

**Quantifying the magnitude of
hazardous incidents among laboratory
staff in Kenya: Preliminary results of a
national health care workers survey,
2014-2015**

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Background

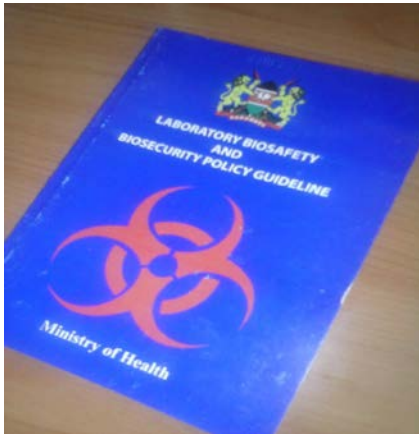
- Clinical laboratories in health care facilities receive clinical specimens with requests ;
 - infectious nature of clinical material is unknown
 - a broad request for microbiological examination for multiple agents is usually made (e.g., sputa submitted for “routine,” acid-fast, and fungal cultures).
 - US Department of Health and Human services CDC, NIH, 2009, Biosafety in microbiological and biomedical laboratories 5th edition

Background

- Laboratory staff therefore exposed to risks in the course of handling infectious materials
- Bio-safety training programs should take into account the needs assessment of the learners
 - includes assessment of the safety climate at health facilities and prevalence of occupational injuries (WHO manual, 2004)

Objective

- To quantify the magnitude of hazardous incidents among laboratory staff in Kenya



Methods

- As part of the Kenya's premier national public health laboratory's training on bio-safety and bio-security between August 2014 and March 2015, a survey on occupational hazards and the safety climate in laboratories in Kenya was conducted among laboratory staff



- Descriptive statistics was used to summarize types of hazardous incidents experienced by laboratory personnel
- Logistic regression was used to describe factors associated with reporting hazardous injury

Bio-safety/ Bio-security Training- Health Care Workers Survey Tool

Name of health facility _____ Training dates _____

1. Check job category below (check one box only)

<input type="checkbox"/> Doctor - medical officer	<input type="checkbox"/> Clinical Officer Intern
<input type="checkbox"/> Doctor - Senior	<input type="checkbox"/> Lab. Technologist / Technician
<input type="checkbox"/> Non-physician Clinical Officer	<input type="checkbox"/> Lab. Scientist
	<input type="checkbox"/> Chem. Officer

2. Duration of experience working in the hospital (in years) _____

3. When did you last receive training on prevention of exposure to hazards associated with hospital settings (Chemicals, pathogens, sharps)? _____

4. Have you been vaccinated against any of the commonly occurring pathogens in the laboratory? Yes No

5. Is HIV post-exposure prophylaxis available in your facility? (check one box only)

Yes No

6. How many times have you experienced hazardous incidents/experiences at work in the last one year?

- Fall
- Inhalation of harmful gases
- Injection of hazardous agents
- Subcutaneous chemical exposure
- Sharps injury
- Microbial spills

7. If no incident within the last one year, which year was your last incident? _____

Specify the exposure _____

8. Which conditions did the incident(s) occur? (Tick all that apply)

<input type="checkbox"/> 1. Poorly maintained equipment	<input type="checkbox"/> 6. Poorly maintained sharps
<input type="checkbox"/> 2. Poorly maintained sharps	<input type="checkbox"/> 7. Poorly maintained sharps
<input type="checkbox"/> 3. Poorly maintained sharps	<input type="checkbox"/> 8. Poorly maintained sharps
<input type="checkbox"/> 4. Poorly maintained sharps	<input type="checkbox"/> 9. Poorly maintained sharps
<input type="checkbox"/> 5. Poorly maintained sharps	<input type="checkbox"/> 10. Poorly maintained sharps

9. Which personal protective equipment were you wearing at the time of exposure (tick where appropriate)

<input type="checkbox"/> 1. Goggles	<input type="checkbox"/> 6. Goggles/face shield
<input type="checkbox"/> 2. Goggles	<input type="checkbox"/> 7. Goggles/face shield
<input type="checkbox"/> 3. Goggles	<input type="checkbox"/> 8. Goggles/face shield
<input type="checkbox"/> 4. Goggles	<input type="checkbox"/> 9. Goggles/face shield
<input type="checkbox"/> 5. Goggles	<input type="checkbox"/> 10. Goggles/face shield

10. Other: describe _____

10. Did you report the occurrence (s) to the appropriate authority? (check one box only)

1. Yes 2. No

If yes, describe the remedial action _____

11. Was remedial action offered to you (for example PPE, PPE kit)?

1. Yes 2. No

12. Did you follow up on the remedial offering?

1. Yes 2. No

13. Were incentive tests done on you? 1. Yes 2. No

14. Did you complete follow up laboratory tests? 1. Yes 2. No

15. What are some of the safety mechanisms available to you or carried out on regular basis at your workplace?

1. Adequacy of waste disposal	2. Adequacy of waste disposal
3. Adequacy of waste disposal	4. Adequacy of waste disposal
5. Adequacy of waste disposal	6. Adequacy of waste disposal
7. Adequacy of waste disposal	8. Adequacy of waste disposal
9. Adequacy of waste disposal	10. Adequacy of waste disposal

16. Has a risk assessment been done at your department to define risks and draw out mitigation measures?

Yes No

If yes, describe action taken _____

17. Are you provided with protective clothing of approved design and fabric during working hours?

Yes No

18. How useful is this survey in getting information on hazardous exposure to infectious/dangerous agents?

Yes No

19. How can this exercise be improved?

Characteristics of laboratory staff who took part in the survey

- 294 laboratory personnel participated
 - Excluded from the analysis
 - 10 from Research laboratories
 - 2 from Reference laboratories
- 282 included in final analysis
 - 204 (72%) from government-owned health facilities
 - 145 (51%) had worked at the same facility for 4+ years
 - 142 (50%) Vaccinated against Hepatitis B virus
 - 48 (17%) ever trained on biosafety & biosecurity
 - 68 (24%) had an incident reporting mechanism present

Prevalence of Occupational hazards

6% falls



41%
Sharps
injuries



7%
Hazardous
agents
ingestion



**Ever experienced
a hazard
238/282
(84%)**

33%
Hazardous
spills



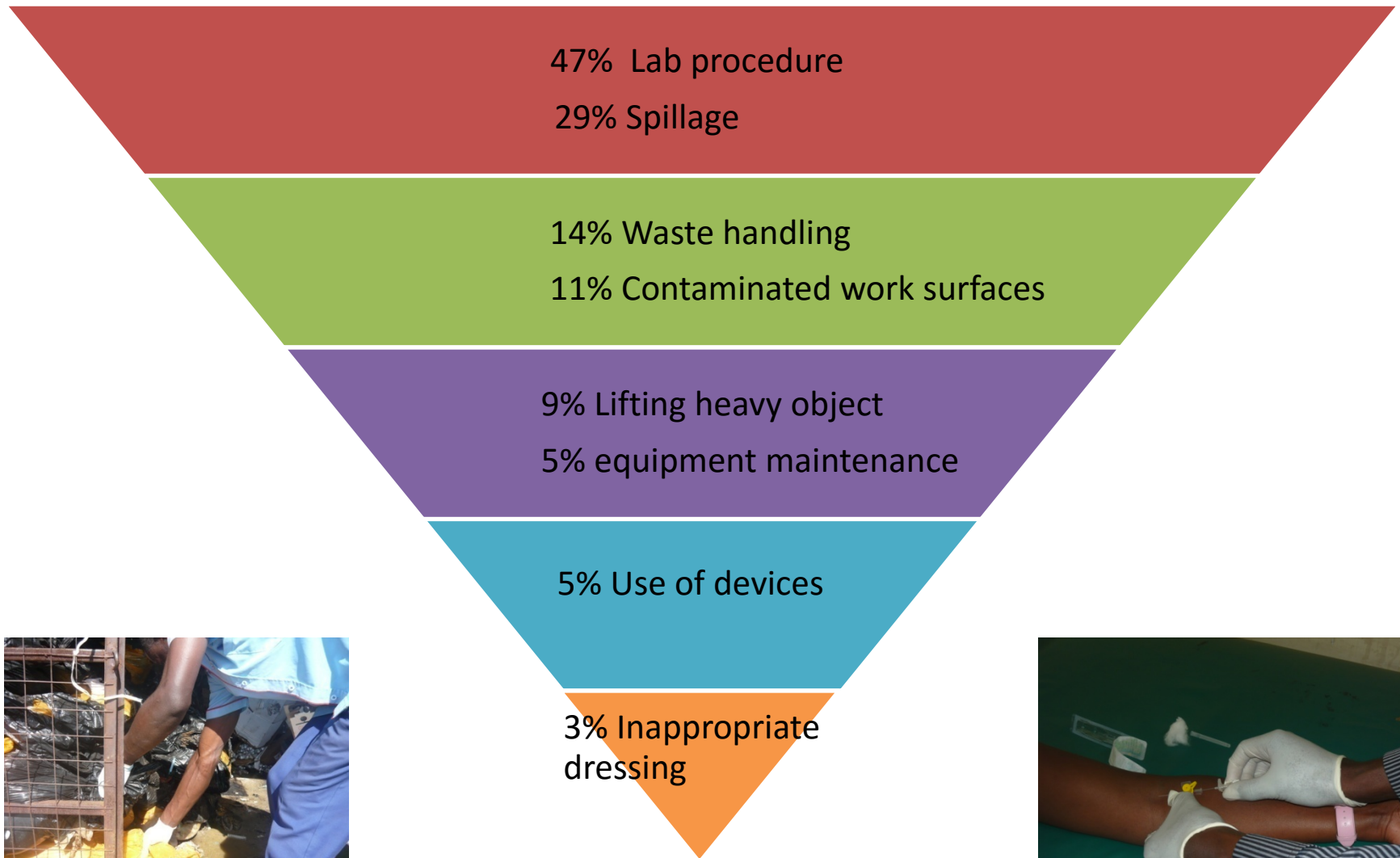
17%
Hazardous
gases
inhalation



18%
Subcutaneous
chemical
exposure



Conditions under which incidents occurred



Personal Protective Equipment donned at time of injury



11 (5%)
Respirator

189 (79%) Gloves

164 (68%) Lab
coat

6 (2%) Other PPE
3 cotton surgical gown
1 mask
1 shoes covers
1 closed shoes)

5 (2%) face shield



3 (1%)
goggles/safety
spectacles

Reporting of incidents

- Only 132/238 (55%) injuries reported
 - 11/14 (76%) of falls
 - 69/98 (70%) of sharp injuries
 - 44/79 (56%) of hazardous spills
 - 22/43 (51%) of subcutaneous chemical exposures
 - 19/41 (46%) of inhalation of harmful gases
 - 3/7 (43%) of ingestion of hazardous agents



Reporting of incidents

Participant characteristics		Reported an injury/Total 132/282 (47%) n/N(%)	Crude Odds ratio (95% CI)	P value
Ever been trained	Yes	30/50 (60)	1.8 (0.9-3.3)	0.06
	No	105/232 (45)	Ref	
Vaccinated against HepB	Yes	79/164 (49)	0.9 (0.6-1.6)	0.91
	No	57/116 (49)	Ref	
Presence of reporting mechanism	Yes	47/75 (63)	2.1 (1.2-3.5)	0.007
	No	89/205 (43)	Ref	
Work duration in facility	<4 years	56/110 (51)	1.2 (0.7-1.9)	0.57
	4+ years	80/170 (47)	Ref	
Facility type	Government owned	119/256 (46)	0.5 (0.2-1.2)	0.17
	Other	15/22 (68)	Ref	

Intervention Instituted upon reporting a hazardous incident

- Remedial action instituted for 110/132 (83%) of reported incidents
 - 3/3 (100%) of ingestion of hazardous agents
 - 64/69 (93%) of sharp injuries
 - 18/22 (82%) of subcutaneous chemical exposures
 - 35/44 (80%) of hazardous spills
 - 14/19 (74%) of inhalation of harmful gases
 - 8/11 (73%) of falls

Limitations

- Incidents surveyed were by self report and were not verified by review of facility incident-reporting logs

Conclusion

- High incidence of injuries maybe attributed to low rates of PPE use at the time of incidents ⁴
- Rates of reporting of incidents was higher in the laboratory than has been observed among other cadres ⁵
 - Maybe attributed to the safety climates at these institutions ⁶.

Recommendations

- Institute training on bio-safety and bio-security for laboratory staff⁷
- Site assessments to
 - Verify the safety climate where laboratory staff were drawn from
 - propose infrastructural changes and equipment to improve the safety climate in laboratories
- Implement an efficient, multifaceted legislation covering all aspects of occupational exposure
 - E.g. an integrated information and incident management system to routinely document occupational hazards⁸

References

- ¹US Department of Health and Human services CDC, NIH, 2009, Biosafety in microbiological and biomedical laboratories 5th edition
- ² Ministry of Health (nd) Laboratory Biosafety and Biosecurity policy Guideline, Nairobi, Kenya; NPHLS
- ³ World Health Organization (2004) Laboratory biosafety manual. – 3rd ed, Geneva, WHO
- ⁴ Mbaisi ME, Ng'ang'a Z, Wanzala P, Omolo J. Prevalence and factors associated with percutaneous injuries and splash exposures among health care workers in a provincial hospital, Kenya, 2010. The Pan African Medical Journal. 2013;14(10).
- ⁵ [Kaczan E](#) [Gottlieb I](#) [Jans H](#) 1994 Occupational injuries with risk of transmission of blood-borne pathogens. A study of a 2-year material from the Holstebro Central Hospital 25;156(30):4360-4.
- ⁶ Higgins, JJ, Weaver, P,J, Fitch P, Johnson, B, Pearl, RM, 2013 Implementation of a Personnel Reliability Program as a Facilitator of Biosafety and Biosecurity Culture in BSL-3 and BSL-4 Laboratories Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science Volume 11, Number 2
- ⁷ [Riddell LA](#), [Sherrard J](#). 2000 Blood-borne virus infection: the occupational risks. [Int J STD AIDS](#). 2000 Oct;11(10):632-9.
- ⁸ Ganczak M 2006, HIV infection under laboratory conditions , [Med Pr](#). 57(4):353-

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