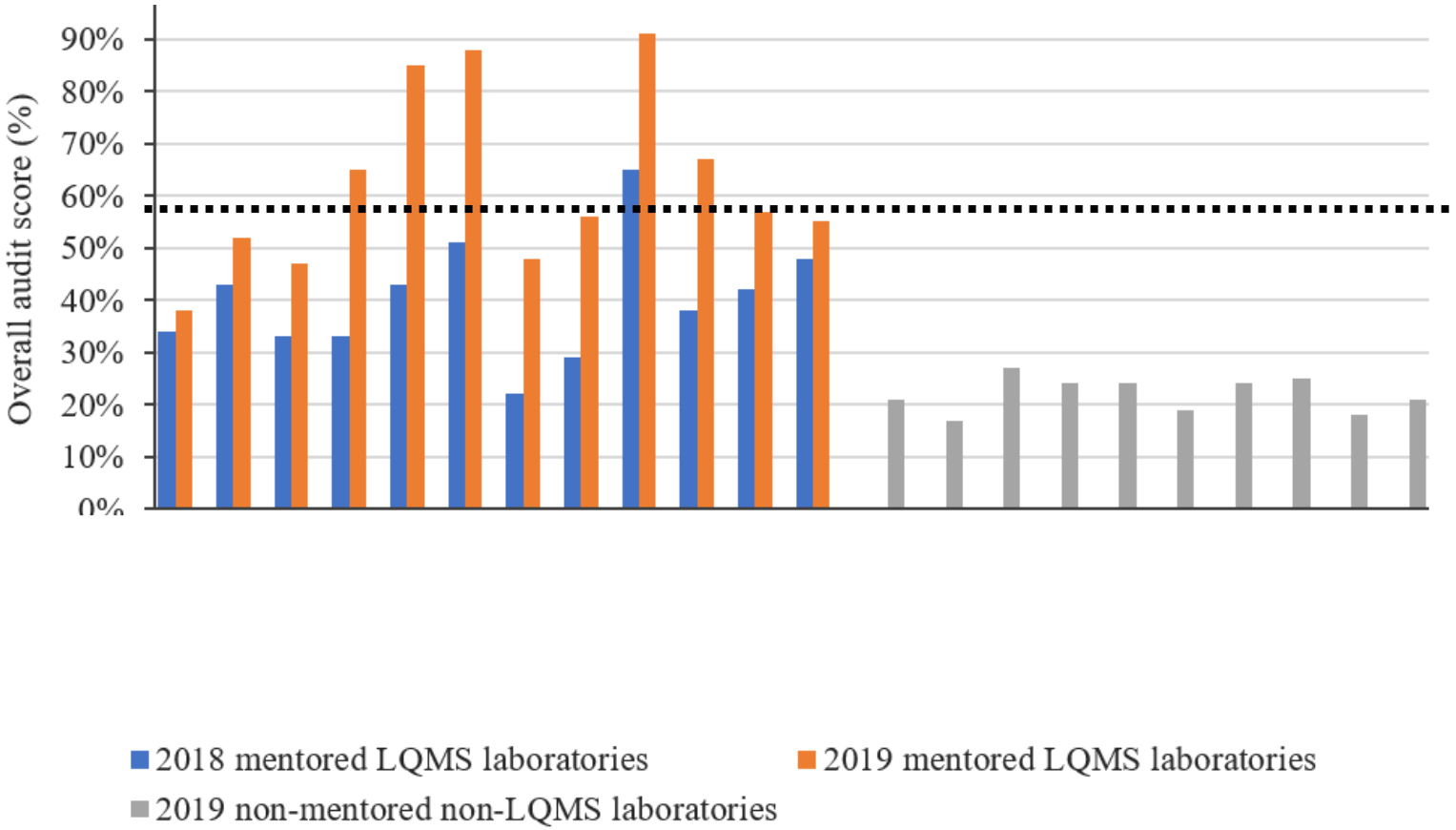


Strong relationship between laboratory participation in Zoom mentoring and differences between audit assessments (r_s=0.66, p=0.02)

Scatter gram represents the percent difference in mentored LQMS audit scores plotted against video conference participation time by lab.

Line represents a locally weighted scatterplot smoothing of the data (LOWESS curve).

Training and mentoring works.

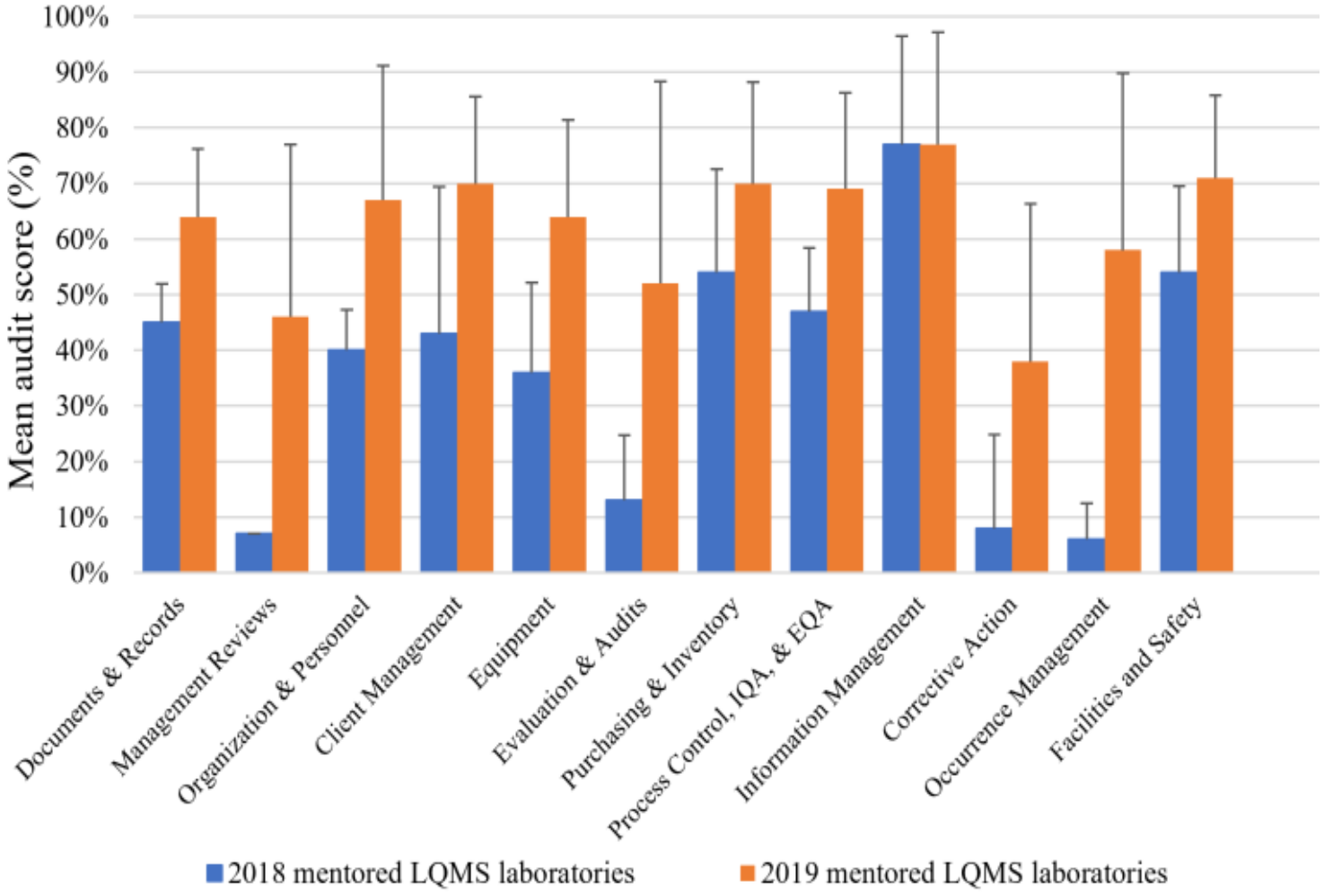


Median=57%

Overall, audit scores for mentored LQMS laboratories in 2019 **were significantly higher** than audit scores for non-mentored, non-LQMS laboratories (median=23%) in the same year (z=3.96, p=0.0001).

	Documents and records[b]	Management reviews[b]	Organization and personnel[b]	Client management and customer service[b]	Equipment[b]	Evaluation and audits[b]	Purchasing and inventory[b]	Process control and internal and external quality assessment[b]	Information management[a]	Corrective action[b]	Occurrence management and process improvement[b]	Facilities and safety[b]	Overall score[b]
2019 mentored LQMS laboratories	46%	14%	41%	40%	33%	13%	46%	50%	87%	5%	17%	44%	38%
	64%	14%	45%	60%	55%	13%	58%	57%	87%	16%	42%	70%	52%
	54%	43%	50%	70%	33%	40%	50%	47%	73%	16%	25%	60%	47%
	82%	43%	68%	70%	79%	47%	54%	73%	60%	26%	50%	74%	65%
	75%	71%	100%	90%	82%	100%	96%	94%	93%	79%	100%	84%	85%
	61%	93%	100%	90%	82%	100%	83%	97%	100%	79%	100%	88%	88%
	57%	21%	45%	50%	64%	7%	50%	57%	100%	11%	17%	53%	48%
	68%	36%	45%	70%	58%	20%	67%	60%	42%	37%	58%	72%	56%
	71%	100%	100%	90%	82%	100%	96%	91%	100%	79%	100%	98%	91%
	82%	57%	82%	60%	76%	73%	88%	57%	47%	21%	75%	70%	67%
	46%	14%	55%	70%	61%	20%	67%	66%	73%	47%	67%	72%	57%
	61%	14%	45%	70%	61%	47%	75%	66%	73%	16%	33%	60%	55%
2019 non-LQMS comparison laboratories	11%	7%	18%	0%	24%	0%	25%	33%	64%	0%	0%	37%	21%
	21%	7%	27%	10%	24%	0%	17%	17%	46%	0%	0%	19%	17%
	29%	0%	27%	10%	36%	0%	71%	18%	64%	0%	0%	35%	27%
	11%	0%	23%	10%	30%	0%	42%	25%	91%	0%	0%	40%	24%
	25%	0%	27%	30%	24%	0%	17%	28%	67%	0%	17%	37%	24%
	18%	0%	18%	10%	15%	0%	42%	17%	55%	0%	0%	30%	19%
	29%	7%	27%	10%	33%	0%	25%	33%	40%	0%	8%	33%	24%
	25%	0%	27%	20%	30%	0%	21%	30%	85%	0%	0%	35%	25%
	0%	7%	23%	20%	15%	0%	33%	18%	37%	0%	0%	35%	18%
	18%	14%	32%	10%	9%	0%	38%	28%	37%	0%	8%	33%	21%

Laboratories in the mentoring program are improving, but there is variation within the cohort



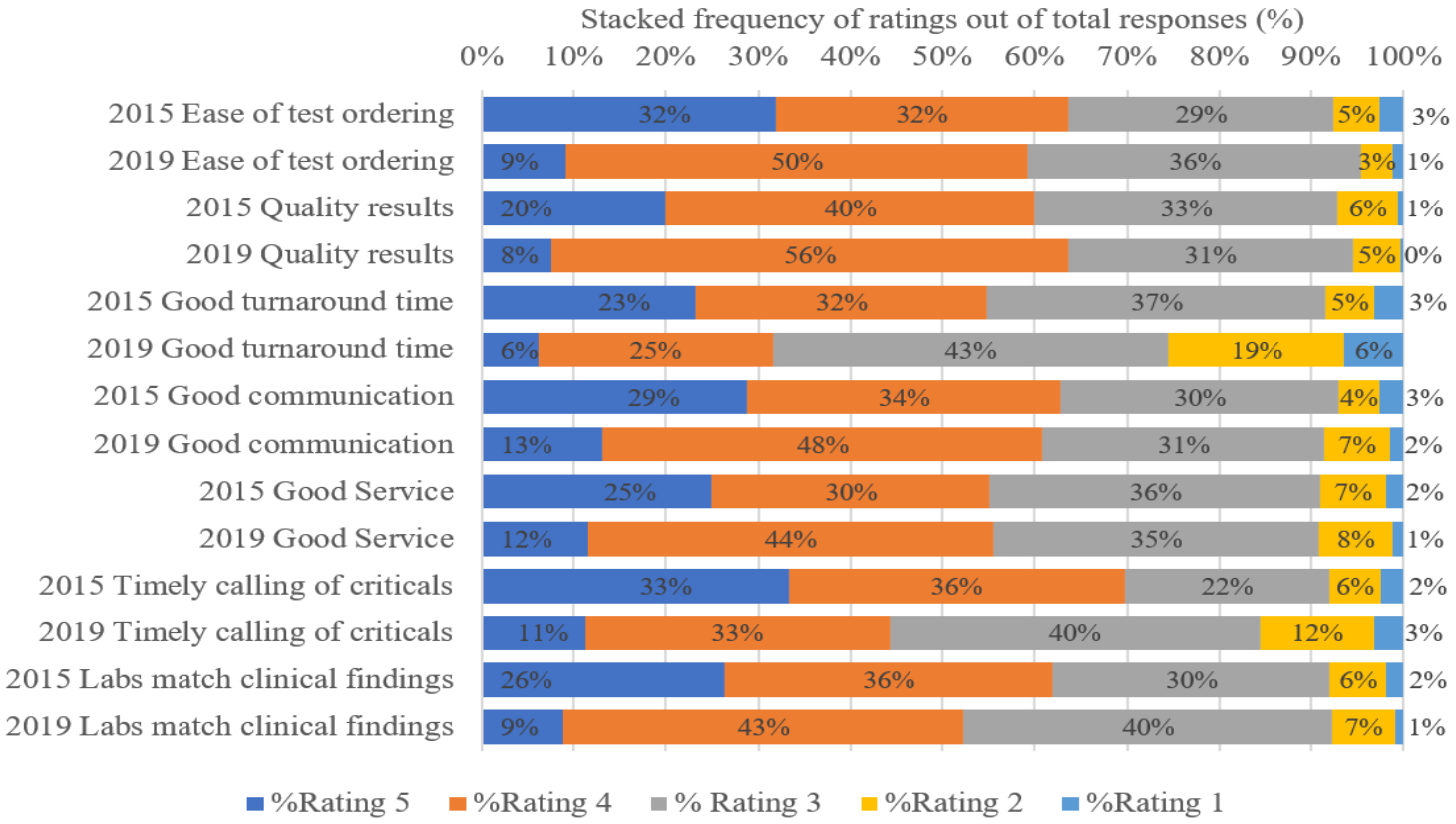
Wilcoxon Signed-Ranks Test indicated that mean audit scores for 11 out of 12 audit sections have improved significantly ($p<0.01$) between assessments, with *information management* being the exception

How well are indicators of quality changing *as a result* of improved quality management?

Changes in physician ratings of satisfaction between 2015 and 2019

What dropped:
Ease of test ordering, communication, turnaround time, timely calling of critical results, and test corroboration of clinical findings

What dropped a lot:
Turnaround time and timely calling of critical results



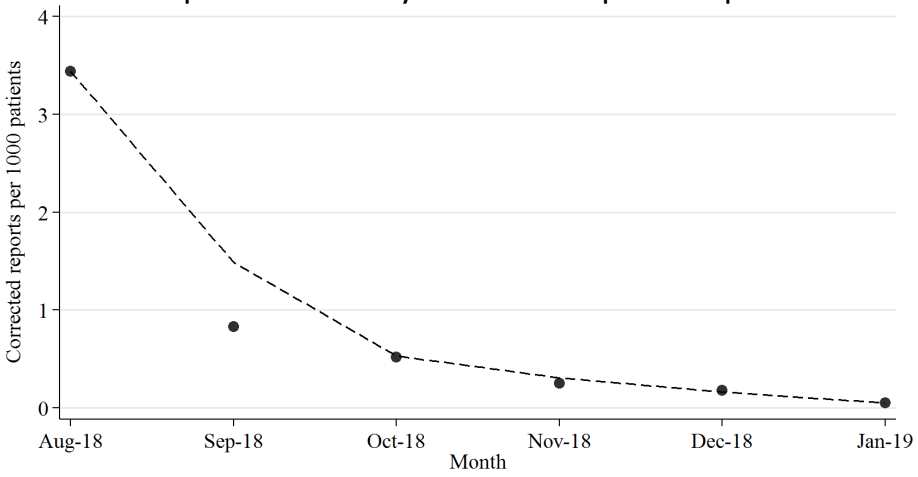
Why did physician ratings decrease? Did quality go down or did physician expectations go up?

Corrected report frequencies show no overall change over time.
A longer study may provide additional insight.

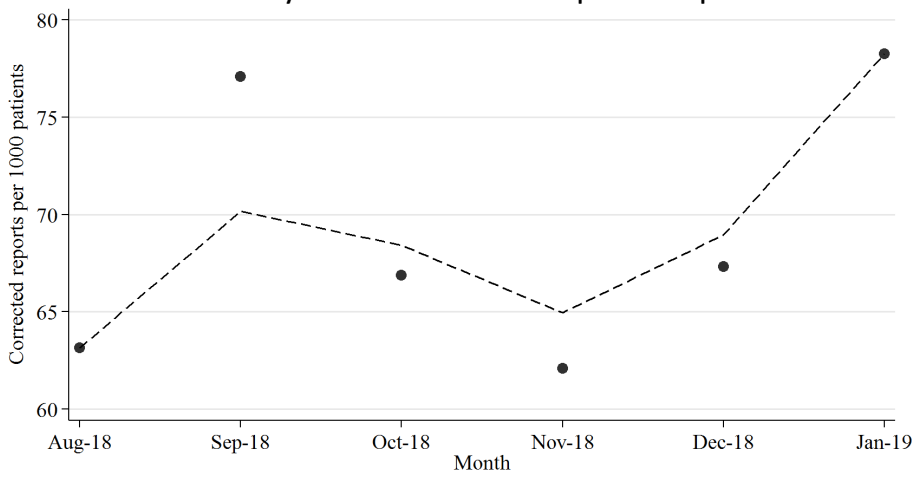
Changes in corrected report frequencies between August-2018 and January 2019

	Month						Spearman r_s	
Laboratory	Aug-2018	Sep-2018	Oct-2018	Nov-2018	Dec-2018	Jan-2019	r_s	p
.	4.3	0.37	0.058	0.30	0.21	0.034	-0.83	0.04
.	13	55	51	92	26	130	0.6	0.2
.	2.0	0.79	2.3	1.7	0.66	0.21	-0.71	0.1
.	1.8	1.1	1.1	1.4	2.0	1.0	-0.26	0.6
.	320	480	370	330	330	320	-0.086	0.9
.	16	9.7	7.6	7.7	1.9	37	-0.086	0.9
.	0.84	1.4	4.8	0.93	0.46	0.82	-0.54	0.3
.	3.4	0.83	0.52	0.25	0.18	0.051	-1.00	<0.001
.	35	24	33	19	37	25	-0.03	1.0
.	290	270	260	230	340	330	0.37	0.5
:	7.3	6.2	9.7	3.6	2.8	6.1	-0.66	0.2
Mean±SD	63±120	77±155	67±125	62±112	67±133	78±130	0.43	0.4

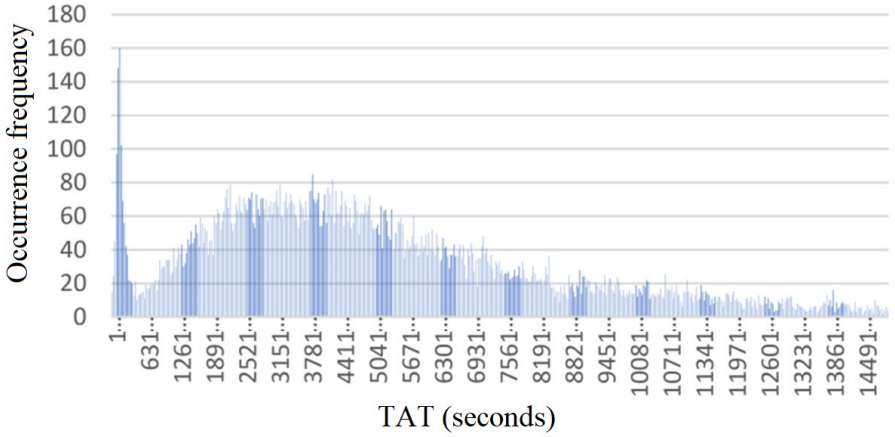
X Hospital Laboratory corrected report frequencies



Interlaboratory mean corrected report frequencies



Turnaround time (TAT) analysis

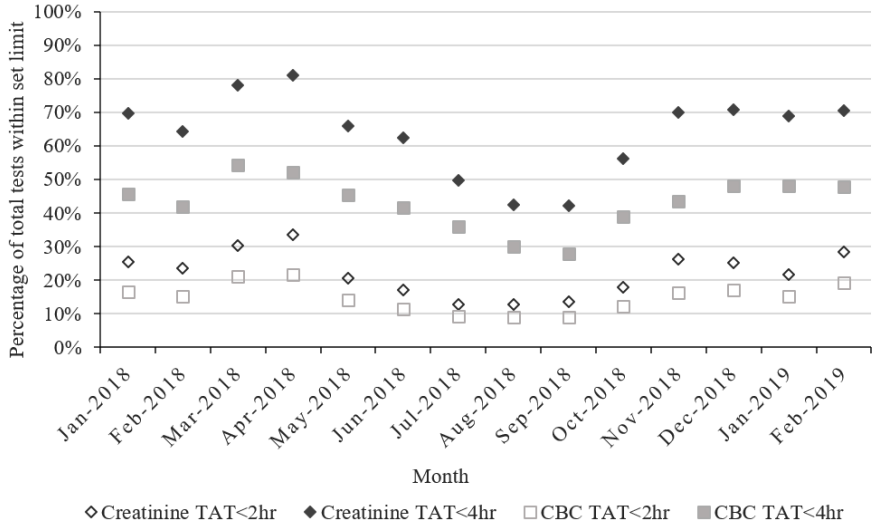


Only one laboratory provided accurate data for turnaround time analysis due to poor recording practices within laboratories

-No trend is identified-

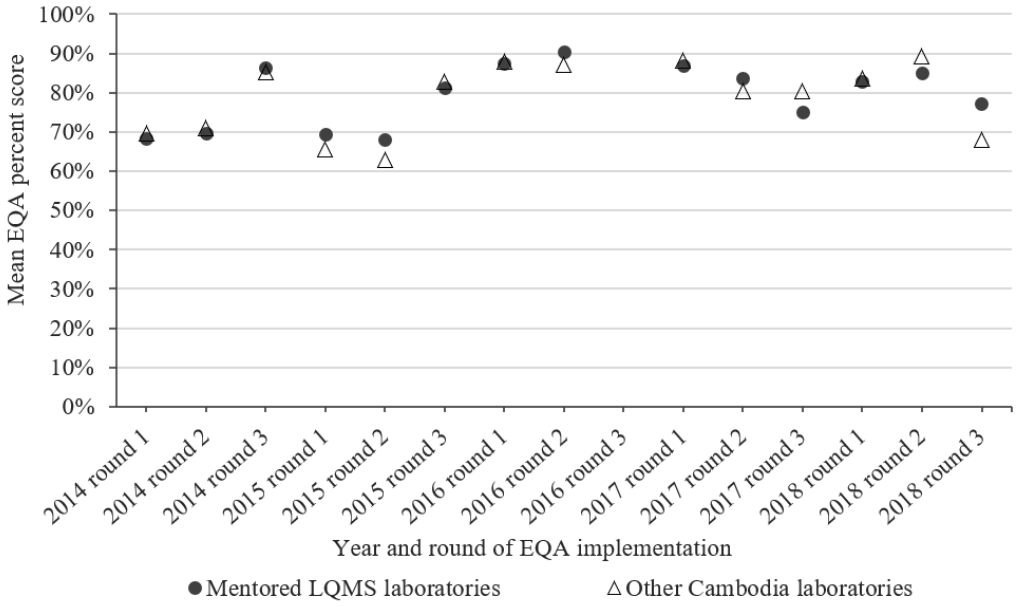
To improve laboratory timeliness, documentation practices need to be improved

Percentage of tests completed within lab TAT goals



Proficiency testing (External Quality Assessments)

Although I-TECH mentored LQMS laboratories increased in EQA program participation and compliance, average external quality assessment scores in intervention laboratories do not differ from those of other Cambodian laboratories



Key findings

- Significantly improved quality management systems
- Strong association between remote mentorship and improved LQMS
- Data from the Cambodia laboratory information system helped to identify gaps in laboratory quality
- Gaps in accurate recordkeeping may hinder process improvement, particularly in improving timeliness

Limitations

- Small sample sizes
- Confounding associations
- Missing data: Zoom calls and EQA
- Audit scores are not equal between sections, thus interpreted with caution.

Shared successes

While significant progress has been demonstrated, accreditation has still not yet been achieved, laboratories in Cambodia should continue to implement stepwise improvement programs toward accreditation with increased emphasis on improving the quality of performance indicator data for effective quality improvement.