

A National Biosafety Curriculum: Consequences for Biosafety Training at BSL3

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Abstract

Objective: To establish a national biosafety curriculum for BSOs working at biosafety levels 1 to 3 and to evaluate its feasibility during a pilot course for BSOs at BSL3.

Methods/Implementation: In Switzerland, two Ordinances stipulate that each facility working with biological agents must assign at least one person to oversee the biological safety. In order to fulfil this task, this person must have a sufficient professional background and knowledge in safety issues. However, no further details in relation to the person's background and training are given in the legislation.

Here, we propose a biosafety curriculum that covers all necessary aspects of biosafety and biosecurity regarding the respective needs at the different levels of biosafety. We outline the curricular timetable, subjects to be covered and propose courses that go into more specific details regarding the individual needs of BSOs.

Results/Discussion: The proposed curriculum for BSL3 was evaluated with people who have or are about to gain experience working at BSL3. Feedback from participants was positive and a quick implementation of the curriculum was highly recommended. However, the proposed course will need to be adapted with regards to its length as well as content.

Conclusions: Implementation of a national biosafety curriculum will significantly increase biological safety at all levels and will improve the standing of BSOs to better fulfil their daily duties. Also, it could be shown that pilot courses can be a valuable tool to evaluate proposed curricula.

The Swiss Biosafety Curriculum

Aims of the Swiss Biosafety Curriculum

Initiative:

- Define the required specialist skills and the necessary knowledge in biosafety of BSOs (i.e. curriculum)
- Improve and harmonise the level of education of BSOs in Switzerland
- Encourage the formation of contacts between the authorities and the end users as well as among BSOs

Aims of the Swiss Biosafety Curriculum:

- BSOs must be able to
- fulfil their tasks according to national and international regulations
- convey the required knowledge and competencies and maintain them in the long term
- attain the international standard.

Setting up a Pilot Course for BSOs at BSL3

Aims of the Pilot Course:

- Determine the minimal amount of time required
- Determine the structure of a BSL3 course
- Determine what topics (based on Biosafety Curriculum) to cover
- Determine the ratio of theoretical vs. practical exercises
- Determine what training tools to use
- Feedback of participants

The training course was focused on the differences between BSL2 and 3. The course followed a red line based on three specific BSL3 scenarios:

- Work with prions
- Work with avian influenza
- Work with anthrax.

Compulsory Topics to Be Covered at BSL2 and BSL3 According to the Swiss Biosafety Curriculum

Topic	BSO at BSL2		BSO at BSL3	
Fundamentals of Biosafety	3 h		3 h	
Waste Management	2 h	1 day	2 h	1 day
Safe work practices in biorisk areas	3 h		3 h	
Hygiene, disinfection, decontamination, sterilisation	3 h		3 h	
Risk assessment	3 h	1 day	3 h	1 day
Biological hazards and lab-associated infections	1 h		1 h	
Packaging, shipping, transportation, import & export	1 h		1 h	
Laboratory and safety equipment	2 h		2 h	
Facility architecture and engineering (fundamentals)	1 h		1 h	
Personal protective equipment (fundamentals)	3 h	1 day	3 h	1 day
Biosafety training	1 h		1 h	
Barrier principles	1 h		1 h	
Facility architecture and engineering (II)			5 h	1 day
Facility operation and maintenance			3 h	
Personal protective equipment (II)			2 h	
Development of safety culture			3 h	1 day
Emergency preparedness and response			3 h	

Topics Covered during a Pilot Course for BSOs at BSL3

Day	Topic	Theoretical	Hands-on
Day 1	Introduction (risk assessment, barrier principles, biosafety in animal facilities)	yes	yes
	Laboratory & Safety Equipment	yes	yes
Day 2	Personal Protective Equipment & Measures	yes	yes
	Facility Architecture & Engineering	yes	-
	Facility Operation & Maintenance	yes	-
	Facility Tour	-	yes
Day 3	Emergency Preparedness & Response	yes	yes
	Biorisk Management (CWA 15793, Safety Culture, Training)	yes	-
	Biosecurity	yes	-

Pilot Course for BSOs at BSL3

- Participants in the pilot course were employees of SPIEZ LABORATORY and IVI.
- Main lecturers were the first two authors with support from other members (4 in total) of the two institutions
- The course was documented (filmed) and evaluated by the 3rd author

Differences between Proposed Curriculum and Pilot Course

- Duration of BSL3 specific topics extended from 2 to 3 days
- Inclusion of biosecurity in Pilot Course
- Extension of topics covering equipment and PPE

Conclusions

The course and its set up was well received by the participants. The following recommendations were put forward:

- Limit the number of participants to 6-8 people
- Practical exercises are essential
- Following a red line proved to be beneficial
- 3 days are the minimum to cover the specific aspects of biosafety at BSL3
- Biosecurity must be an integral part of the course

Outlook

The Swiss Biosafety Curriculum will start in the fall of 2009 with a BSL1 and a BSL2 course. A BSL3 course will follow in January 2010 and will be based on the recommendations of the pilot course.

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Supervising Committee of the Swiss Biosafety Curriculum