Evaluating the effectiveness and sustainability of the Responsible Conduct of Life Sciences training in Pakistan

DR. MASHAAL CHAUDHRI

PAKISTAN BIOLOGICAL SAFETY ASSOCIATION

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Highlights

Pakistan Biological Safety Association (PBSA), Fogarty International Center (FIC) at NIH, USA and Chrome Biorisk Management conducted 4 Responsible Conduct of the Life Sciences (RCLS) Workshops.

Aim:

- Develop risk management programs for 'dual use research of concern.'
- Handle the ethical and moral issues that such research might generate.

We evaluated the workshops with a mixed-methods approach.

We looked at the impact of the RCLS training programs on effectiveness and sustainability.

Introduction

Advanced biological research has rapidly increased at institutions across Pakistan. However, biosafety and biosecurity still in its infancy.

PBSA has collaborated with the Fogarty International Center (FIC), NIH since 2013 to increase capacity in biorisk management.

As a part of the program we conducted four RCLS Workshops developed by Chrome Biorisk Management and led by its founder Tim Trevan.

The RCLS Workshop

- Addressed many aspects of the scientific process:
  - Research and public health
  - Ensuring the public's continued trust in the scientific research community and belief that science will be pursued for society's benefit, and not misused or misapplied.
  - Security, scientific publishing and public communications, biotechnology, ethics and wider societal issues.
- 22 – 29 Participants in each workshop
- Total Trained = 102
- 16 Master Trainers who further led and facilitated the workshops under International Expert

The RCLS Workshop

The workshops used an innovative combination of adult education and social psychology approaches, centered around an inverted classroom *Jigsaw Technique*, which aimed at increasing:

1. levels of participation
2. amount, depth, and duration of learning achieved
3. opportunities for participants to draw on their own experience, learn from each other, and apply this new knowledge to their own work
4. ability of the participants to replicate the workshops to teach others

Learning Objectives:

- Explain the inverted classroom jigsaw technique as a method for adult learning
- List techniques to make biosecurity training interesting and accessible for participants
- Describe how to develop a sustainable RCLS/DURC trainer program

Evaluation Purpose

- Assess if the learning objectives were met
- Describe the impact of the RCLS workshops
- Comment on the effectiveness and sustainability of the RCLS in Pakistan

Evaluation Objectives:

1. To gain insights of the workshop from the participants' perspectives
2. To determine the barriers and facilitators to the implementation from the perspectives of the participants
3. To deduce how well the program is being accepted by the participants and their organizations
4. To anticipate any unintended outcomes of the program

Methodology

- Summative/Impact evaluation
- Needs based: to identify the needs which the program responded to and investigate to what extent those needs have been met.
- A mixed-methods approach: Quantitative and Qualitative data
- An evaluation framework was developed to guide the qualitative and quantitative data. The framework included evaluation questions that shed light on the evaluation objectives.

Evaluation Framework

Quantitative Indicators

Activity	Output Indicator	Outcome Indicator	Impact
Responsible Conduct of Life Sciences workshop	# of scientists trained	% of people who go on to facilitate other RCLS workshop organized at national level	Evidence of safer behaviors adopted in target population/ laboratories. These indicators also shed light on how effectively the RCLS workshop met its objectives and it's sustainability
	% increase in knowledge after workshop	% of people who organize teaching sessions related to the topic at their own institutions or regionally	

Evaluation Framework

- Qualitative Method
- RE-AIM Framework
- Insight on different aspects on the RCLS
- Evaluation Questions used as guide during focus groups

Reach It refers to the 'measure of participation and the characteristics of the participation'	Is the program reaching the target audience? What proportion of individuals who have attended the RCLS, have used it to learn about DURC? What people in the workshops are not participating and what are the reasons of non-participation? Are these strategies in the plan effective in bringing about the desired outcome?
Effectiveness It assists in 'assessing both positive and negative consequences of the program'	Are individuals from the target group learning about RCLS? To what extent has knowledge improved in the context of RCLS? To what extent can the improvement of safety outcomes be attributed to the workshops? Are there any unintended outcomes? Are people making changes at their institutions after being exposed to the workshops?
Adoption Proportion of settings, practices, and plans that will adopt this intervention	In what ways are the participants adopting RCLS? To what extent are the training workshops a success? How many individuals completed the training? Went on to train other people? Are people making lifestyle modifications and/or behaviour changes after being exposed to RCLS?

Evaluation Framework

- Framework Continued
- Questions developed to get data about implementation and sustainability
- The answers also shed light onto the evaluation objectives

Implementation It refers to the extent to which the program is delivered as intended	Have the workshops been fully implemented as intended? How responsive is the workshop in addressing the needs of the target audience? Are the participants satisfied with the program? What factors may have impacted the implementation of the RCLS? Has the implementation of the workshops reached its full potential?
Maintenance/Sustainability It refers to the extent to which an intervention and the benefits it generates are sustained over time	Can the program run for an indefinite period of time? What additional resources would be required to maintain the running of the plan? Would you be wiling to pay for the RCLS program? What changes, if any need to be made to the RCLS?

Data Sources

QUANTITATIVE	QUALITATIVE
1. Pre-Post Scores for the RCLS 2. PBSA record of participants, trainers and institutions	3. Answer to qualitative questions on the evaluation forms 4. In Person Focus Group interviews

Data Collection and Sample Size

QUANTITATIVE

- Pre-Post Scores for the RCLS
- PBSA record of participants, trainers and institutions

- **Collected During the Workshop.**
- **Filled by all participants.**
- **N = 75**

QUALITATIVE

- Answer to qualitative questions on the evaluation forms
- In Person Focus Group interviews

- **Forms Collected During Workshop (N=75)**
- **Focus Groups Conducted 2 – 5 months after the workshop (N = 15)**
- **Semi Structured Interviews**

Data Analysis

QUANTITATIVE

- Data were analysed using computer software Microsoft Excel.
- Data were organized, put into groups; sum/percentages calculated and presented in bar/pie charts

After data analysis of the quantitative and qualitative data was complete, the themes and results were judged against the evaluation purpose and objectives.

QUALITATIVE

The interviews were transcribed verbatim. Thematic analysis of transcripts done.

Coding methods used:

1. *Descriptive coding* - summarizes what was talked about; generates a sufficient list of subtopics using descriptive nouns.
2. *InVivo coding* - prioritises and honour the participants' voices by taking a word or short phrases used by the participants themselves.

Challenges and Mitigation

Challenges

i. Lack of baseline data to make comparisons.

ii. The written qualitative surveys have limited utility as they can be self-selecting and give time to prepare responses.

iii. Focus groups may bring out a sense of competition between institutions and participants maybe hesitant to talk about true picture.

Solutions

i. Mixed method approached addressed both the number of people we have trained/institutions we have covered, trainees who went on to become trainers etc. along with qualitative data that captured impact in terms of what worked and didn't. And why it did or didn't.

ii. In-person focus groups gave answers closer to the truth.

iii. Individuals were given the option to come talk in private

We also kept in mind while doing data analysis that the answer to evaluation questions will vary based on designations of the participants.

Ethical Considerations

- Consent was taken.
- The participants were assured that what they say will not influence their chance to be invited to any future workshops.
- The transcripts were de-identified and only the researchers have access to the raw data, to maintain the anonymity of the participants.
- Additionally, identifiers were replaced with pseudonyms throughout data analysis.
- Furthermore, the participants will not be identified in any publication that might result from this report.

Results

- Effective - Increase in knowledge / Critical thinking skills
- Implementation Barriers – Structural Hierarchy
- Sustainable - 52% facilitated subsequent workshops
- Most participants reported they now keep biosecurity in mind while working.
- All participants indicated they would recommend the workshop to a colleague.

Effectiveness

- 50% increase in knowledge measured through a test
- 80% reported they now keep biosecurity in mind while working
- Qualitative Analysis – Critical Thinking, Increased Self Awareness and Self Motivation

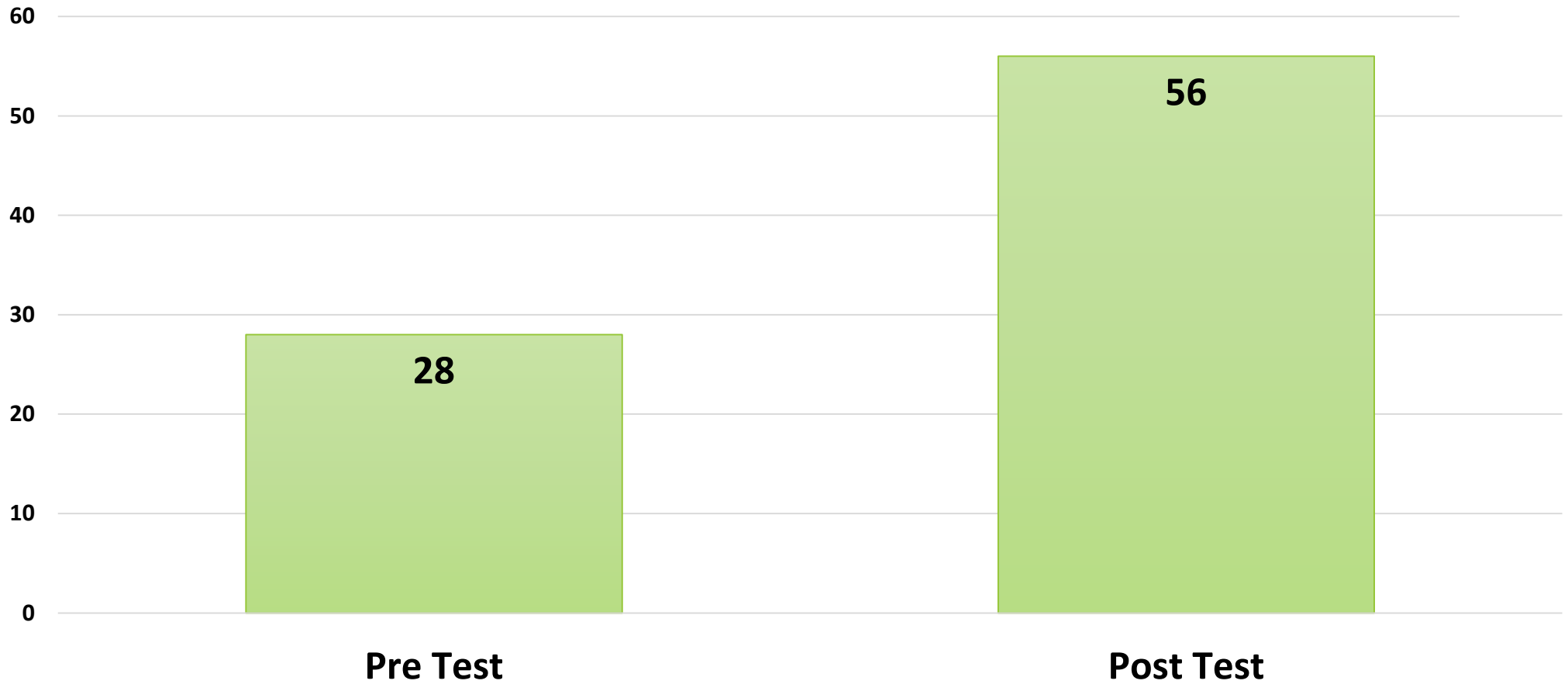
"I will try to look at proposal with a more comprehensive and holistic approach with a focus on legislative, administrative and national/international guidelines as well"

"The uncomfortable format became the most comfortable platform"

"I feel I have been woken up to these issues"

"I took the RCLS principles to my IBC committee which was very dysfunctional before and had no concept of DURC or ethics. They were impressed with what I told them and I am now in charge of incorporating these principles, RCLS ones in it"

Test Scores



Barriers

The majority (90%) of focus group participants mentioned structural hierarchy in Pakistani workplaces as a **barrier** to implementation of workshop strategies, though only 33% mentioned this in written evaluations.

"Can apply this format easily. Worried some academic engagement and administrative issues may delay the process."

"Administrative policies of the institution. The mindset of allowing certain things to be approved and follow up (may prevent me from applying this at work)"

"Changing a lab culture takes time and effort – the initial effort to catalyze this change may be too much when there are other pressing matters e.g. publishing papers"

Sustainability

Of 23 trained in the Master-Trainer Workshop, 52% facilitated subsequent workshops.

Those trained in subsequent workshops also went on to facilitate further workshops.

One of the main benefits of passing the leader, presenter and facilitator role over to locals was the reduction of Language Barriers.

"(I will be) Using similar techniques to organize other similar type of workshop."

"Will try to organize awareness among colleagues and the department regarding responsible conduct in life science."

Conclusions/Outcomes

- Objectives of the workshop were successfully achieved.
- It is an effective approach to improve participant engagement with biosecurity and DURC, however some barriers to implementation like structural hierarchy must be addressed.
- The RCLS had significant impact on how issues related to biosecurity were perceived in Pakistan.
- Sustainable though Local Trainers.

Recommendations

1. Further research to see if change in perceptions have translated into adoption of safer behaviors in the institute.

2. Engagement of Leadership is critical.

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