

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

Contents

<i>List of Figures</i>	<i>page</i> xvii
<i>List of Tables</i>	xxii
<i>Acknowledgments</i>	xxvii
<i>List of Contributors</i>	xxix

1 Introduction and context • MARGARET COX, AMBIKA FLAVEL, AND IAN HANSON

1

1.1	Rationale	1
1.2	Scope, background planning, and flexibility	3
1.3	Structure of this book	6
1.4	Historical context	7
1.5	Semantics	9
1.6	Political and legal context	12
1.7	Forensic science and the investigation of mass murder, disposal, and concealment	15
1.8	Mass murder and disposal scenes	19
1.9	The ethical context	21
	1.9.1 Overriding code of conduct	24
	1.9.2 Contractual and operational involvement	24
	1.9.3 Treatment of human remains in investigations, analysis, and research	25
	1.9.4 Acting as an expert witness	25
	1.9.5 Education and public liaison	26
1.10	Concluding remarks	26
1.11	Inforce Foundation recording forms	26
	1.11.1 Introduction	26
	1.11.2 Selecting the correct form	27
	1.11.3 The recording forms	28

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

I Protocols for the location, excavation, and analysis of remains from mass graves and other deposition sites

2 Protocols for the investigation of mass graves •

ALISON ANDERSON, MARGARET COX, AMBIKA FLAVEL,
IAN HANSON, MICHAEL HEDLEY, JOANNA LAVER,
ALISON PERMAN, MARK VINER, AND RICHARD
WRIGHT

39

2.1	Standards and personnel	39
2.2	Phase 1 – Site assessment and evaluation	41
2.2.1	Planning	43
2.2.2	Area or site preparation	46
2.2.3	Area location	47
2.2.4	Site location	48
2.2.5	Site confirmation	50
2.2.6	Evidence processing	52
2.2.7	Documentation and recording	53
2.2.8	Assessment completion	53
2.2.9	Site integrity	55
2.2.10	Information dissemination	55
2.2.11	Evidence handover	56
2.2.12	Summary: Phase 1 – Site assessment and evaluation	56
2.3	Phase 2 – Site excavation and evidence recovery	57
2.3.1	Planning	59
2.3.2	Evidence processing	62
2.3.3	Documentation and recording	63
2.3.4	Site preparation	63
2.3.5	Site investigation I: Surface evidence	65
2.3.6	Site investigation II: Site formation and grave exposure	67
2.3.7	Site investigation III: Excavation	68
2.3.8	Completion of excavation	71
2.3.9	Site closure	72
2.3.10	Off-site analysis	73
2.3.11	Final reports	73
2.3.12	Information dissemination	73
2.3.13	Evidence handover – Check	74
2.3.14	Summary: Phase 2 – Site excavation and evidence recovery	74

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

CONTENTS

ix

2.4	Phase 3 – The mortuary	76
2.4.1	Planning	77
2.4.2	Site preparation and commissioning	81
2.4.3	Evidence management, integrity, and custody	83
2.4.4	Postmortem examination	87
2.4.5	Completion of the postmortem examination	96
2.4.6	Final reports	97
2.4.7	Case completion and closure of the mortuary	97
2.4.8	Information dissemination	98
2.4.9	Evidence handover	98
2.4.10	Summary: Phase 3 – Mortuary process	99
2.5	Appendix: Equipment lists	102

II Standard operating procedures**3 Health and safety • ALISON ANDERSON, IAN HANSON, DAVID SCHOFIELD, HENDRIK SCHOLTZ, JEANINE VELLEMA, AND MARK VINER****109**

3.1	Introduction	109
3.1.1	Statement of intent	110
3.2	General policy	110
3.3	Legal requirements	115
3.4	Health and safety in the field	115
3.5	Health and safety in the mortuary	120
3.5.1	Radiological safety in the mortuary	123
3.5.2	Supervision of safety procedures	124
3.5.3	Personal protective equipment	126
3.5.4	Health and safety during postmortem examinations	128
3.5.5	Disposal of waste	132
3.5.6	Mortuary specification	134
3.5.7	Other personnel	135
3.5.8	Health and safety and the arrival of remains at the mortuary	136
3.5.9	Decontamination and disinfectants and disinfection of the mortuary	137
3.5.10	Clinical waste management	139
3.5.11	Observation of postmortem examinations	142

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

x

CONTENTS

3.6	Documentation and recording: Risk assessment forms and logs	143
3.7	Appendix: Health and safety legislation	143
4	Scene of crime examination • SARAH DONNELLY, MICHAEL HEDLEY, TIM LOVELESS, ROMINA MANNING, ALISON PERMAN, AND ROLAND WESSLING	148
4.1	Introduction	148
	4.1.1 Scene of crime manager	149
	4.1.2 Scene of crime examiner	150
4.2	Field procedures	150
	4.2.1 Site integrity and continuity	150
	4.2.2 Evidence integrity and continuity	151
4.3	Mortuary procedures	159
	4.3.1 Mortuary integrity and continuity	159
	4.3.2 Evidence integrity and continuity	159
4.4	Forensic photography	168
	4.4.1 Photographic processes	170
	4.4.2 Digital image capture and handling	174
	4.4.3 Protection of digital photographs	175
4.5	Data storage and security	175
	4.5.1 Hardware and software	176
	4.5.2 Electronic data handling	177
	4.5.3 Postmortem database	179
	4.5.4 Laptop user policy and guide	181
5	Search, location, excavation, and recovery • PAUL CHEETHAM, MARGARET COX, AMBIKA FLAVEL, IAN HANSON, TIM HAYNIE, DAVID OXLEE, AND ROLAND WESSLING	183
5.1	Introduction	183
	5.1.1 Personnel and standards	185
5.2	Approaches and phases	189
	5.2.1 Resources	190
	5.2.2 Climate and environment	190
5.3	Area and site location	190
	5.3.1 Remote sensing and imagery	196
	5.3.2 Geophysical survey	203
	5.3.3 Other methods	206
	5.3.4 Key points	211
5.4	Site confirmation	211
	5.4.1 Surface scatters	211
	5.4.2 Site assessment	212

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

CONTENTS

xi

5.5	Forensic archaeological excavation	216
5.5.1	Forensic sites and archaeology	218
5.5.2	Survey	219
5.5.3	Grave preparation and protection	229
5.5.4	Excavation	234
5.5.5	Recovering forensic evidence	243
5.5.6	Excavation techniques	246
5.5.7	Other forensic contexts for mass disposal of human remains	252
5.6	Excavation of human remains	254
5.6.1	Excavation of human remains procedures	255
5.6.2	Documentation and recording responsibilities	258
5.6.3	Recovery of human remains	259
5.6.4	Excavation of human remains: Summary	263
5.7	Sampling and sieving	264
5.8	Site preservation and restoration	265
5.9	Documentation and recording: Field forms and logs	266
6	Mortuary procedures I – Pathology, radiography, and the role of the anatomical pathology technologist • ALISON ANDERSON, HENDRIK SCHOLTZ, JEANINE VELLEMA, AND MARK VINER	268
6.1	Introduction	268
6.2	Property and exhibits	270
6.3	Role and duties of the forensic pathologist	271
6.3.1	Medicolegal postmortem examination	271
6.3.2	Features contributing to the identification of the deceased	273
6.3.3	Establishing the cause and manner of death	275
6.3.4	Guidelines on issuing death certificates	277
6.3.5	Specimen collection and sampling	278
6.3.6	Body and specimen/sample storage	282
6.4	Role and responsibilities of the anatomical pathology technologist	283
6.4.1	Medicolegal duties	283
6.4.2	Reconstruction of the body	284
6.4.3	Viewing for identification purposes	284
6.4.4	Skeletonised remains	285

6.5	Role and responsibilities of the forensic radiographer	286
6.5.1	Personnel	286
6.5.2	Examination procedure	286
6.5.3	Equipment and storage	289
6.5.4	Recording	291
6.6	Documentation and recording: Mortuary forms and logs	292
7	Mortuary procedures II – Skeletal analysis I: Basic procedures and demographic assessment • CAROLINE BARKER, MARGARET COX, AMBIKA FLAVEL, JOANNA LAVER, AND LOUISE LOE	295
7.1	Introduction	295
7.2	Basic procedures	297
7.2.1	Defleshing, cleaning, and handling human skeletal remains	297
7.2.2	Distinguishing human from nonhuman skeletal and dental remains	301
7.2.3	Reconstruction of human skeletal remains	304
7.2.4	Determination of the minimum number of individuals and the examination of commingled skeletal remains and body parts	305
7.2.5	Application of population-specific methods	308
7.3	Assessment of taphonomic change	311
7.3.1	Types of taphonomic change	312
7.3.2	Water and taphonomic change	316
7.3.3	Assessing and recording bone surface changes	318
7.4	Estimation of ancestry	322
7.4.1	Visual assessment of ancestry	323
7.4.2	Osteometric assessment of ancestry	327
7.5	Assessment of biological sex	328
7.5.1	Morphological methods for estimating biological sex	332
7.5.2	Metrical analysis for estimating biological sex	335
7.5.3	Disorders of sexual differentiation	336

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

CONTENTS

xiii

7.6	Assessment of parturition	342
7.6.1	Methodology and recording	344
7.7	Estimation of age at death	344
7.7.1	Ageing nonadults	345
7.7.2	Ageing adults	367
7.7.3	Recording	382
8	Mortuary procedures III – Skeletal analysis 2: Techniques for determining identity • CAROLINE BARKER, MARGARET COX, AMBIKA FLAVEL, JOANNA LAVER, MARY LEWIS, AND JACQUELINE MCKINLEY	383
8.1	Introduction	383
8.2	Estimation of stature	384
8.2.1	Stature estimation from the complete skeleton	385
8.2.2	Stature estimation from complete long bones	386
8.2.3	Relative stature	390
8.3	Assessment of skeletal pathology and trauma	391
8.3.1	Skeletal pathology	396
8.3.2	Skeletal trauma	397
8.4	Examination of dentition	410
8.5	Assessment of heat-modified remains	418
8.5.1	Analytical techniques	420
8.5.2	Assessment of demography, pathology, and trauma in burnt bone	424
8.6	Assessment of handedness	425
8.7	Sampling tissue for analysis by external laboratories	426
8.8	Metrical analysis	430
8.8.1	Measurement of nonadult skeletons	432
8.8.2	Measurement of adult skeletons	434
8.9	Documentation and quality control	459
8.9.1	Recording and documentation	459
8.9.2	Quality control	459
8.9.3	Recording forms	461
9	Forensic sciences • MARTIN HALL, TONY BROWN, PETER JONES, AND DEREK CLARK	463
9.1	Forensic entomology	463
9.1.1	Introduction	463

	9.1.2	Equipment for insect collecting	465
	9.1.3	Collection of insect samples	468
	9.1.4	Killing and preservation of insect specimens	471
	9.1.5	Maintenance of living larvae	473
	9.1.6	Recording	474
	9.1.7	Summary points	474
9.2		Environmental sampling	475
	9.2.1	Introduction	475
	9.2.2	Soil and sediment	475
	9.2.3	Sampling	477
	9.2.4	Analytical methodology: Macroscopic	478
	9.2.5	Analytical methodology: Palynomorphs	478
	9.2.6	Analytical methodology: Mineralogy and geochemistry	481
	9.2.7	Conclusions	482
9.3		DNA analysis	482
	9.3.1	Introduction	482
	9.3.2	Rationale	483
	9.3.3	DNA quality and quantity	485
	9.3.4	Sampling from bodies	485
	9.3.5	Field preservation of samples	486
	9.3.6	Sample verification	487
	9.3.7	Contamination issues	487
	9.3.8	Recording, packing, labelling, and transporting	489
9.4		Forensic odontology	490
	9.4.1	Introduction	490
	9.4.2	Personnel	490
	9.4.3	Procedure for dental identification	491
	9.4.4	Age assessment in neonates and infants	492
	9.4.5	Forensic odontological examination and recording	492
	9.4.6	Collection of antemortem records	496
10		Antemortem data collection: Interaction with families and communities • MARGARET SAMUELS	498
	10.1	Introduction	498
	10.2	Antemortem data collection	499
		10.2.1 Engaging informants	501
		10.2.2 Data collection tool	502
		10.2.3 Engaging appropriate staff	502

Cambridge University Press

978-0-521-86587-6 - The Scientific Investigation of Mass Graves: Towards Protocols and Standard Operating Procedures

Margaret Cox, Ambika Flavel, Ian Hanson, Joanna Laver and Roland Wessling

Table of Contents

[More information](#)

CONTENTS

xv

10.2.4	Elements of an antemortem data tool	503
10.2.5	Informant rights and terminating the interview	507
10.3	Viewing human remains and clothing	507
10.4	Traumatic events and reactions	508
10.5	What can the forensic team and helping professional do?	511
10.6	The professionals' own reactions	513
	<i>Bibliography</i>	517
	<i>Index</i>	543