

Risk assessment and process planning for bariatric patient handling pathways

Prepared by **Loughborough University**
for the Health and Safety Executive 2007

Risk assessment and process planning for bariatric patient handling pathways

Sue Hignett, Susan Chipchase
Amanda Tetley & Paula Griffiths
Department of Human Sciences
Loughborough University
Leicestershire
LE11 3TU

The obese population in the UK is growing and this group are considerably over-represented in their use of health and social care services. This project aimed to identify and explore the manual handling risks and process planning for bariatric patients by mapping the patient pathway for an emergency admission to identify the major risks by:

- reviewing public health data to provide an estimate of the current and future bariatric patient population;
- surveying strategic, clinical and operational policies and procedures for bariatric patient handling; and
- obtaining case studies of specific incidents and risk management actions.

Findings revealed that 40%-70% of Trusts did not have a bariatric policy. These policies are needed to lead the process planning, assessment and management of manual handling risks including the number of staff, provision of appropriate equipment and intra- and inter-agency communication. Spatial risk factors were identified but seemed to have a poor management record for both building and vehicle design with over half of the Trusts with policies not considering space in the policy; almost 30% of ambulances not having specialist vehicles and 33% of respondents reporting inaccessible areas in their buildings. Even with good communication it was not always possible to manage all of the risks, and the provision of appropriate equipment and successful management of pain, safety, dignity and comfort all contributed to successful pathway experiences.

This report and the work it describes were funded by the Health and Safety Executive (HSE). Its contents, including any opinions and/or conclusions expressed, are those of the authors alone and do not necessarily reflect HSE policy.

HSE Books

© Crown copyright 2007

First published 2007

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of the copyright owner.

Applications for reproduction should be made in writing to:
Licensing Division, Her Majesty's Stationery Office,
St Clements House, 2-16 Colegate, Norwich NR3 1BQ
or by e-mail to hmsolicensing@cabinet-office.x.gsi.gov.uk

PROJECT TEAM

The following individuals contributed directly to this research:

Sue Hignett	Healthcare Ergonomics and Patient Safety Research Unit Dept of Human Sciences Loughborough University	Principal Investigator
Paula Griffiths	Healthcare Ergonomics and Patient Safety Research Unit Dept of Human Sciences Loughborough University	Co-investigator
Susan Chipchase	Healthcare Ergonomics and Patient Safety Research Unit Dept of Human Sciences Loughborough University	Research Associate
Amanda Tetley	Healthcare Ergonomics and Patient Safety Research Unit Dept of Human Sciences Loughborough University	Research Associate
Emma Crumpton	Healthcare Ergonomics and Patient Safety Research Unit Dept of Human Sciences Loughborough University	Research Associate
Joanna Prichard	Healthcare Ergonomics and Patient Safety Research Unit Dept of Human Sciences Loughborough University	Research Associate (Bariatric FSEs)

ACKNOWLEDGEMENTS

The project group would like to thank the following people for their help and support particularly with data collection and analysis: Dennis Prosser (HSE), Ian Strudley, (HSE), Stuart Charles (HSE), Anita Rush (Berkshire Community Equipment Services), Alan Hill (East Midlands Ambulance Service), Terry Doherty (East Midlands Ambulance Service), Hilary Pillin (Ambulance Service Association), members of the National Back Exchange Special Interest Group on Bariatrics, members of the National Ambulance Risk & Safety Forum, the participants in the focus groups and case study interviews and the respondents to the questionnaire.

We would also like to thank the members of National Back Exchange who participated in the Functional Space Experiment. Huntleigh Healthcare and Liko (UK) kindly loaned equipment and furniture for the FSEs.

CONTENTS

Executive Summary.....	xi
Background	xi
Aims of the current study	xi
Method	xi
Results	xi
Discussion and Conclusions.....	xiii
Recommendations For Future bariatric Strategies	xiii
1 Introduction.....	1
1.1 Context	1
1.2 Aims	2
2 Literature review	3
2.1 Background	3
3 Method	6
3.1 Overview of methods	6
3.2 Equipment survey.....	6
3.3 Focus groups/group interviews	7
3.3.1 Participants	7
3.3.2 Focus Group protocol.....	7
3.4 Population data.....	9
3.4.1 Participants	9
3.4.3 Data Analysis	11
3.5 Questionnaire survey.....	12
3.5.1 Introduction	12
3.5.2 NBE Questionnaire development.....	12
3.5.3 Ambulance Questionnaire development	13
3.5.4 National Back Exchange and Ambulance Service questionnaire analysis.....	14
3.6 Case studies.....	15
3.6.1 Participants	15
3.6.2 Interview protocol	15
3.7 Ethics.....	18
3.7.1 Research Governance	18
4 RESULTS	19
4.1 Equipment	19
4.2 Focus groups	20
4.2.1 Pathway 1. A&E – X-Ray – ward – discharge/nursing home (figure 6).....	21
4.2.2 Pathway 2. Patient home – ambulance – hospital - home (figure 7)	23

4.2.3	Pathway 3. Bed and Breakfast bedroom – Ambulance – Maternity – Ultrasound – Delivery – Home (figure 8).....	23
4.2.4	Specialist Areas: (1) Ward Hygiene, (2) Diagnostics, (3) Mortuary, (figure 9) and (4) Community (figure 10).....	26
4.2.5	Pathway 4: Theatres (figure 11)	29
4.2.6	Pathway 5: Admission – Care (ward)– Transfer - Physiotherapy (figure 12).....	31
4.2.7	Manual handling risks in the Bariatric Patient Journey.....	34
	Patient Factors [A]	34
	Building/Vehicle Space and Design [B]	34
	Equipment (manual handling and clinical) and furniture [C]	34
	Communication [D]	34
	Organisational and Staff Issues [E].....	35
4.3	Population data.....	35
4.3.1	Hip and waist circumference estimations.....	35
4.3.2	Weight estimations.....	38
4.3.3	BMI estimations	40
4.4	Questionnaire survey.....	44
4.4.1	National Back Exchange questionnaire.....	44
	Response rate	44
	Respondent characteristics.....	44
	Defining ‘bariatric’	46
	Bariatric manual handling policy.....	47
	Experience of risks and risk assessments.....	49
	Patient Issues.....	49
	Building space/design	52
	Manual handling training (bariatric).....	52
	Bariatric equipment.....	52
4.4.2	Ambulance questionnaire.....	54
	Response rate	54
	Respondent characteristics	54
	Definition of ‘bariatric’	56
	Manual handling policies and procedures.....	56
	Patient Issues.....	56
	Risks and Risk assessments	58
	Communication.....	59
	Manual handling training (bariatric).....	59
	Equipment.....	59
	Transporting patients	60
4.5	Case studies.....	63

4.5.1	Booked, routine, urgent inter-hospital transfer with 2 days notice from urban ambulance station.....	63
4.5.2	Emergency admission to hospital (ambulance perspective).....	63
4.5.3	Emergency admission to hospital (hospital perspective)	64
4.5.4	Advanced planning for an emergency admission to hospital (Community Equipment Specialist Nurse).....	65
4.5.5	Emergency admission to Hospital (Lead Handling Advisor in an Acute Hospital) 66	
4.5.6	Bariatric maternity patient (Lead Handling Advisor in an Acute Hospital).....	67
4.5.7	Planned Surgical Admission (Manual Handling Advisor at Acute Hospital)	67
4.5.8	Emergency Admission (Manual Handling Advisor, Acute Hospital Trust)	68
4.5.9	Emergency admission to hospital (Ambulance Service).....	70
4.5.10	Planned discharge of patient to home from community hospital (Social Services) 71	
5	Discussion.....	72
5.1	Patient factors.....	72
5.2	Building/Vehicle Space and design.....	73
5.3	Equipment (manual handling and clinical) and furniture.....	74
5.4	Communication	75
5.5	Organisational and staff issues	76
5.5.1	Organisational Issues.....	76
5.5.2	Staffing issues	77
5.6	Limitations	78
6	Conclusions.....	79
6.1	Recommendations	79
7	Bariatric Functional Space experiment	81
7.1	Method	81
7.1.1	Participants	81
7.1.2	Equipment	82
7.1.3	Tasks	82
7.2	Results	83
7.3	Conclusion.....	85
8	References.....	87

LIST OF FIGURES

Figure 1 Examples of body shape	4
Figure 2 Project protocol.....	6
Figure 3 Draft questionnaire schedule included with ethics application.....	13
Figure 4 Draft Interview Schedule	16
Figure 5 Final Interview Schedule	17
Figure 6 Pathway 1: Scenario - Journey from Admission to the Ward. Focus Group 16 th March 2006 [Secondary Coding refers to Figure 14]	22
Figure 7 Pathway 2: Scenario- Community. Focus Group 16 th March 2006 [Secondary Coding refers to Figure 14].....	24
Figure 8 Pathway 3: Scenario - Maternity. Focus Group 15 th March 2006 [Secondary Coding refers to Figure 14].....	25
Figure 9 Specialist areas (1) Ward Hygiene; (2) Diagnostics; (3) Mortuary [Secondary Coding refers to Figure 14].....	27
Figure 10 Specialist areas (4) Community general issues.....	28
Figure 11 Scenario: Theatres. Focus Group 16 th March 2006 [Secondary Coding refers to Figure 14].....	30
Figure 12 Scenario: Focused on location. Focus Group 16 th March 2006 [Secondary Coding refers to Figure 14].....	32
Figure 13 Manual handling risks in the bariatric patient pathway	33
Figure 14 Hip circumference percentiles (50 th , 85 th , 95 th , and 99 th) for males (A) and females (B) aged 15 years and over for the period between 1993 and 2004	36
Figure 15 Waist circumference percentiles (50 th , 85 th , 95 th , and 99 th) for males (A) and females (B) aged 15 years and over for the period between 1993 and 2004	37
Figure 16 Weight percentiles (50 th , 85 th , 95 th , and 99 th) for males (A) and females (B) aged 15 years and over for the period between 1993 and 2004.....	39
Figure 17 Increase in proportion of adults in obesity Class I (BMI over 30) Class II (BMI over 35), and Class III (BMI over 40) for males (B) and females (C) separately, and for the overall population (A)	41
Figure 18 Proportion of adults in obesity Class I (BMI over 30) predicted from 1993 to 2010 .	43
Figure 19 Reasons for non-return of questionnaires	44
Figure 20 Number of bariatric patients encountered and/or written guidance provided in the previous twelve months (n = 212).....	46
Figure 21 Definition of 'bariatric' in percentages (n = 210).....	47
Figure 22 Adherence to the manual handling bariatric policy (n = 87)	48
Figure 23 Organisational success at minimising manual handling risks and planning to avoid problems (n = 200).....	50
Figure 24 Organisational success at achieving a high level of patient safety, dignity, and comfort (n = 200)	51
Figure 25 Number of bariatric patients encountered and/or written guidance provided in the previous twelve months (n = 18).....	55
Figure 26 Definition of 'bariatric' (n = 18).....	56

Figure 27 Patient safety, comfort, and dignity in the Ambulance Service (n = 17).....	57
Figure 28 Ambulance Trusts: Minimising manual handling risks and planning to avoid problems (n = 17).....	58
Figure 29 Time to access specialist bariatric equipment (n = 11).....	61
Figure 30 Number of bariatric ambulances available (n = 18).....	61
Figure 31 Types of vehicles used to transport bariatric patients (n= 18).....	62
Figure 32 Case Study: Inter-hospital transfer (urgent).....	63
Figure 33 Case Study: Admission from GP referral (emergency).....	64
Figure 34 Case Study: A&E orthopaedic admission (emergency).....	65
Figure 35 Case Study: Admission following proactive assessment (Community Nurse).....	66
Figure 36 Case Study: A&E medical admission (emergency).....	66
Figure 37 Case Study: Maternity admission (planned).....	67
Figure 38 Case Study: Surgical/Orthopaedic admission (planned).....	68
Figure 39 Case Study: Medical admission (urgent).....	69
Figure 40 Case Study: Medical admission (urgent).....	70
Figure 41 Case Study: Planned discharge.....	71
Figure 42 Bariatric model for FSEs.....	81
Figure 43 Equipment for Bariatric FSE.....	82
Figure 44 Tasks for Bariatric FSE.....	813
Figure 45 Link Analysis for resuscitation task from one FSE (Task 2.5).....	84

LIST OF TABLES

Table 1 Number of valid measures included in population data analysis.....	10
Table 2 Summary of equipment survey.....	20
Table 3 Parameter estimates used to predict the trends in obesity from 2005 to 2010.....	42
Table 4 Job titles, employment sectors, and the regions of the UK, (n = 211).....	45
Table 5 Minimum and maximum pre-defined weight and BMI to define 'bariatric'.....	47
Table 6 Bariatric policies addressing the generic risks (n = 34).....	48
Table 7 Percentage of respondents who identified each of the barriers to the effectiveness of their bariatric manual handling policy.....	49
Table 8 Risk assessments for admission and discharge.....	50
Table 9 Frequency of general and specific bariatric manual handling.....	52
Table 10 Availability and use of bariatric equipment.....	53
Table 11 Storage places for bariatric equipment.....	53
Table 12 Problems accessing specialist bariatric equipment.....	54
Table 13 Job titles and the regions of the UK (n = 17).....	55
Table 14 Ambulance Service: Frequency of general and specific bariatric manual handling	59
Table 15 Availability of bariatric equipment in the Ambulance Service.....	60

Table 16 Problems accessing specialist bariatric equipment 60

Table 17 Methods used to load/lift patients into ambulances 62

Table 18 Link Analysis results..... 85

APPENDICES

Appendix 1 National Back Exchange questionnaire

Appendix 2 Ambulance questionnaire

Appendix 3 Equipment survey

EXECUTIVE SUMMARY

BACKGROUND

The obese population in the UK is growing and this group are considerably over-represented in their use of health and social care services. The manual handling of these patients presents a specific challenge partly due to individual factors but also due to the lack of policies, space, equipment and vehicles for safe care, treatment and transportation. Previously the risk factors associated with the bariatric patient pathway through the health and social care systems have not been investigated systematically.

AIMS OF THE CURRENT STUDY

The primary aim was to identify and explore the manual handling risks and process planning for bariatric patient pathways by:

1. Mapping the patient journey (pathway) for an emergency medical admission (e.g. breathing problems) to identify the major risks.
2. Reviewing public health data to provide an estimate of the current and future bariatric patient population.
3. Developing, distributing and analysing a national questionnaire to manual handling experts and back care advisors to survey strategic, clinical and operational policies and procedures for bariatric patient handling.
4. Visiting key informants to obtain case studies of specific incidents and risk management actions in the bariatric patient pathway.

METHOD

The project used five methods: (1) an equipment/furniture survey to identify the range and availability of manual handling equipment for people weighing over 190kg; (2) four group interviews (n=25) with key stakeholders to map the bariatric patient journey (pathway) to identify the manual handling risks; and (3) a review of public health data to provide an estimate of the current and future bariatric patient population. These three data sources were then used to develop (4) a questionnaire that was used to survey strategic, clinical and operational policies and procedures for bariatric patient handling (n=212). The final method (5) was a series of 10 case study interviews to obtain examples of specific incidents and risk management actions.

RESULTS

The greatest range of equipment safe working load (SWL) was for stretcher/trolley/treatment couches with a SWL from 200kg to 1,100kg. There were 28 hoists/stand-aids identified with a SWL of 190kg to 500kg and 24 bathing aids (commode, shower chair, transfer bench and commode) with a SWL of 160kg to 454kg. 25 chairs (SWL from 172kg to 341kg) and 21 beds (SWL from 190kg to 454kg) were available. Only one supplier of theatre tables (SWL 450kg) was found. There were 14 models of walking aids (SWL from 190kg to 340kg) but only one option for crutches (SWL 272kg to 318kg).

Throughout the bariatric patient pathway five themes emerged as generic risks: patient factors [A], building (or vehicle) space and design [B]; equipment (manual handling and clinical) and furniture [C]; communication [D]; and organisational and staff issues [E].

The population data identified that there has been a continual increase in the waist and hip circumferences of typically 5cm or above since 1995, for the top 50, 85, 95, and 99% of the both the male and female population. The weight of the top 50, 85, 90, and 99% of the population has increased over this period for both males and females. These increases have been in the range of between 3kg and 15kg. Since 1993 there has been approximately a 50% increase in the proportion of individuals with a BMI over 30 and more than a 100% increase in the proportion of individuals with a BMI over 35 or 40. If current trends continue 26% of the adult population of England will be obese by 2010.

230 responses were received from approximately 44% of acute Trusts, 25% of PCTs and 56% of ambulance Trusts. Three main definitions of 'bariatric' were used by these Trusts: (1) if weight exceeds a predefined value (wide range); (2) if weight/size permits the use of the required equipment; (3) patients with complex needs. 42% of the acute and primary care Trusts reported that their organisation had a specific policy for bariatric patients but only 28% of the ambulance Trusts has such a policy. 82% of the acute and primary care Trusts rated their organisations as quite to extremely successful at achieving a high level of patient safety in contrast to only 53% of the ambulance Trusts. Again the acute and primary care Trusts felt that they were mostly successful at achieving a high level of patient comfort (74%) in contrast to the ambulance Trusts (24%). 84% of the ambulance Trusts reported that risk assessments were conducted before admitting a bariatric patient to hospital and prior to discharge in contrast to only 40% of the acute and primary care Trusts. 89% of the ambulance Trusts communicated the risk assessment information to the hospital before arrival.

38% of acute and primary care Trust respondents suggested there were parts of the building (e.g. hospital, nursing home) essential to patient care that could not be accessed by bariatric patients. 89% of ambulance respondents reported that the Fire Service did assist with the extraction and transportation of bariatric patients, but 56% reported that this was only in an emergency. The remaining respondents (44%) stated that the Fire Service do help for both emergency and non-emergency cases. None of the respondents reported having an official contract with the Fire Service.

Over 75% of all respondents reported that their organisations provided staff with general manual handling training. Over 35% of all Trusts explicitly stated that no extra manual handling training for bariatric patients was provided in their organisations

77% of acute and primary care and 61% of ambulance Trusts had specialist bariatric equipment. In the acute sector equipment was least likely to be available in theatre and x-ray, but when available it was more likely to be used with every bariatric patient. Most popular storage places for bariatric equipment were on individual hospital wards (44%) and in central storage units (30%). In the ambulance Trusts the equipment was mostly stored in the ambulance station or on bariatric ambulances. 64% of ambulance Trusts reported that bariatric equipment could be available within two hours of arriving at the patient's location but only 39% had specialist bariatric ambulances. The most commonly reported problems with accessing equipment related to staff not being aware of equipment (52%); not being able to find it (52%); not being able to use it due to confined spaces (44%); or not knowing how to use it (41%).

Ten case studies were collected to give examples of specific incidents and risk management actions. These included both urgent and planned admission for medical, surgical and maternity pathways. The case studies were analysed to identify successful management of the generic

risks. The risk factor managed least successfully was building (or vehicle) space and design [B], with only 6 of the case studies reporting success in overcoming this risk factor.

The Bariatric Functional Space Experiment (FSE) determined that an average width of 3.93m, length of 4.23m, and area of 16.61m² was needed for the safe care and treatment of a bariatric patient. The spatial requirements recommended by the Department of Health Estates and Facilities Directorate are currently 3.6m (width) by 3.7m (length) giving an area of 13.32m² (NHS Estates, 2005).

DISCUSSION AND CONCLUSIONS

Based on the analysis of data from 1993-2004 there is an upward trend, with almost one third of the population likely to be obese (BMI greater than 30) by 2010. Many of the equipment and furniture risks related directly to the weight, shape and size of the patient. Although a wide range of manual handling equipment was reported to be available, the demand is likely to grow and more focus should be placed on 'fit' rather than just the safe working load.

40%-70% of Trusts did not have a bariatric policy. These policies are needed to lead the process planning, assessment and management of manual handling risks including the number of staff, provision of appropriate equipment and intra- and inter-agency communication. For a policy to be successful it must be supported throughout the organisation; staff must be encouraged to follow it (training) and resources (equipment and spaces) must be available. Spatial risk factors were identified throughout the pathway but seemed to have a poor management record for both building and vehicle design. Over half of the case studies suggested that addressing these risks were fundamental to the success of the pathway but over half of the Trusts with policies did not consider space in the policy; almost 30% of ambulances did not have specialist vehicles and 33% of NBE respondents had inaccessible areas in their buildings. Most acute and primary care Trusts thought that their Trust managed patient dignity, safety and comfort well but the ambulance Trusts rated safety and comfort much lower, especially comfort (24%). The provision of appropriate equipment and successful management of pain, safety, dignity and comfort all contributed to successful pathway experiences. The case studies suggested that the success of the pathway was determined by communication between and within the different agencies. However, even with good communication it was not always possible to manage all the risks, e.g. equipment availability and space constraints.

RECOMMENDATIONS FOR FUTURE BARIATRIC STRATEGIES

- Strategic policies need to be formulated to equip the NHS for the rapidly growing obese population in England.
- Operational policies are needed to lead the process planning, assessment and management of the manual handling risks for the care and treatment of bariatric patients.
- Buildings and vehicles need to be designed to accommodate bariatric patients in safety and comfort and with dignity.
- Equipment needs to be designed to 'fit' a range of bariatric shapes and sizes (using population data).
- Training is needed to support the assessment of bariatric patients and the use of specialist manual handling and clinical equipment.

1 INTRODUCTION

1.1 CONTEXT

The obese population in the UK is growing and is presenting an increased risk for manual handling in health and social care. Although the morbidly obese population is relatively small they are considerably over-represented in their use of health and social care services. When an emergency medical admission (DoH, 2004) is required the pathway for transporting the patient from their home is complex and can be very hazardous for both the patient and the attending staff. At present ambulance services respond with several A&E crews and often need to call the Fire Service for additional assistance. The extrication of the patient may be very undignified and rarely uses specially designed bariatric lifting equipment (Yeomans, 2004). Patients have been carried on the floor of the ambulance rather than secured on a stretcher. On arrival at hospital patients are being reported to have been ‘dragged’ down hospital corridors due to the lack of appropriate procedures, space and equipment. In the ward space presents a major risk for safe working practice due to compromised working postures and inappropriate equipment. On discharge special transport services have been resourced requiring multiple ambulance and social service teams. For unsuccessful outcomes fork-lift trucks have anecdotally been reported to have been used to transport coffins from the mortuary to the crematorium.

The provision of health and social care to obese (bariatric) patients presents difficulties in all areas of health and social care services. The manual handling of these patients presents a specific challenge partly due to individual factors but also due to the lack of space, equipment and vehicles for safe care, treatment and transportation (Hignett et al, 2003). If the patient is cared for at home then appropriate furniture and equipment has to be provided to fit the available space and environment. If the patient is transported to hospital appropriate vehicles and equipment are needed to ensure a safe and dignified transfer. In hospital, severely obese patients often require specialist furniture and equipment to receive basic care, e.g. beds, chairs, commodes, wheelchairs, hoists and toilet facilities.

Previously the risk factors associated with the bariatric patient pathway through the health and social care systems have not been investigated systematically. A ‘patient pathway’ is the route that a patient will take from first contact with the NHS (usually their GP), through referral, to completion of their treatment. It is also the period from entry into hospital until the patient is discharged (Department of Health website, 2006). For example, the patient pathway might incorporate extrication from the scene of an emergency through to Accident and Emergency, and then admission to a ward. Alternatively it might involve admission to a ward, transportation to diagnostics and/or theatre and then discharge. There are many risk factors associated with the care of bariatric patients that might present themselves during this pathway.

At each stage of the journey the care-givers may be responding reactively, without carrying out proactive risk assessments, increasing the musculoskeletal risks associated with excessive load manual handling.

1.2 AIMS

This project aims to identify and explore the manual handling risks associated with the care and treatment of a bariatric patient during their journey in health, social care and domestic settings by:

1. Mapping the patient journey (pathway) for an emergency medical admission (e.g. breathing problems) to identify the major risks e.g. space, equipment, organisational interfaces.
2. Reviewing public health data to provide an estimate of the current and future bariatric patient population.
3. Developing, distributing and analysing a national questionnaire to manual handling experts and back care advisors to survey strategic, clinical and operational policies and procedures for bariatric patient handling.
4. Visiting key informants to obtain case studies of specific incidents and risk management actions.

2 LITERATURE REVIEW

2.1 BACKGROUND

The term bariatric comes from *barros* (Greek) meaning large or heavy (American Society of Bariatric Physicians, 2003) but the application of this term is used to include a wider population than the definition of obesity. Individuals with a Body Mass Index (BMI) of greater than 30 are classified as obese, and greater than 40 as morbidly obese.

The prevalence of obesity is increasing at an alarming rate. In the United States of America the age-adjusted prevalence of obesity was 30.5% in 1999-2000, an increase up from 22.9% in 1988-1994, the prevalence of extreme obesity (BMI ≥ 40) also increased significantly from 2.9% in 1988-1994 to 4.7% in 1999-2000 (Flegal et al, 2002). Similar rates of increase in obesity and extreme obesity have also been shown in England. The proportion of males who are obese has increased by 8.3% from 1999 to 2004, whilst the proportion of obese females has increased by 2.1% (Health Survey for England, 2004). This growth in the size and weight of the general population will also be reflected in an increase in the size and weight of people attending for health and social care (Sturm, 2002).

The majority of reports of obesity trends use BMI data (e.g. Flegal et al, 2002), however it has been shown that by examining waist circumference in young people even greater increasing trends have been shown, suggesting that the use of BMI data may have systematically underestimated the prevalence of obesity (McCarthy et al, 2003). This has an impact for health and social services in providing appropriately sized equipment for their future patients/clients as waist circumference may cause difficulties with equipment when there are no problems with safe working load. As the increasing trends of overweight in children and adolescents has shown (Ogden et al, 2002), the issue of providing health/social care for patients of an increasing size and weight needs to be addressed in the short term and also in the long term as there will be increasing proportions of larger patients. The relationship between increasing BMI and health risk has been well established (WHO, 1998; Cuiilso et al., 2005) and it may be that very large people have a greater likelihood of needing health care than those not overweight/obese.

Transportation to hospital might be the first occasion where risk factors present themselves in the bariatric patient pathway. For example, when very large or heavy patients need to be taken to hospital, for an emergency or planned admission there can be physical and logistical difficulties in getting the patient out of the house and transporting them to the hospital (Beebe et al, 2002). When patients are extremely large, many staff might be required to lift and transport the patient to the ambulance, and in extreme cases, fire-fighters may be required to remove doors and widen walls within the patient's house (Brunette, 2002). Beebe et al (2002) identified difficulties experienced by ambulance crews when trying to move a large patient from their house using a standard backboard including: the patient may not fit on the board, or they may exceed its safe working load which makes it difficult for the crew to carry and manoeuvre the patient and retain their grasp of the board; the board may bend or break; the patient must be lifted from ground level up to waist height and this requires significant upper body strength; some morbidly obese patients cannot tolerate lying flat for more than 10 minutes, whilst some cannot tolerate it at all due to breathing difficulties which precludes this method of moving a patient. They go on to describe methods that have been used to move patients in the USA including using basket stretchers normally used for wilderness rescues and the modification of existing equipment e.g. a tarpaulin to be used with a flat platform warehouse style cart. Ambulance crews are routinely instructed not to transfer patients on stretchers when they are in

the elevated position because of the potential for it to tip, although crew may sustain back injuries from bending over to pull or push the stretcher when it is in a low position (Beebe et al, 2002).

Difficulties in transporting large patients from rural areas (as described in Australia, and may be relevant to some parts of the UK) can occur when a patient's size/weight precludes transportation by air. If long distance road transport is required as an alternative to air transport, difficulties can be experienced with the inability to utilise bed pans or successfully insert indwelling urinary catheters, pressure care and frequent requirements for continuous non-invasive respiratory support (Grant and Newcombe, 2004).

When a bariatric patient is admitted to hospital a series of risk factors associated with care have been identified. These patients will present with different body shapes (Dionne, 2002) resulting in, for example, hip widths in excess of 400mm for even the shortest stature (figure 1). This requires consideration because the patient width may exceed the width of the equipment. For example, weight limits and width accommodations of the hospital bed (side rails and bed frame), wheelchair, bedside commode/shower chair should be assessed (Barr and Cuneen, 2001).

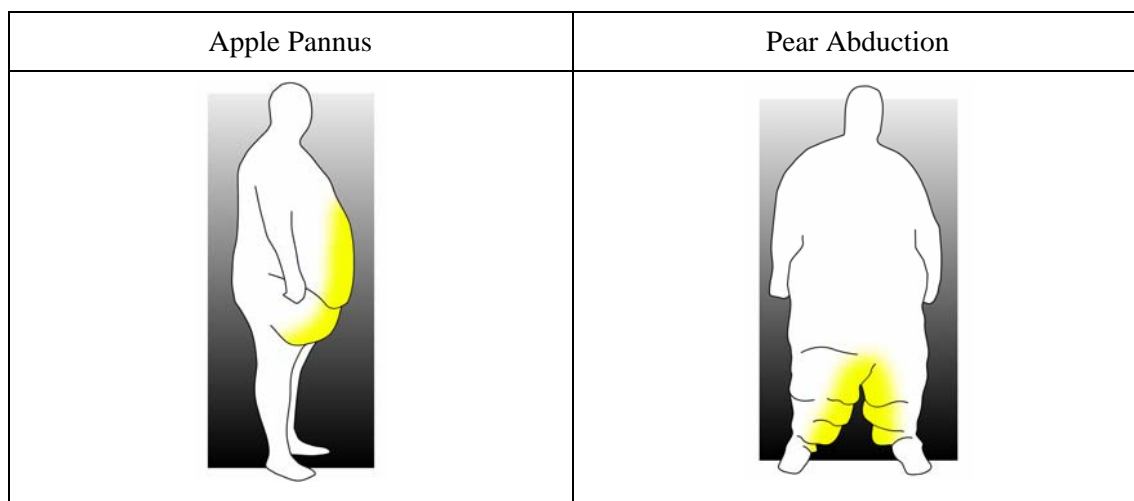


Figure 1 Examples of body shape

Bariatric patients are at increased risk of pressure sores due to poor blood supply to fatty tissue resulting in skin breakdown (Barr and Cuneen, 2001). They are more likely to suffer from hip pressure ulcers than thinner patients due typically to prolonged unrelieved pressure from a side rail, wheelchair or commode, particularly in the patient with very wide hips (Gallagher, 1999). To prevent pressure ulcers patients may need turning or repositioning requiring immense physical effort by care-givers. Techniques used with non-obese patients may not be feasible with a very large patient and specialised equipment may be required (e.g. overhead bars or turning devices) (Gallagher, 1999). Renting such specialised equipment may be costly but the financial costs of treating a full-thickness pressure ulcer can be considerable, estimated to be \$70,000 in the USA (Braun et al, 1992). Mathison (2003) suggests that the risk of skin breakdown in the morbidly obese patient is also increased due to immobility caused by improperly sized rooms and equipment and inadequate staff numbers or staff who lack training

in bariatric patient care. Tissue death leading to pressure ulcers can develop in as little as 2 hours over pressure points if pressure is unrelieved (Bergstrom et al, 1994).

The anthropometric (body segment) dimensions for individuals of these weights could present difficulties for the equipment currently provided in most ambulance services.

3 METHOD

3.1 OVERVIEW OF METHODS

The project used five methods to identify and explore the manual handling risks in the patient journey as shown in figure 2. After the literature review the first stage included: (1) an equipment/furniture survey to identify the range and availability of manual handling equipment for people weighing over 190kg; (2) four group interviews with key stakeholders to map the bariatric patient journey (pathway) to identify the manual handling risks; and (3) a review of public health data to provide an estimate of the current and future bariatric patient population. These three data sources were then used to develop (4) a questionnaire that was used to survey strategic, clinical and operational policies and procedures for bariatric patient handling. The final method (5) was a series of 10 case study interviews to obtain case studies of specific incidents and risk management actions in relation to the bariatric patient journey.

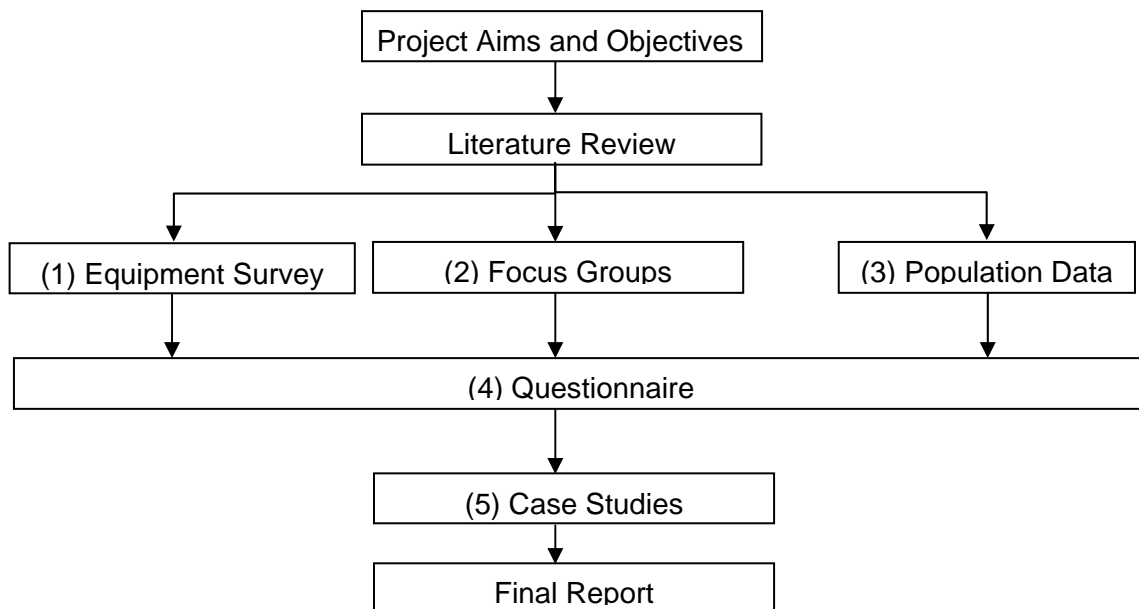


Figure 2 Project protocol

3.2 EQUIPMENT SURVEY

To identify equipment and furniture suitable for people weighing over 190kg (30 stone) bariatric patients experts were contacted through three networks: (1) National Back Exchange (UK); (2) European Panel on Patient Handling Ergonomics; and (3) International Ergonomics Association Technical Committee on Healthcare Ergonomics. Information was also collected from exhibitors at the Disabled Living Foundation conference (12th Moving and Handling People conference, March 2006) and via an internet search on Google using the search term 'bariatric equipment'.

Manual handling equipment was included if it had a maximum safe working load of at least 190kg. This limit was chosen as many standard items of equipment have a safe working load to this limit and the aim of this survey was to identify equipment specially designed for people weighing more than the standard safe working load.

3.3 FOCUS GROUPS/GROUP INTERVIEWS

Focus groups/group interviews are an efficient way of generating substantial amounts of data by collecting information from several people at the same time (Robson, 2002). The 'focus' for these open-ended group interviews related to the specific topic under discussion. The aim was to develop a first framework for the patient journey in an emergency admission and identify the major manual handling risks e.g. space, equipment, organisational interfaces. These data were then underwent a preliminary analysis to inform the questionnaire development and interview schedule for the case studies. Several sessions were held to facilitate participation from all health and social care sectors and geographical areas across England.

3.3.1 Participants

The participants were recruited from the National Back Exchange (NBE) Special Interest Group on Bariatrics (100 members) and the National Ambulance Risk & Safety Forum (71 members). An invitation was issued: (1) at the NBE group meeting on 31st January 2006 (followed up by an email on 6th February 2006); and (2) with an email to the Ambulance Forum on 13th February 2006.

Forty-four people (10 from the Ambulance Service, 34 from National Back Exchange) expressed an interest in participating. To facilitate participation the locations of the four focus groups were spread across the UK in Leeds, Loughborough (2) and London during March 2006. Twenty-five people took part in the focus groups, 20 from National Back Exchange and 5 from the Ambulance Service. The first two focus groups were held at Loughborough University. Four participants attended on the 15th and seven attended on the 16th March. The third focus group was held in London on the 22nd March, with eight participants attending and the final focus group was held in Leeds on the 23rd March with six participants.

The participants represented the acute (n=14), community including primary care and social services (n=6) and ambulance sectors (n=5). They included Back Care Advisors/Manual Handling Co-ordinators (n=17), Health and Safety Advisors including Risk Managers (n=4) and clinical staff (n=4).

3.3.2 Focus Group protocol

In each session participants were split into two sub-groups according to their own area of expertise (i.e. whether they worked in the acute sector or in the community). Each sub-group was given a scenario detailing the weight/height of a particular bariatric patient and the patient journey. The sub-groups were asked to describe all of the manual handling risks involved in this journey and discussed the scenario for approx 20 minutes within their sub-group and then for a further 15 minutes with the whole group.

As the data collection progressed the scenarios were developed to achieve theoretical saturation. It was found that the participants did not always have knowledge of specific parts of the pathway so elements of scenarios were considered in more detail to maximise data collection. The first focus group discussed 3 scenarios: surgical, maternity and medical emergency admissions. Preliminary fishbone diagrams were drafted to capture these data and to identify further areas for future data collection. The fishbone diagrams were enlarged and if necessary, separated, to capture the detail of the manual handling risks and issues.

Focus group (FG) 2 discussed the surgical and maternity emergency admissions and a modified medical emergency admission (scenario 4) with an additional scenario (5) to address community issues in more detail. Focus groups 3 and 4 discussed the surgical and maternity emergency admissions, a modified medical emergency admission (scenario 6) and the community scenario (5).

Scenario 1: Surgical emergency admission (FG 1, 2, 3, 4)

Pathway: Upstairs bathroom in back of house: - Ambulance - A&E - X-ray - Orthopaedic ward - Theatre - Nursing home.

Patient: Female, 80 years, 5ft 2ins (1.57m), 18 stone (114 kg), BMI = 46.

Condition: Fallen with fracture to neck of femur; Three days on the floor, grade 4 pressure ulcer on hip and the sacrum; conscious.

Additional issues: needs to be hydrated, anaesthetic risk.

Scenario 2: Maternity emergency admission (FG 1, 2, 3, 4)

Pathway: In upstairs bedroom of Bed and Breakfast (B&B) holiday accommodation - Ambulance - Maternity - Home (50 miles away).

Patient: Female, 30 years, 5ft 5ins (1.65m), 35 stone (222 kg), BMI = 82.

Condition: Pregnant 28 weeks gestation, in labour (early), diabetic, conscious.

Additional issues: on holiday in the area, very narrow path to front door of B&B, needs ultrasound scan

Scenario 3: Medical emergency admission (FG 1)

Pathway: On sofa in living room - Ambulance - A&E - Coronary care ward – Diagnostics (ECG) – Home.

Patient: Male, 45 years, Caucasian, 5ft 10ins (1.78m), 55 stone (349kg), BMI = 110.

Condition: Heart attack, diabetes, previous left below knee amputation, right above knee amputation, conscious.

Additional issues: 999 call received at 2am, needs cannulation, incontinent (double catheter), early self-discharge.

Scenario 4 (modified from scenario 2): General Medical/Surgical pathway (FG 2)

Pathway: Ward – Admission - Personal care – Transferring - Therapy – Rehabilitation

Patient: Male, 45 years, Caucasian, 5ft 10ins (1.78m), 55 stone (349kg), BMI = 110.

Scenario 5: Discharge into community (FG 2, 3, 4)

Pathway: Community – Patient's home (environment, equipment, staff, vehicle for transfer, return to community)

Patient: Male, 45 years, Caucasian, 5ft 10ins (1.78m), 55 stone (349kg), BMI = 110.

Scenario 6 (modified from scenario 4): Emergency medical admission (FG 3, 4)

Pathway: Acute – A&E - X-ray – Ward – Bathrooms – Diagnostics – Rehabilitation - Mortuary

Patient: Male, 45 years, Caucasian, 5ft 10ins (1.78m), 55 stone (349kg), BMI = 110.

3.4 POPULATION DATA**3.4.1 Participants**

The Health Survey for England recruits a nationally representative sample of people of different age, sex, geographic area and socio-demographic circumstances using stratified random sampling from the Postcode Address File (PAF). Data from 150,822 male and female participants aged 15 and above from the Health Survey for England between 1993-2004 were included in this study. In some years (1997, 1999, 2000, 2002, and 2004), it also recruits a representative boost sample (for e.g., children, ethnic minorities, and older people). For the purposes of this study, only the data from the general population were used and therefore the boost samples were excluded. Table 1 reports the total sample size for each of the 11 years.

Table 1 Number of valid measures included in population data analysis
(NA: Data not available for the general population sample for this year)

<i>Measurement</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>
Weight	15517	14852	14930	15576	8206	14825	7186	7206	14262	6732	13570	5806
BMI	15284	14680	14675	15304	8075	14558	8533	7083	13913	6591	13270	5674
Waist	13848	13297	NA	NA	7333	13259	809	NA	12060	5687	10931	438
Hip	13873	13325	NA	NA	7339	13258	577	NA	12074	5689	10975	437
Total Sample Size (N)	15805	15805	16292	16684	8721	16154	7930	8121	15907	7517	15074	6812

3.4.2 Measures

The specific measures used in this study were:

- Weight
- Hip circumference
- Waist circumference
- A derived measure of BMI.

Height and weight were measured in an initial interview session. Hip and waist circumference were measured in a subsequent nurse visit. Information was then provided to suggest whether each of the measures were valid. Notably, waist, and hip, measurements were not obtained each year, or were only obtained for specific groups of the population. Specifically, in 1995 and 1996, these measures were not obtained for any of the sample. In the 2000 survey, these measures were only taken for those respondents over 65 years old, and in 1999 and 2004, they were only taken for those belonging to ethnic minorities.

3.4.3 Data Analysis

For the weight measures, the 50th, 85th, 95th, and 99th percentiles were calculated for males, and females separately for each survey year. For hip and waist measures this analysis was conducted for the years where these measures were available for the general population. (i.e., 1993, 1994, 1997, 1998, 2001, 2002, 2003). For the years 1995 and 1996 waist and hip circumference was not measured. In 1999 these measures were only taken for ethnic minorities and in 2000 and 2004 they were only taken for those aged over 65.

In addition to calculating the percentiles for the measures of weight, hip circumference, and waist circumference, the proportion of obese individuals in three different obese classes was also calculated for the overall population and for males and females separately for each survey year. The three obese classes were defined as i) BMI over 30 (class I), ii) BMI over 35 (class II), and iii) BMI over 40 (Class III).

After calculating the proportion of individuals with a BMI over 30 across the years 1993 to 2004, it was also useful to estimate the continued growth in this population after 2004. To estimate trends in any measure, a model must be fitted to the existing data. This model can then be used to predict y values for x values outside the available dataset. Using this method, it was possible to predict the proportion of the English population who might be obese in the years up to 2010. To determine the model which most closely fit the existing data for the proportion of obese individuals between 1993 and 2003, initially the data were modelled using linear, quadratic, and cubic models in SPSS. It was desirable for the model to explain almost all the variance in the proportion of adults with a BMI over 30. Thus given that, if the model was able to predict all at the variation in the data from 1994 to 2003, the R-squared value calculated for the model would be one, the closer this value was to one, the more appropriate the model was for predicting obesity into the value. The result of this process suggests that a cubic function ($R^2 = 0.997$) provides a better estimate of the overall population than either the linear ($R^2 = 0.995$) or quadratic function ($R^2 = 0.995$) and so was chosen to provide an estimate of the growth in the proportion of obese individuals between 2005 and 2010. However, using this function to predict the data between 1993 and 2004 for the overall sample indicated that the standardised residual for 2001 was greater than 2. For this reason, this data point was removed from the analysis and linear, quadratic, and cubic curves were modelled to the overall data for a second time. With the data from 2001 removed, the cubic function ($R^2 = 0.999$) continued to provide a

better estimate of the data than either the linear ($Rsq = 0.998$) or quadratic function ($Rsq = 0.998$). Thus the proportion of the population of England who are likely to be obese in 2005 to 2010 was estimated using the cubic function.

In addition to estimating the future proportion of the overall population who are likely to be obese, it was also useful to make this prediction for males and females separately. For the data relating to the proportion of males and females who were obese between 1993 and 2004 linear, quadratic and cubic curves were fit to the data. For females the cubic curve ($Rsq = 0.960$) was a better fit to the data than either the linear ($Rsq = 0.953$) or quadratic curve ($Rsq = 0.958$). For males both the cubic ($Rsq = 0.988$), and the quadratic ($Rsq = 0.988$) curves provided better fits to the trend data than the linear model ($Rsq = 0.987$). Cubic curves were therefore chosen as the best fit to predict future trends in obesity for males and females separately between 2005 and 2010.

3.5 QUESTIONNAIRE SURVEY

3.5.1 Introduction

An initial list of questions was drawn up from issues arising from analysis of the focus groups. Due to the limited length required for the questionnaire only the main issues were included, e.g. those with the greatest impact on manual handling affecting the majority of organisations. The questionnaire length was limited to 2 sides of A3 to encourage completion. After initial drafting of the questionnaire by the Research Associate (SC), the questionnaire was improved, refined and shortened following discussions with the Co-investigator (PG). Two separate questionnaires were developed, one for the Ambulance Service and one for National Back Exchange (the vast majority of members are employed in acute hospitals or in the community). This is due to the different risks associated with the different sectors.

At this stage the questionnaires were sent to another member of the research team (EC) for checking before the pilot phase. A pilot of each questionnaire was conducted with target people in the different sectors (see figure 3 for draft questionnaire).

3.5.2 NBE Questionnaire development

A back care advisor from the acute hospital sector completed the draft questionnaire and gave feedback comments (05-05-2006). These included: back care advisors (BCAs) not only give advice in person regarding bariatric patients but also over the phone/by email; training may be provided at different intervals both as a single session when new equipment arrives or for assembly and transportation or use of the equipment.

A community equipment specialist made comments on the draft questionnaire by email (08-05-2006): Some of the wording was adapted to improve readability, some of the specialist bariatric equipment was moved to a hospital-only list as it was not applicable to those who only worked in the community; an additional format of equipment contract from the manufacturer was added; and the wording of one of the later questions was adapted to be inclusive of those who worked in the community as well as the acute sector.

1. How many bariatric (obese and morbidly obese) transport cases have you been involved with in the last (a) 12 months, (b) 1 month?
2. On a scale of 1-7 how successful do you think the most recent transfer was for:
 - Achieving a high level of patient (a) safety, (b) dignity, (c) comfort?
 - Minimising the staff exposure to manual handling risks?
 - Advance planning?
 - Communication between wards, different agencies etc.?
3. Does your organisation have strategic policies and operational procedures for manual handling bariatric patients
 - If YES, please send copies
4. How long has your organisation had these policies and procedures?
5. Was there any specific reason (e.g. particular problem) that initiated the development of these policies and procedures?
6. Have you carried out an audit to evaluate the effectiveness of these policies and procedures?
 - If YES, please send a copy of the results/report
 - If NO, how well do you think that these policies and procedures are used? (Scale)

Figure 3 Draft questionnaire schedule included with ethics application

Following the discussions during piloting several questions were amended, deleted or added. The questionnaire was then converted into a format that enabled it to be scanned electronically for data inputting. This format was chosen due to the possible large number of questionnaires to be returned to ensure accuracy of data input in a very quick time.

The questionnaire was distributed to all members of National Back Exchange (n=1289) at either their home or work address (appendix one). The questionnaires were sent in sealed pre-stamped envelopes to the National Back Exchange on Friday 21st July 2006 who then posted out the questionnaires to all of their members (over the next 4 weeks). A pre-printed freepost envelope was included for return of the questionnaire. A reminder email was sent out via the chairs of each of the regional groups of the National Back Exchange on the 16th August 2006. A reminder was sent out via email rather than post as the NBE was not able to send out a postal reminder in the time frame necessary for the research. The deadline given for return of the questionnaire was 31st August 2006.

3.5.3 Ambulance Questionnaire development

An ambulance officer with experience and an interest in bariatric patients completed and made feedback comments on the questionnaire (11-05-2006), including: addition of an option of relying on other services to provide equipment/assistance when specialist bariatric equipment/ambulances are not available in one Ambulance Trust; separation of proportion of emergency or planned admissions for bariatric patients; additional ways of transporting patient to hospital; risk assessment made at admission and at discharge; clarification of when information is received about size of a bariatric patient; where equipment may be stored; and different types of bariatric ambulance.

A risk manager from an Ambulance Trust with experience of bariatric patients made comments on the questionnaire by email (08-05-2006). These included: inclusion of questions asking specifically about risk assessments being carried out in advance of the time of admission to hospital or discharge from hospital.

Following discussions during the piloting of the questionnaire amendments were made. The questionnaire design was changed so that it could be emailed out to the Ambulance Service and completed and returned electronically. It could also be printed out, completed on paper and returned via a Freepost address if respondents preferred.

The questionnaire was emailed to the National Ambulance Risk and Safety Forum mailing list (n=71) on the 30th May 2006 with a deadline for return given of 16th June 2006 to encourage swift reply (appendix two). A reminder email was sent out on the 23rd June 2006. A second reminder email was sent out on the 29th August 2006.

3.5.4 National Back Exchange and Ambulance Service questionnaire analysis

The analysis for this questionnaire involved generating descriptive statistics for all the questions. Initial inspection of the questionnaire suggested that for many questions a large proportion of the respondents had provided responses other than those options already provided in the question. In these instances, where possible, other responses were grouped into the options already predefined in the question. If this was not possible new categories were created for some questions.

In addition to providing responses other than those options provided in the question, a large proportion of respondents provided multiple responses for many of the questions. To account for this, different approaches were adopted for different questions. In some instances (e.g. questions 2, 3, and 4), new categories were created to incorporate multiple responses. For example, for the question relating to the region of the United Kingdom in which respondents work (question 3), a new category (combination of regions) was created. In other instances where respondents provided multiple responses (e.g. questions 8, 10, 11, 16, 17 for the NBE questionnaire and questions 11, 12, 15, 17, 19, 20, and 25 on the Ambulance Service questionnaire), for purposes of analysis, each option was regarded as a separate question. If respondents had indicated this response they were regarded as responding 'yes', if they had not highlighted this response they were regarded as responding 'no.' For example, for question 8, (barriers to the effectiveness of a policy for manual handling of bariatric patients) for each barrier pre-defined in the questionnaire if respondents had highlighted this barrier they were regarded as responding 'yes' to this barrier being a problem. By contrast, if they did not highlight this barrier they were regarded as responding 'no' to this barrier being an issue for the effectiveness of a manual handling policy. Using this approach, it was then possible to determine the percentage of respondents to each question who had indicated that particular response. In instances where responses other than those already defined in the question were provided, the themes of these responses are summarised in the text. Finally, some questions were not answered by all respondents. Where the total sample did not complete the question, the number of participants who did answer the question is indicated.

3.6 CASE STUDIES

Case studies were collected to give examples of good management systems and inter-agency communication of specific incidents and risk management actions.

3.6.1 Participants

Ten participants were recruited from the questionnaires where they indicated that they would be interested in participating in a case study interview. Participants were selected for interview if they could give details about a case study of a bariatric patient journey where the manual handling risks were successfully managed. Participants were selected across the UK.

The participants were from the acute sector (n=4; manual handling advisors); community (n=2; equipment speciality nurse, social services); ambulance sector (n=4; back care advisor, paramedic team leader and 2 risk managers). The case studies discussed pathways for emergency medical admissions (6), planned surgical admissions (2), inter-hospital urgent transfer (1) and an emergency maternity admission (1).

3.6.2 Interview protocol

Each case study interview lasted between 20 and 45 minutes and was, with permission, audio-taped. The data were analysed for critical incidents and are presented as individual pathways with key points (themes) highlighted.

Critical Incident Technique (CIT) is a qualitative method using interview data to determine significant incidences experienced by the subject (Flanagan, 1954). The procedure identifies the event, how it was managed, issues of significant importance to the respondent and the resultant effects on the respondent. This enables the issues surrounding events to be outlined in context, so that the interviewer can understand the elements surrounding the event (Chell, 1998). In applying the technique the researcher aims to highlight the cause of the incident (Shepherd, 2001). The incidents recorded are events or features within an area of work that have had significant impact on the system objectives. Although this impact would usually be of a negative nature, the technique also presents a way of identifying positive influences (Kirwan and Ainsworth, 1992). The key strength of CIT is the ability to rapidly draw out the core problems in a system (Kirwan and Ainsworth, 1992). Although little has been reported in terms of the reliability and validity of the technique, Chell (1998) argues that the reliability of the results is built into the quality of the interview and therefore relies on the interviewer being skilled at acquiring information which is not forthcoming. The issues about reliability and validity for qualitative data have been discussed in great detail elsewhere (Hignett, 2005).

The first interview schedule (figure 4) was developed from the literature and expert knowledge. This was revised with the data from the focus groups (figure 5). The transcripts were returned to the participants for accuracy and confidentiality checking before analysis. Minor points were corrected and all the transcripts were approved.

	Topic	Prompt
1	Specific experiences (cases) of bariatric transport	What went well? What went badly? How could it have been done differently?
2	Issues for domestic location	Up stairs location Width of stairs, curve in stairs, landing House access, door jambs etc.
3	Issues for ambulance	Loading system (tail lift, ramp etc.) Bariatric equipment Staff involved Interface at hospital
4	Admission at hospital	A & E Admissions ward Other access interface? Compatibility of equipment
5	Transfer to another area in hospital	ICU/Theatres/Radiology General (Med/Surg) ward Speciality ward Equipment, Time
6	Patient issues	Safety Comfort Dignity
7	Interfaces/planning	Prospective? Communication Protocol
8	Discharge planning	By whom? Agencies involved?

Figure 4 Draft Interview Schedule

	Topic	Prompt
1	Specific experiences (cases) of bariatric transport	What went well? What went badly? How could it have been done differently?
2	Issues for domestic location	Up stairs location Width of stairs, curve in stairs, landing, corridors, banisters House access, door jambs, door widths etc. SWL Floor Double bed against wall, clutter
3	Issues for ambulance	Loading system (tail lift, ramp etc.) Straps on stretcher Position of trolley on vehicle Delay in vehicle arriving Bariatric equipment (ET tubes, needles, maternity equipment) Staff involved Interface at hospital Treatment at home
4	A&E	Equipment Time to prepare Compatibility of equipment Transfer equipment Which trolley Cleaning up patient when arrive Building design, Floor loadings
5	Admission at hospital	Time to prepare Admissions ward Other access interface? Compatibility of equipment
6	Transfer to another area in hospital	ICU/Theatres/Radiology – tables (SWL, width) General (Medical/Surgical) ward - positioning Speciality ward Equipment, Time, Floor - SWL
7	Patient issues	Safety Comfort (Dignity – if influences method of task)
8	Interfaces/planning	Prospective? Communication Protocol
9	Discharge planning	By whom? Agencies involved?
10	Communication	External/Internal Ambulance - control, vehicles, co-ordinator Hospital – A&E, wards, radiology etc

Figure 5 Final Interview Schedule

3.7 ETHICS

Ethical approval was obtained from the Multi-site Research Ethical Committee (MREC, reference no. 05/Q0104/162, Huntingdon) and Loughborough University Ethical Advisory Committee.

3.7.1 Research Governance

Participants were asked to gain research governance approval from their organisation before taking part in the research for all parts of the project.

In the postal questionnaire study participants were notified that *'The NHS Research Ethics Committee who gave approval for this research recommended that your own organisation gives research governance approval for this project'*. Of the 212 responses from National Back Exchange members and 18 Ambulance Trusts only 16 (<1%) contacted the researchers about research governance.

Two Trusts were unable to process the research governance in the project time frame with the details arriving in August and the next meetings not held until October, they were withdrawn from the project. The other responses varied considerably with five Trusts just providing confirmation of research governance (no additional information requested or provided). Two (one PCT and one Foundation Acute Trust) required the researcher to have an honorary contract with the Trust – these were withdrawn from the project by the research team on the basis of an inappropriate request for a postal questionnaire. Two required the researcher to complete a local R&D supplementary form. The other five requested additional information, including: regular progress reports; notification of all publications and presentations; a report within three months of completion.

It was found that four Trusts registered the project with the National Research Register with funding amounts varying from £250 to £69,065 (full budget of the project).

The range of different responses for research governance provides an interesting perspective on the application of the Department of Health (<http://www.dh.gov.uk/PolicyAndGuidance/ResearchAndDevelopment/ResearchAndDevelopmentAZ/ResearchGovernance/fs/en> , Accessed 10th January 2007).

4 RESULTS

4.1 EQUIPMENT

The results from the equipment survey are shown in appendix 3. The results were compiled into a summary table and made available during the project at <http://www.lboro.ac.uk/departments/hu/groups/hepsu/webpages/Specialist%20equipment%20for%20bariatric%20patients.pdf> (30th June 2006). It is likely that the list is neither complete nor exhaustive as new products have been brought to market since the survey was conducted. Bariatric furniture and equipment was identified and included from the UK and internationally, in particular Canada, USA and Sweden.

Table 2 gives a summary of the equipment types found in the survey. The greatest range of equipment safe working load (SWL) was for stretcher/trolley/treatment couches with a SWL from 200kg to 1,100kg. There were 28 hoists/stand-aids identified with a SWL of 190kg to 500kg and 24 bathing aids (commode, shower chair, transfer bench and commode) with a SWL of 160kg to 454kg. 25 chairs (SWL from 172kg to 341kg) and 21 beds (SWL from 190kg to 454kg) were available. Only one supplier of theatre tables (SWL 450kg) was found. There were 14 models of walking aids (SWL from 190kg to 340kg) but only 1 option for crutches (SWL 272kg to 318kg).

Table 2 Summary of equipment survey

Equipment type	SWL range (kg)	Number available
Bathing aids (commode, shower chair, transfer bench, shower commode)	160-454	24
Bed	190-454	21
Bed frame	190-450	17
Cane	159-222	2
Carry chair (ambulance)	200	2
Chair	172-341	25
Commode	190-454	15
Crutches	272-318	1
Hoist (mobile and gantry) and Stand-aid	190-500	28
Lift (including lifting cushion, mattress elevator)	190-496	11
Mattress (pressure reducing, alternating etc.)	222-413	11
Other (mover, carrying sheet, ramp, seat cushion, toilet)	See list	5
Sling	190-500	16
Stretcher/trolley/treatment couch	200-1100	10
Theatre table	450	1
Transfer aids (including sliding sheets, boards, rollers)	190-285	8
Walker	190-340	14
Weighing scales	190-500	13
Wheelchair	210-451	18

4.2 FOCUS GROUPS

The flip chart data from the four focus groups were analysed by two researchers (SH and SC) by reviewing the issues and coding them into themes for the geographical and/or clinical speciality to represent discrete elements in the patient journey. The preliminary analysis is shown as 'Cause and Effect' or Fishbone (Ishikawa) diagrams. Langford and McDonagh (2003) describe this approach to focus group data analysis as a systematic, uncomplicated but powerful analytical technique for looking at cause and effect, to identify key issues affecting the problem

and understand linkages. The Fishbone diagrams (figure 6- figure 12) show the pathway with additional causes and risks as ‘side bones’.

The secondary analysis reviewed, coded and re-organised these diagrams by grouping and combining themes within an iterative (circular) patient pathway. This analysis resulted in the identification of 5 generic themes for manual handling issues (figure 13). The coding is shown in figure 6- figure 12 as [A] Patient factors; [B] Building/Vehicle space and design; [C] Equipment (manual handling and clinical) and Furniture; [D] Communication; and [E] Organisational and Staff issues.

4.2.1 Pathway 1. A&E – X-Ray – ward – discharge/nursing home (figure 6)

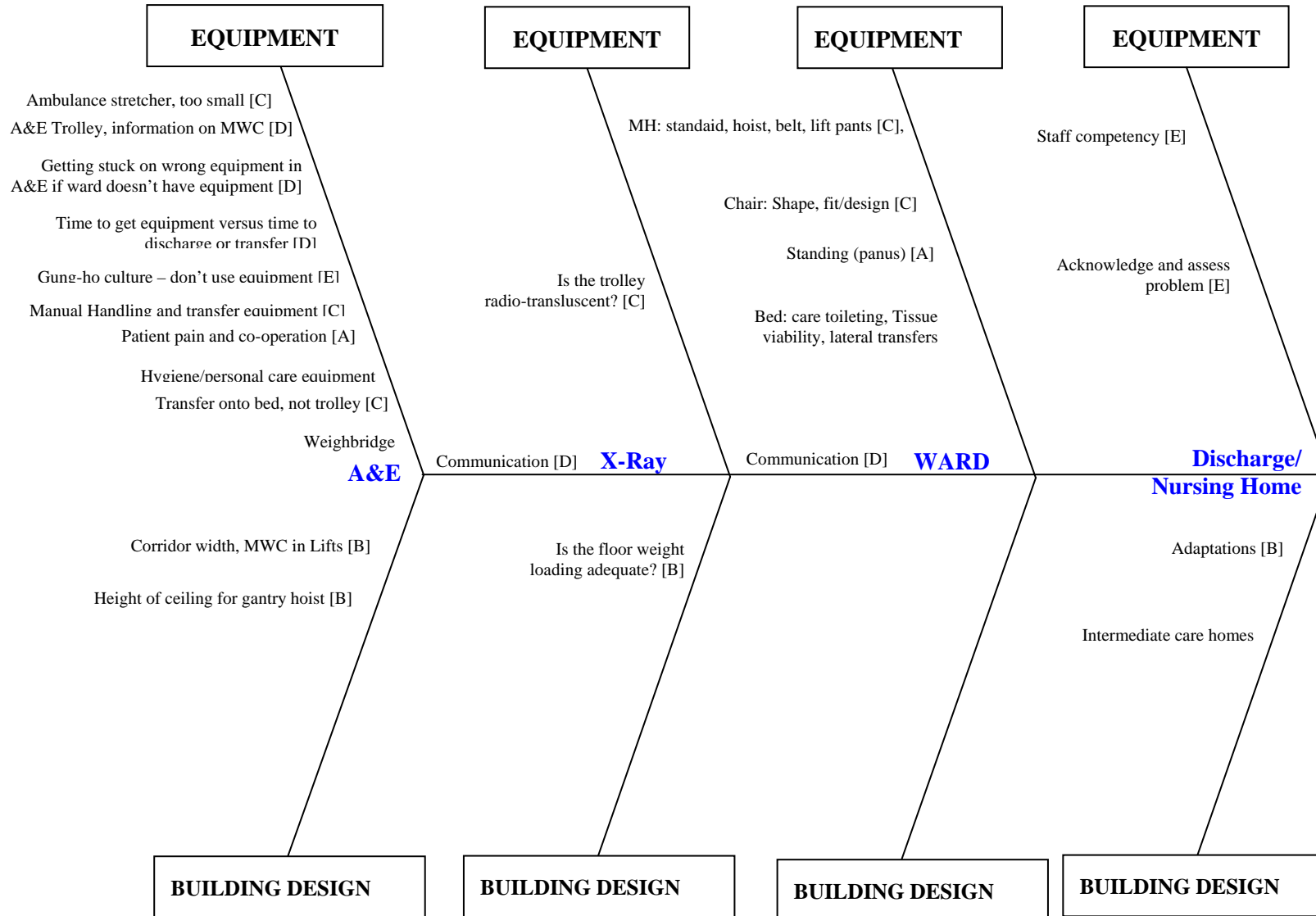
This pathway starts in the Accident and Emergency department (A&E). Risks included the size and weight capacity of stretchers and trolleys and might include being transferred on to a bed rather than a trolley. The availability of manual handling, transfer, hygiene and personal care equipment suitable for the patient was identified as a risk. The time to get the correct equipment was raised in comparison with discharging or transferring the patient and a risk was identified with the patient getting stuck in A&E if the ward did not have the right equipment to receive the patient. Building design contributed to the manual handling risks with respect to corridor width, (relating to wider equipment), maximum weight capacity (MWC) for lifts and the height of ceiling to use gantry hoists. Some A&E departments have weighbridges but there was still a concern about a ‘gung-ho’ culture, where equipment was not used. Patient issues included pain, ability and willingness to co-operate.

Transfer to the X-ray department was hampered by a lack of communication. Specific concerns in this pathway were the design of the x-ray trolley (radio-translucent to eliminate the need to transfer the patient) and the load bearing capacity of the floor.

At the ward there were again concerns about the level of communication. Equipment design and availability were raised including manual handling equipment (hoist, stand-aid, belt, lift pants) as well as furniture (chair shape, fit/design) and bed. Personal care and hygiene issues (toileting) were again raised.

Finally, for this pathway, the discharge to the nursing home raised concerns about manual handling risks associated with the acknowledgement and assessment of the problem and staff competency. Adaptations might be needed and the option of intermediate care homes was identified as a possible solution.

Figure 6 Pathway 1: Scenario - Journey from Admission to the Ward. Focus Group 16th March 2006
 [A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]



4.2.2 Pathway 2. Patient home – ambulance – hospital - home (figure 7)

This pathway focussed on the risks outside the hospital. Communication was identified as a problem at two stages; between the patient and the ambulance before arrival and then between the ambulance and the receiving hospital.

A range of clinical professionals could be involved at the patient's home (District Nurse, GP, Fire Service and Ambulance Inter-agency Co-ordinator). Information was needed about the patient's weight, pain control, with additional sedation if required. The design of the patient's home presented considerable manual handling risks associated with room size, corridor width, stair width, gradient and safe working load (SWL). On occasion it was felt that external extrication through a window might be required using, for example, a cherry picker.

The ambulance design could contribute to manual handling risks relating to the position of the stretcher (central was preferred for maximum weight capacity) and the type of loading system. Some participants mentioned that a furniture van, with the patient travelling on the floor had been used. Others identified that specialist vehicles were available but that there might be a time delay for the vehicle to arrive. The design and availability of equipment was of concern, with equipment sometimes being stored on a separate vehicle (again introducing time delays for arrival). Some manual handling equipment has been used in combination (e.g. Manger Elk and spinal board) to great effect, whereas other equipment, for example carry chair, has a limited SWL. In order to get the equipment to the patient there were difficulties in accessing the house (from public roads), and the location of the patient within the house. If the patient was upstairs then additional manual handling risks were identified.

At the receiving hospital there were problems about the expected time of arrival (ETA) that contributed to risks associated with directing the ambulance to the correct receiving department. It was felt that there should be a case conference at admission and that no discharge should take place until staff were organised (including District Nurse, Ambulance, Occupational Therapist) and equipment was in place at the patient's home. It was recognised that early discharge due to hospital pressure for beds could introduce manual handling risks.

4.2.3 Pathway 3. Bed and Breakfast bedroom – Ambulance – Maternity – Ultrasound – Delivery – Home (figure 8)

This patient presented in an upstairs bedroom of a Bed and Breakfast (B&B) accommodation at 32 weeks gestation in early labour. The initial assessment by the paramedics included concerns about the patient's mobility as well as spatial issues. The location of the patient, on a double bed against the wall, increased the manual handling risk by stretching, as did the clutter and excess furniture in the room. The same concerns about residential accommodation included the door width, design and SWL of stairs and the use of the carry chair. The lack of communication between the original emergency call and ambulance responders introduced additional risks.

Similar issues about ambulance design and equipment were raised as pathway 2. This included the choice of vehicle, loading system, space, SWL, position of the trolley, availability of manual handling equipment (hoist) and the risk of transporting the patient on the floor. Additional risks related to maternity equipment, endo-tracheal (ET) tubes and needles for effective treatment of the bariatric patient.

Figure 7 Pathway 2: Scenario- Community. Focus Group 16th March 2006
 [A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

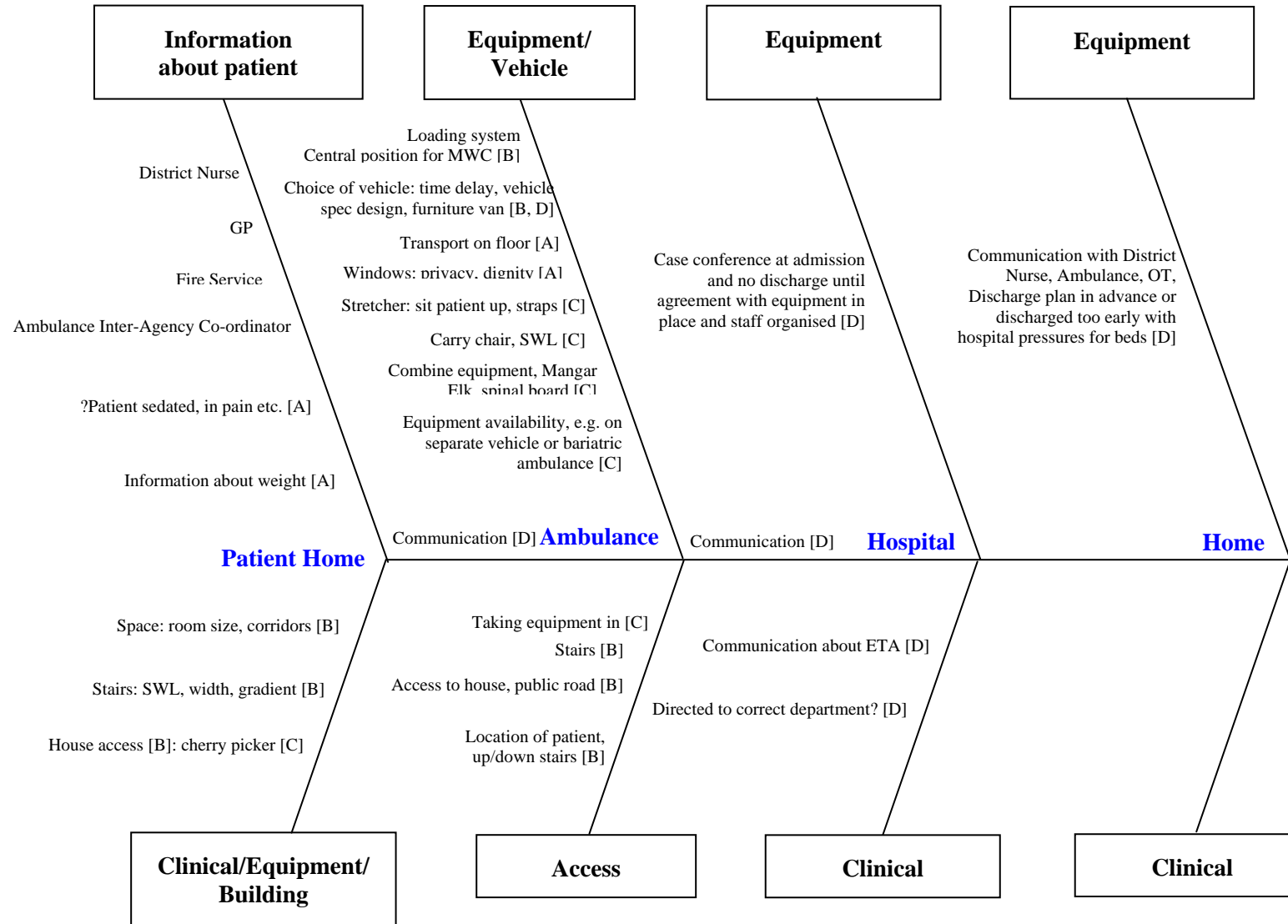
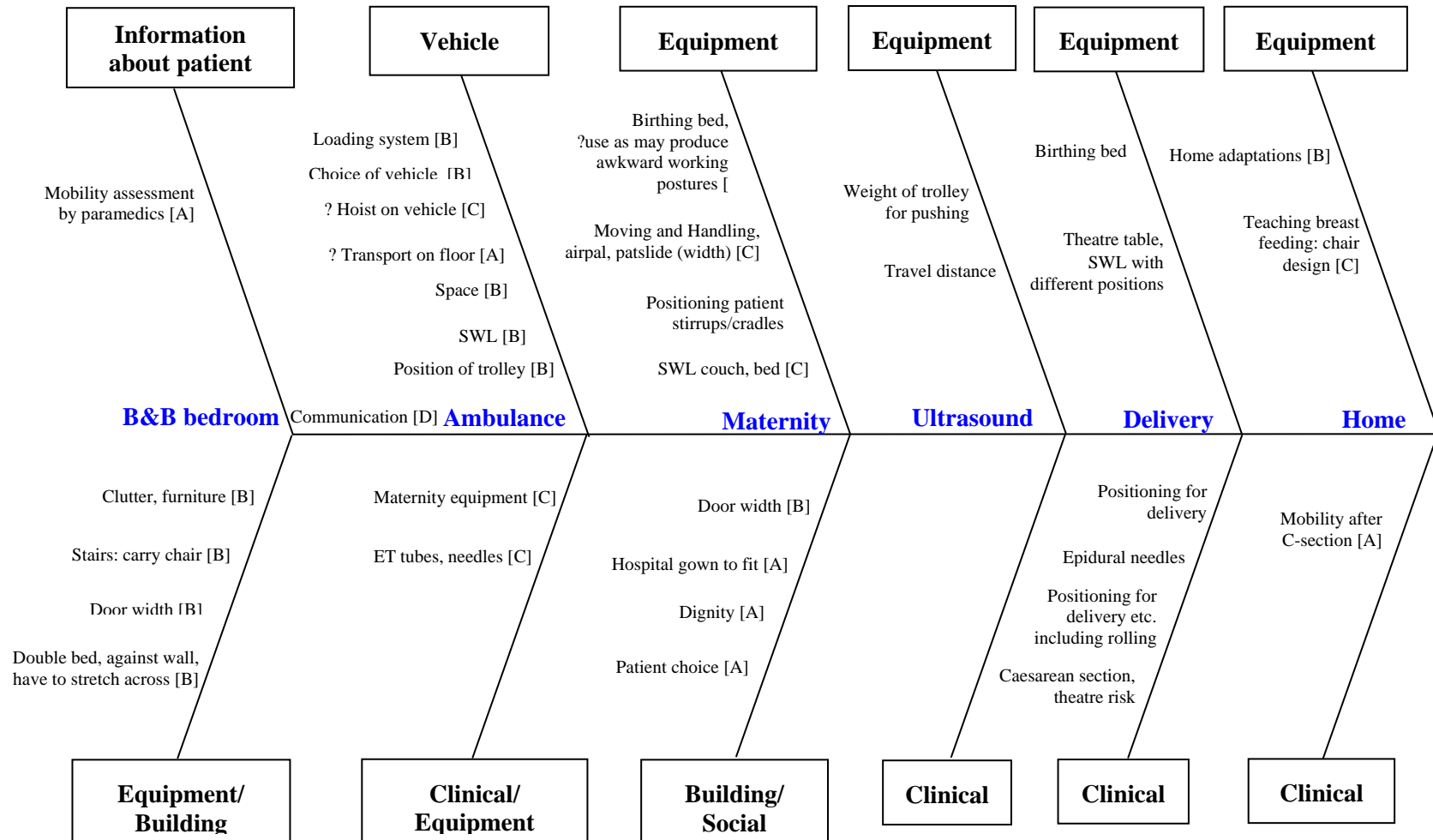


Figure 8 Pathway 3: Scenario - Maternity. Focus Group 15th March 2006
[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]



On arrival at the Maternity Unit there were concerns about the risks involved with clinical tasks (birthing bed, positioning the patient), the furniture (SWL of bed and couch) and manual handling equipment (AirPal, Pat Slide). In this pathway the patient issues were more clearly identified with respect to patient dignity (including provision of a hospital gown to fit) and choice. The building design, with respect to the door width, was again raised as a contributory factor.

For some participants an additional manual handling risk related to taking the patient for an ultrasound due to the weight of the trolley (with patient) for pushing and the distance between departments.

In the Delivery Suite there were again concerns about the equipment (birthing bed, theatre table) and in particular whether it had been tested for the SWL in different position. The availability of theatre equipment for bariatric patients (for example epidural needles) was also a manual handling issue.

Finally, on discharge, there were issues about the problems of mobility for a post-caesarean section bariatric patient as well as specific issues relating to teaching breast feeding for this pathway (community midwife and health visitors). Home adaptations might be needed to support safe discharge.

4.2.4 Specialist Areas: (1) Ward Hygiene, (2) Diagnostics, (3) Mortuary, (figure 9) and (4) Community (figure 10)

Figures 9 and 10 show departments/unit/service areas that could be involved in several pathways.

The first identifies the manual handling problems associated with the supervision, support and provision of personal hygiene on the ward. The building design continues to be a contributory factor, with concerns about accommodating a bariatric patient in a hospital bathroom. The individual items of hygiene equipment/furniture present expected (SWL, fit, shape) problems with a particular risk associated with wall-mounted toilets that could be avoided with floor-mounted toilets. These risks are compounded by the often limited mobility and associated effort of movement for many bariatric patients.

The second area looks at diagnostic issues in more detail. There are risks identified with building design (confined spaces, access to department), equipment (SWL of tables), and patient positioning (static postures for staff, duration, position etc.). Specific risks were related to the clinical activities for scanning (would the patient fit into the scanner or stay on the trolley) and patient's ability to adopt required positions (e.g. side lying for cardiac ultrasonography).

The third area is the mortuary. Again generic risks are starting to emerge relating to spatial constraints, equipment (suitable hoist, SWL of mortuary trolley), communication (advance notice) and staff training, numbers and policies. Specific issues for this department related to the fridge space, access to the fridge and space for the trolley. Additionally this department interfaces with other service providers (e.g. Undertakers) and has to respond to family/carer issues relating to death, but possibly compounded by the bariatric manual handling risks. The mortuary also has to provide information for the Coroners requirements.

Figure 9 Specialist areas (1) Ward Hygiene; (2) Diagnostics; (3) Mortuary
[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

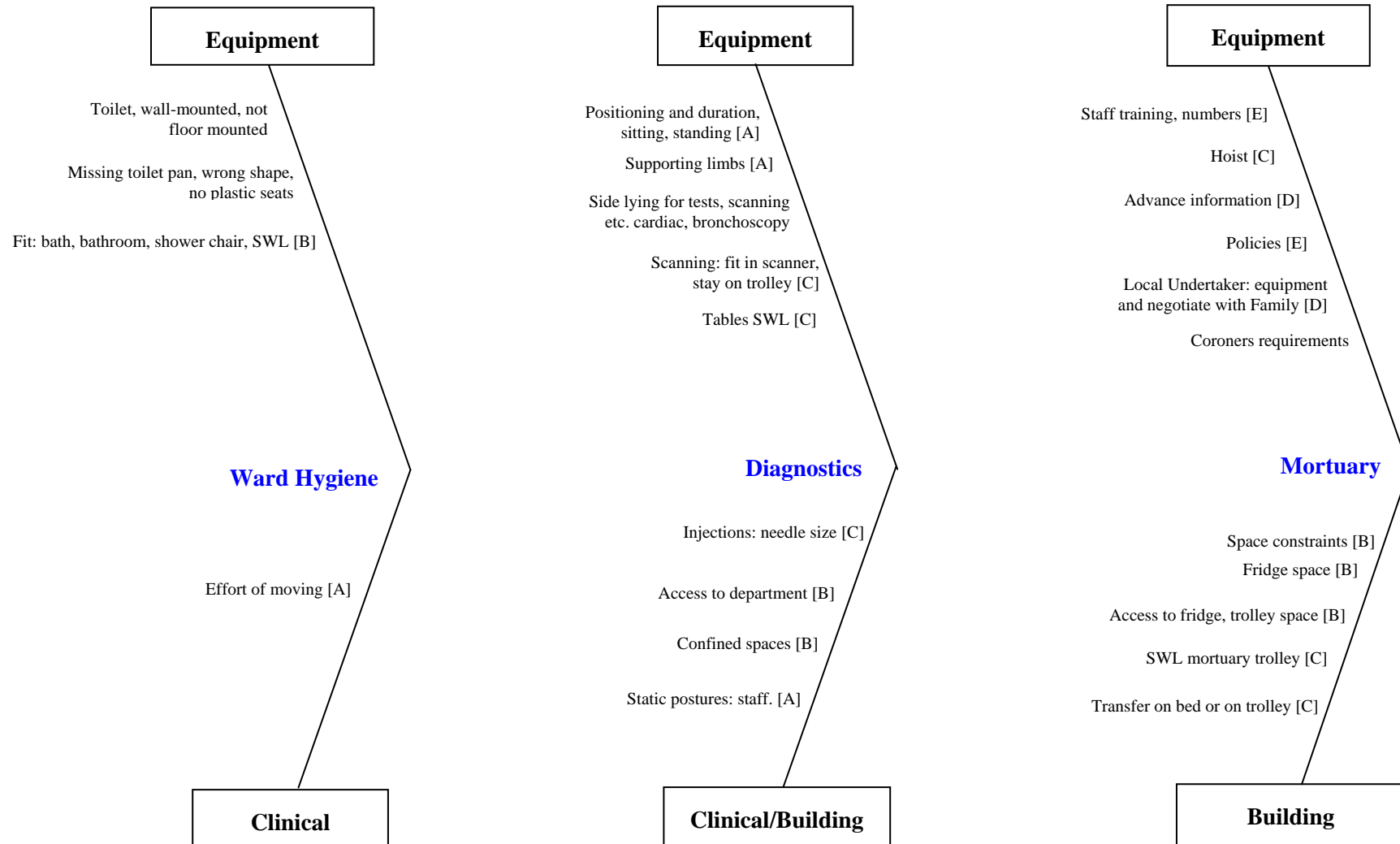
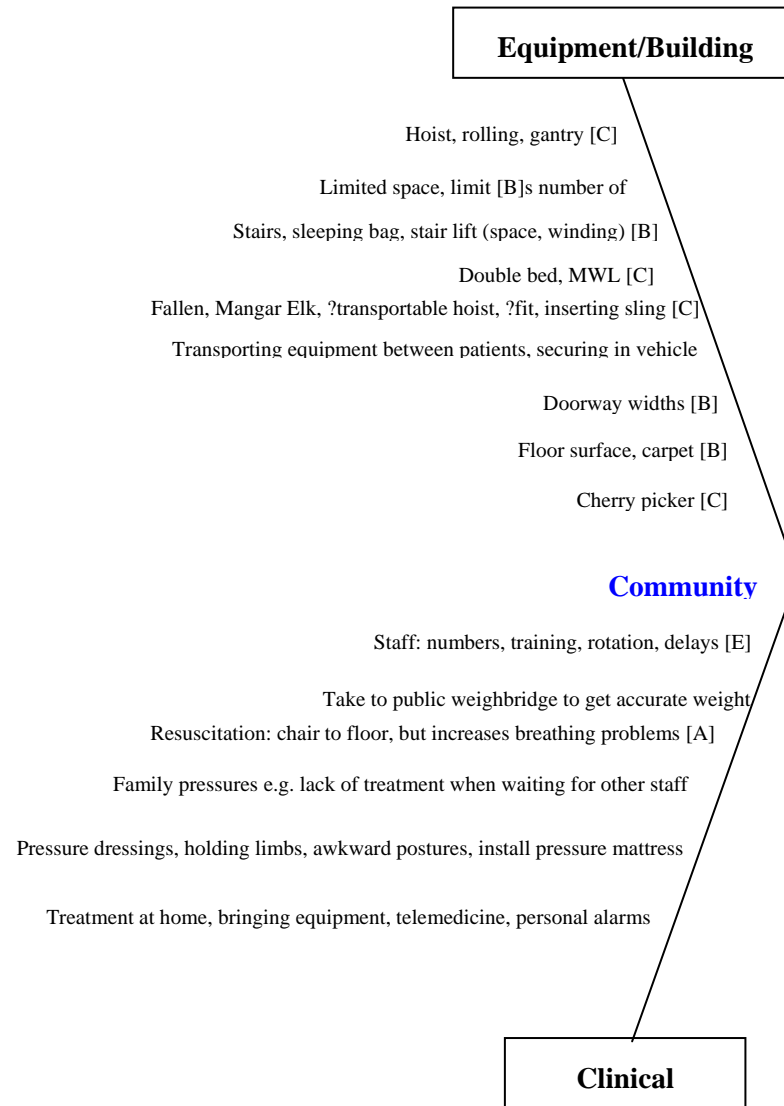


Figure 10 Specialist areas (4) Community general issues
 [A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]



The final specialist area (figure 10) looks at issues in the community in more detail. Again the generic issues are emerging relating to equipment (hoist: mobile or gantry), staffing (numbers, training, rotation, delays). In this figure a link was also made between the confined/limited space of a residential location and how this limits the number of staff able to treat and care for the patient. The design of the property again introduced risks, for example stairs (including additional width restrictions where a stair lift has been installed), floor surface (with difficulties exacerbated on carpet), double beds and doorway widths. The manual handling equipment, although needed, contributed a manual handling risk itself when being taken to the patient as did installing pressure mattresses. On occasion the patient may be taken to a public weighbridge to get an accurate weight. The time delays identified in other pathways could exacerbate family concerns, with a lack of treatment when waiting for other staff. Clinical issues for bariatric patients included relocating them on the floor for resuscitation as lying flat might increase breathing problems. Other clinical concerns included pressure dressings, including holding limbs and awkward working postures. Although staff could see that treatment at home might be a better option there were concerns about the need to bring equipment, the availability of telemedicine and the level of security (personal alarms).

4.2.5 Pathway 4: Theatres (figure 11)

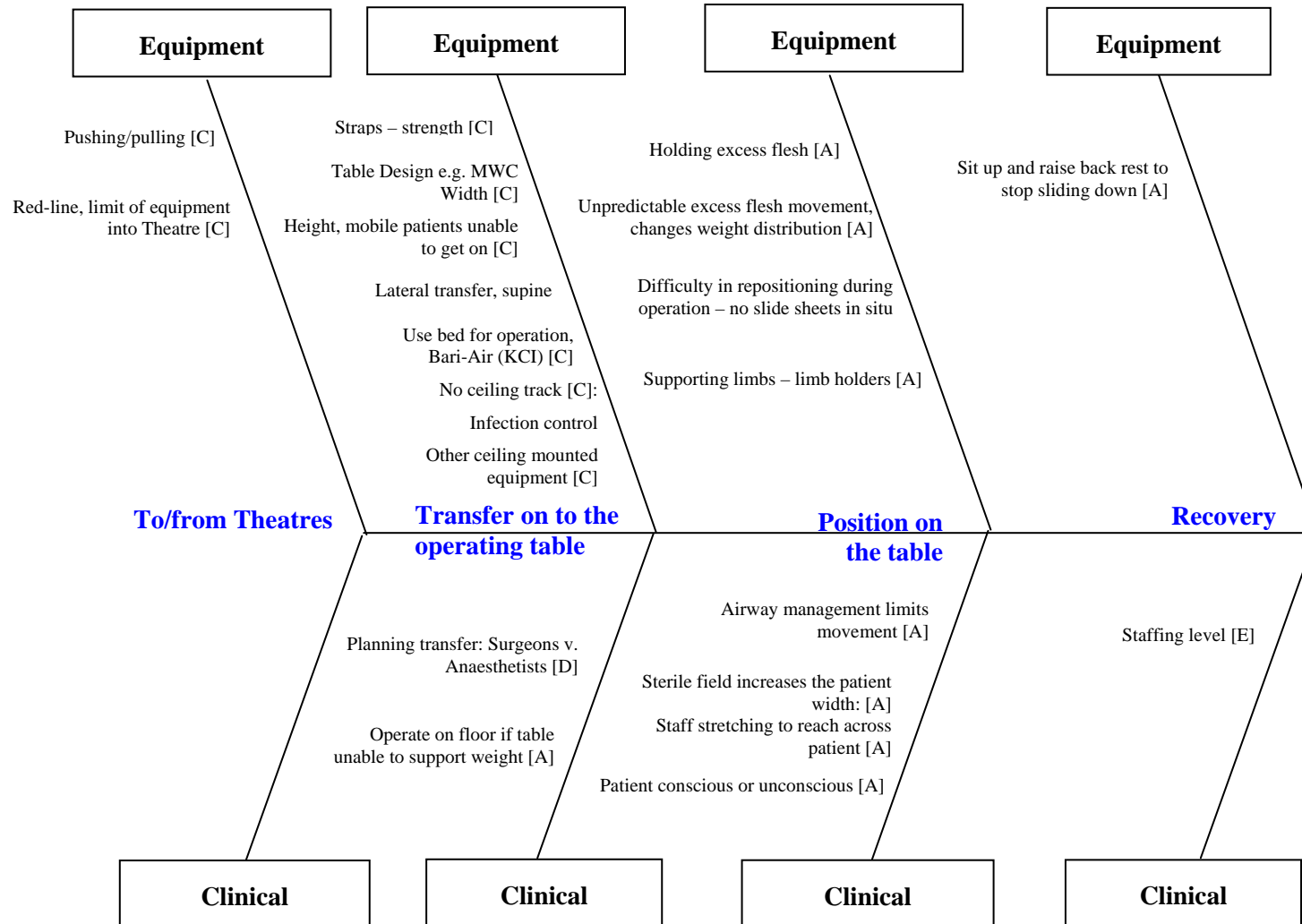
The steps in the patient pathway through Theatres were expanded into four stages. The first stage was the arrival at, and departure from, Theatres where the 'red line' limit of access contributed to the manual handling risks by limiting the availability of equipment across the line.

In the operating theatre there were concerns about the equipment and furniture with respect to table design (MWC, width and height of table), strength (straps) and alternative use of a bed for the operation (or even operating on the floor) if necessary. Due to the other ceiling mounted equipment in an operating theatre it was not always possible to have a ceiling mounted hoist/track so sliding boards were used for lateral horizontal transfers (supine patient). The management of the transfer fell within the jurisdiction of both the anaesthetist (airway management) and surgeon (position on table) contributing to the overall problems.

On the table there were difficulties in positioning the patient due to unpredictable movements of the excess flesh changing the weight distribution on the table. Supporting limbs in limb holders was the preferred option but where patients did not fit then staff might have to stretch across the patient and/or hold the flesh/limb. Slide sheets were not left in situ due to pressure concerns adding to the difficulty of repositioning during the operation. Additional factors contributing to the manual handling risks were the increased width of the sterile field due to the patient width and airway management risks that limited movement options.

The recovery stage of the Theatres pathway only identified two issues. The first associated with sitting the patient up (bed/trolley design) and the second with the staffing level.

Figure 11 Scenario: Theatres. Focus Group 16th March 2006
 [A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]



4.2.6 Pathway 5: Admission – Care (ward)– Transfer - Physiotherapy (figure 12)

This final pathway was derived from elements of scenarios 4 and 6. The information at Admission relates to a patient being admitted directly on to a ward rather than through an A&E dept. There are generic issues about equipment (availability, time delay, effort to move larger equipment), patient weight (accuracy, weighing devices), communication (weight, preparation for admission), and staffing (numbers, morale). The patient would also be assessed for mobility on admission and it was noted that elective surgery patients tended to be a lower risk group with respect to manual handling.

Manual handling issues relating to the provision of care again included the equipment (design, width, SWL), spatial constraints (single rooms being cramped or bed spaces closed to accommodate the bariatric patient). It was identified that manual handling equipment could be used to stand (using the electric bed), turn (using a hoist) and reposition (by leaving the sliding sheets in situ) the patient to reduce the risks. An overhead track or monkey pole could help to increase the patient's independence. A management option that had been used was to accommodate all the bariatric patients on one ward with the effect of increasing specialist equipment availability but also increasing/concentrating the manual handling risks. Clinical issues associated with treatment and care included stretching to treat and holding the weight of limbs (internal examination and blood pressure observations). Tissue viability was a major concern, with specialist mattresses, leg dressings and the problem with the limbs being too heavy for the leg cradle. Respiratory treatment needed specialist equipment, and chest physiotherapy was difficult to deliver due to problems with positioning the patient for access to different areas of the chest, and the physical effort involved.

When the patient had to be moved there were again problems with inter-departmental communication. The generic problems with equipment (bed mover, trolley, second bed) and building design (floor SWL, height clearance, floor surface, corridor width/steering) again raised concerns as did the design of doors with respect to the direction of opening and whether they were automated.

In the Physiotherapy department there were specialist concerns relating to the equipment (sit-stand chairs, parallel bars SWL, hoist) and the risks associated with encouraging mobilisation, with the patient falling identified as a high risk.

Figure 12 Scenario: Focused on location. Focus Group 16th March 2006
 [A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

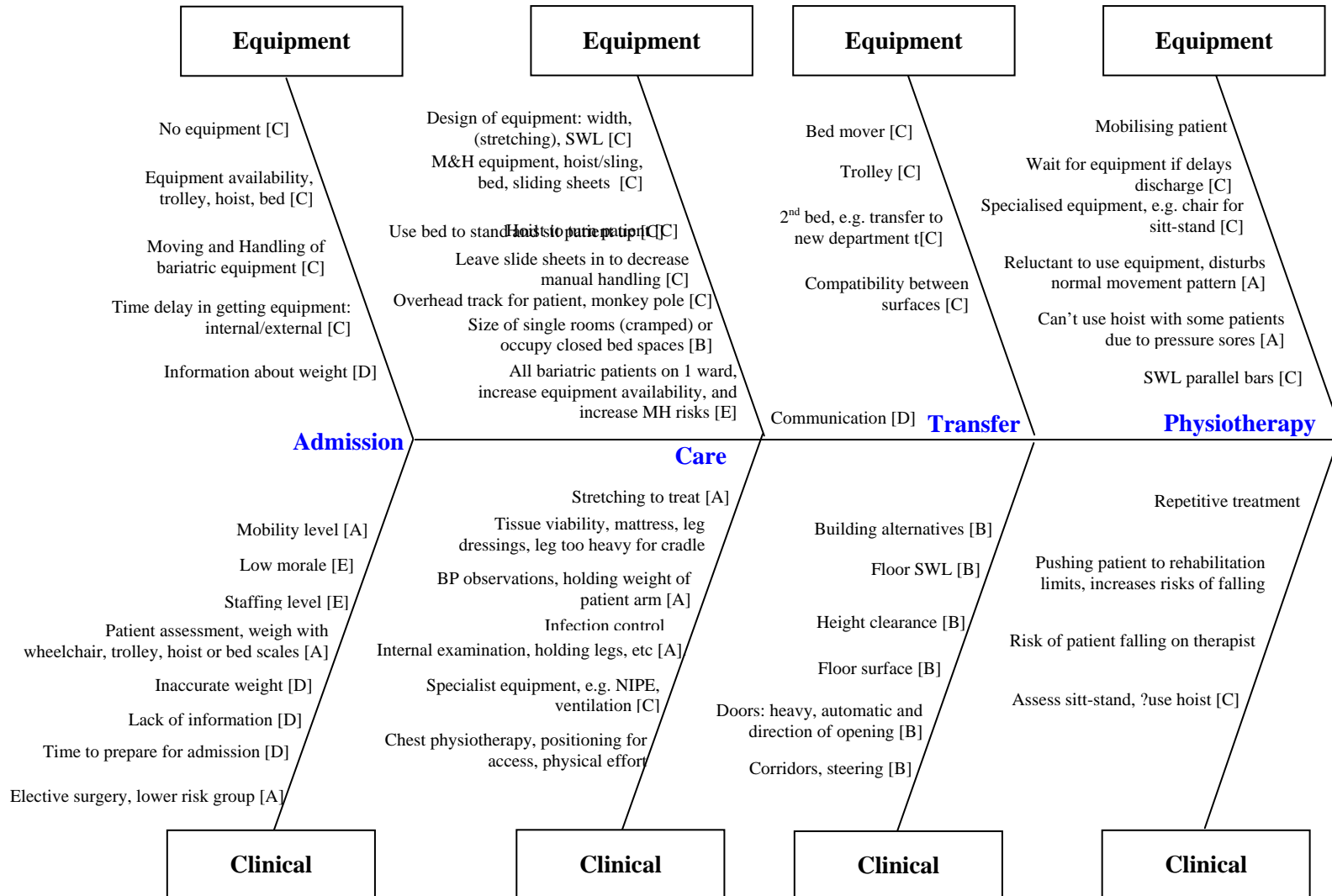
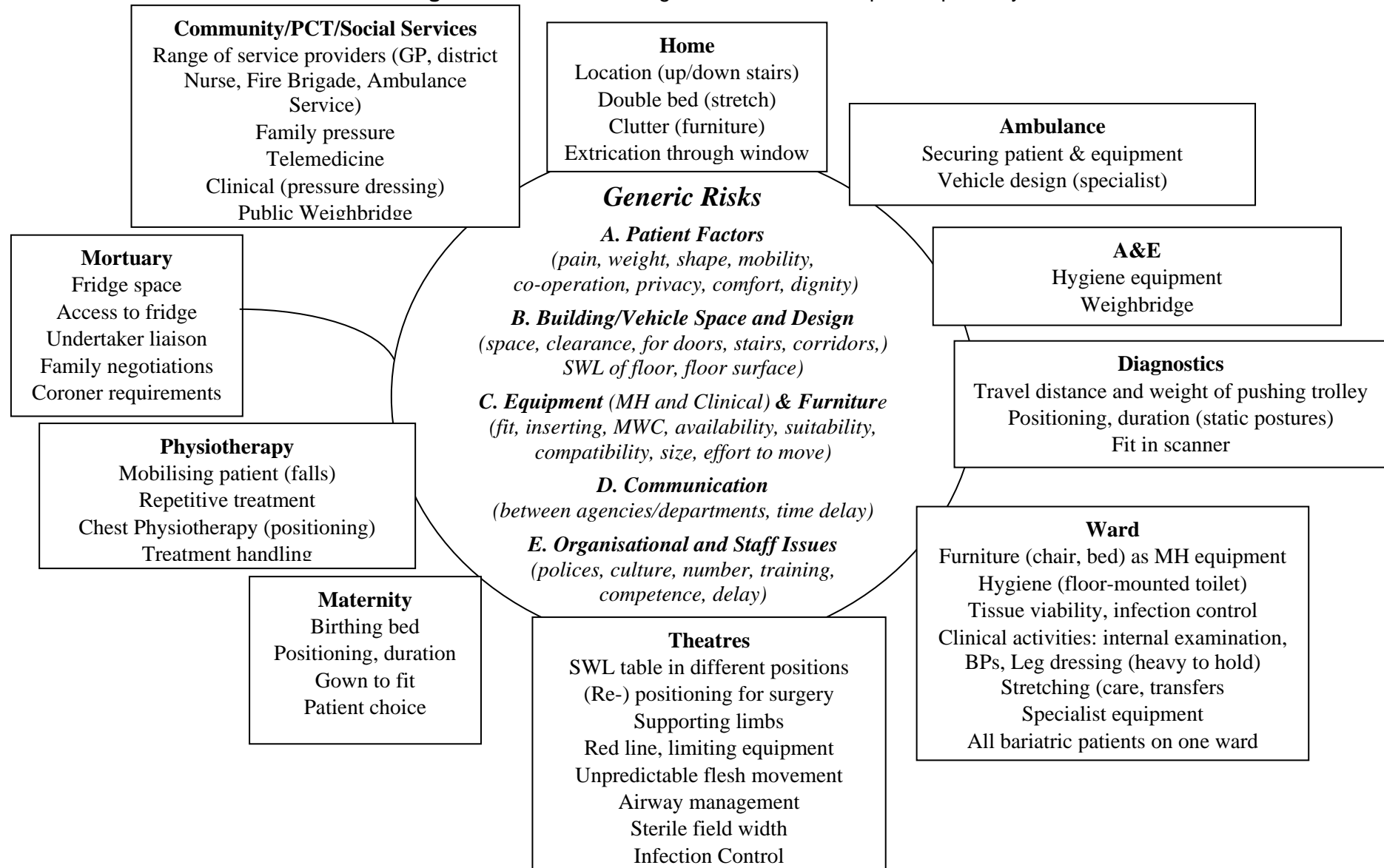


Figure 13 Manual handling risks in the bariatric patient pathway



4.2.7 Manual handling risks in the Bariatric Patient Journey

Throughout the bariatric patient pathway five themes emerged as generic risks: patient factors [A], building (or vehicle) space and design [B]; equipment (manual handling and clinical) and furniture [C]; communication [D]; and organisational and staff issues [E].

Patient Factors [A]

The patient factors contribute to the manual handling risks throughout the journey by defining characteristics of ‘the load’. Manual handling animate loads presents very different risks to inanimate loads, for example weight, shape and size will vary both between patients and for the individual patient themselves. This was identified as ‘unpredictable excess flesh movement’ in figure 11 and the ‘panus in standing’ in the ward (figure 6). Mobility assessments were carried out at all stages of the journey, from the initial interaction with ambulance staff (figure 8) and at admission (figure 12) through to rehabilitation (figure 12).

The patient factors of pain and co-operation were identified as risks at first contact (figure 7) and in the A&E department (figure 6). Privacy, comfort and dignity were all issues identified as contributing to the manual handling risks both directly: ambulance (figure 7), and maternity (figure 8) and indirectly with having to take the patient to be weighed at a public weighbridge (figure 10).

Manual handling risks for clinical activities can be increased due to patient factors, for example static loading when supporting limbs for treatment, diagnosis and positioning (maternity, figure 8; diagnostics, figure 9; community, figure 10; theatres, figure 11; ward, figure 12).

Building/Vehicle Space and Design [B]

Space was identified as a manual handling risk throughout the pathway. The size of rooms, corridors and stairs in the patient’s home could present a problem with extrication (figure 7). Vehicle selection was limited by the space and design available both for the bariatric patient and equipment (figure 8). At the hospital the corridor width, ceiling height and MWC (floors and elevators) was identified as a possible risk in the A&E department (figure 6), diagnostics (figure 10), ward (figure 9), Theatres (figure 11), maternity (figure 8), Mortuary (figure 9) and for discharge (figure 6 – figure 9).

Equipment (manual handling and clinical) and furniture [C]

The generic manual handling risks associated with equipment included the patient/equipment interface (fit, MWC, size and application) as well as the staff/equipment interface (weight to move, availability, suitability) and equipment/equipment interface (compatibility). Examples were given for the patient home (figure 7), A&E department (figure 6), diagnostics (figure 8), ward (figure 6-figure 12), Theatres (figure 11), maternity (figure 8), physiotherapy (figure 12), mortuary (figure 9) and discharge (figure 6, figure 8, figure 10).

Communication [D]

Problems with communication were felt to contribute to the manual handling risks both between (figure 7, figure 8) and within (figure 6, figure 12) organisations. The provision of advance information was raised as a particular problem for bariatric patients (figure 6, A&E figure 7

Ambulance; figure 9, Mortuary) due to the specialist equipment and additional staff needed to provide services.

Organisational and Staff Issues [E]

The organisational issues that were felt to contribute to the manual handling risks included both policies (PCT, figure 7; mortuary, figure 9) and culture (ambulance, figure 6; nursing homes, figure 6). Staffing was raised as a particular problem for community services (figure 10) with respect to staff availability, rotational shifts and delays in arrival at the patient's home. One approach to addressing the staffing issues was to locate all the bariatric patients on one ward in a hospital (figure 12, Care). Although there were benefits to this approach with increased equipment availability and specialist knowledge there were also drawbacks due to the increased manual handling risks and lack of flexibility of bed use.

4.3 POPULATION DATA

4.3.1 Hip and waist circumference estimations

Figures 14 and 15 show the 50th, 85th, 95th, and 99th percentile of hip, and waist, circumferences during the period between 1993 and 2004 for males and females separately. As is evident from these figures, there has been a continual increase in the waist, and hip, circumferences of typically 5cm or above, for the top 50, 85, 95, and 99% of both the male and female population. For example, waist circumference of the top 1% of the males has increased from 122.35cm to 130.56cm over this period, and hip circumference has increased from 123.44cm to 128.97cm. Similarly for the top 1% of females, hip circumference has increased from 135.31cm to 145cm and waist circumference from 116.33cm to 123.40cm..

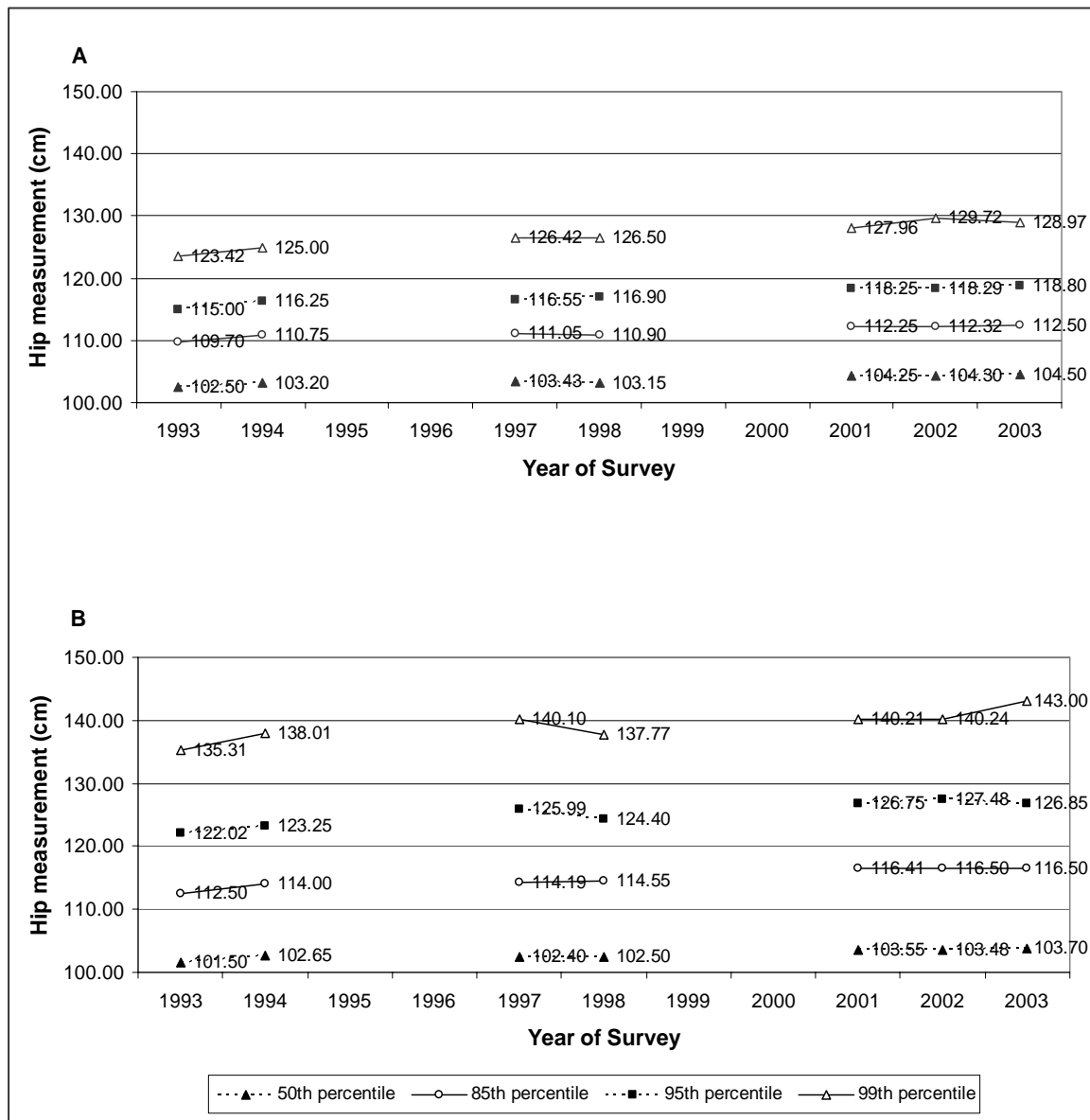


Figure 14 Hip circumference percentiles (50th, 85th, 95th, and 99th) for males (A) and females (B) aged 15 years and over for the period between 1993 and 2004

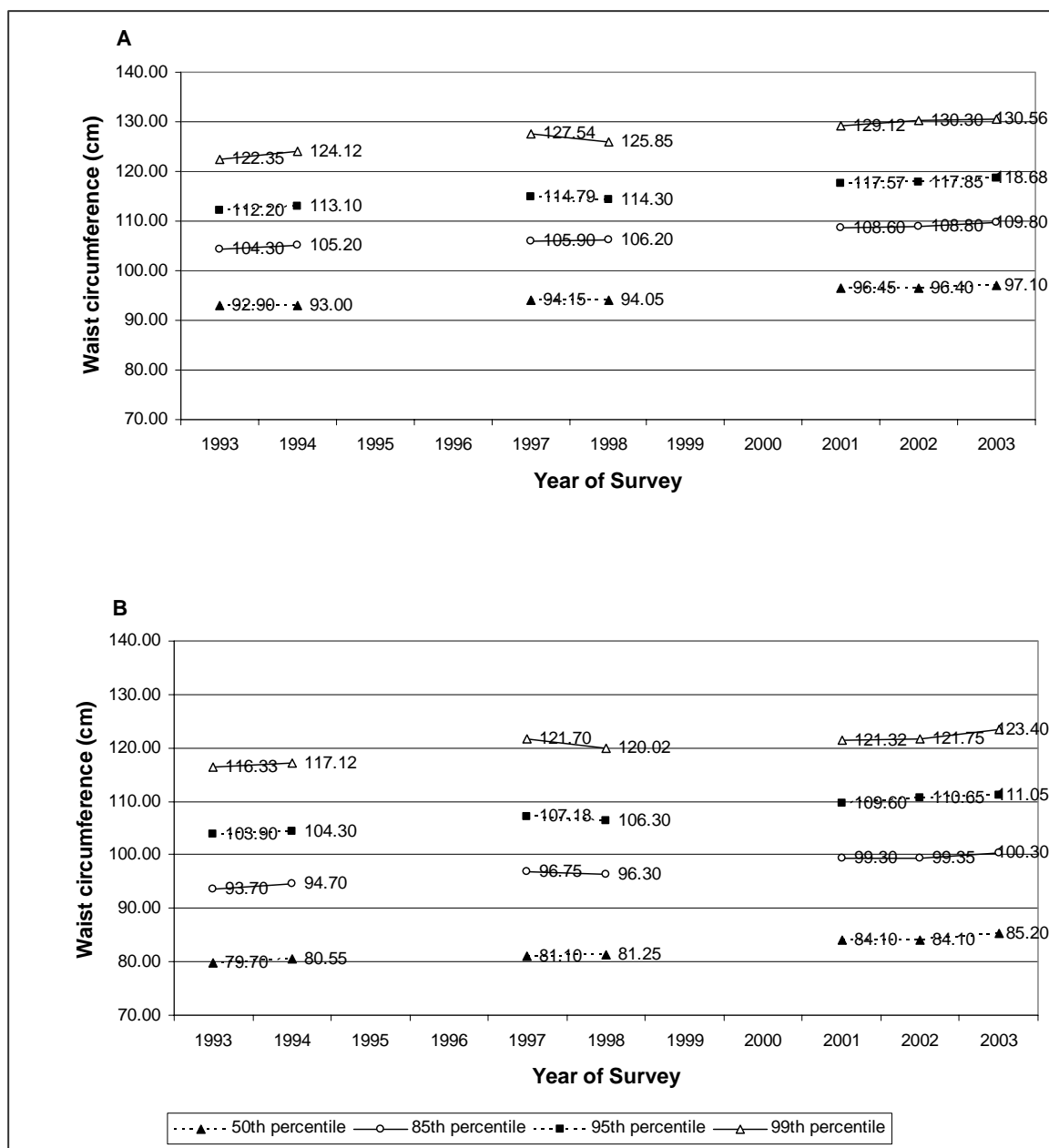


Figure 15 Waist circumference percentiles (50th, 85th, 95th, and 99th) for males (A) and females (B) aged 15 years and over for the period between 1993 and 2004

4.3.2 Weight estimations

Figure 16 shows the 50th, 85th, 95th, and 99th percentile of weight measures for the years 1993 to 2004 for males and females separately. This suggests that the weight of the top 50, 85, 90, and 99% of the population has increased over this period for both males and females. These increases have been in the range of between 3kg and 15kg. For example, the weight of the heaviest 1% of the population of females has increased by approximately 15kg. Although the increase in weight for males for the heaviest 1% has been smaller, an upwards trend is evident from figure 16. The weights corresponding to the 50th percentile of the population have increased by approximately 3kg for both males and females.

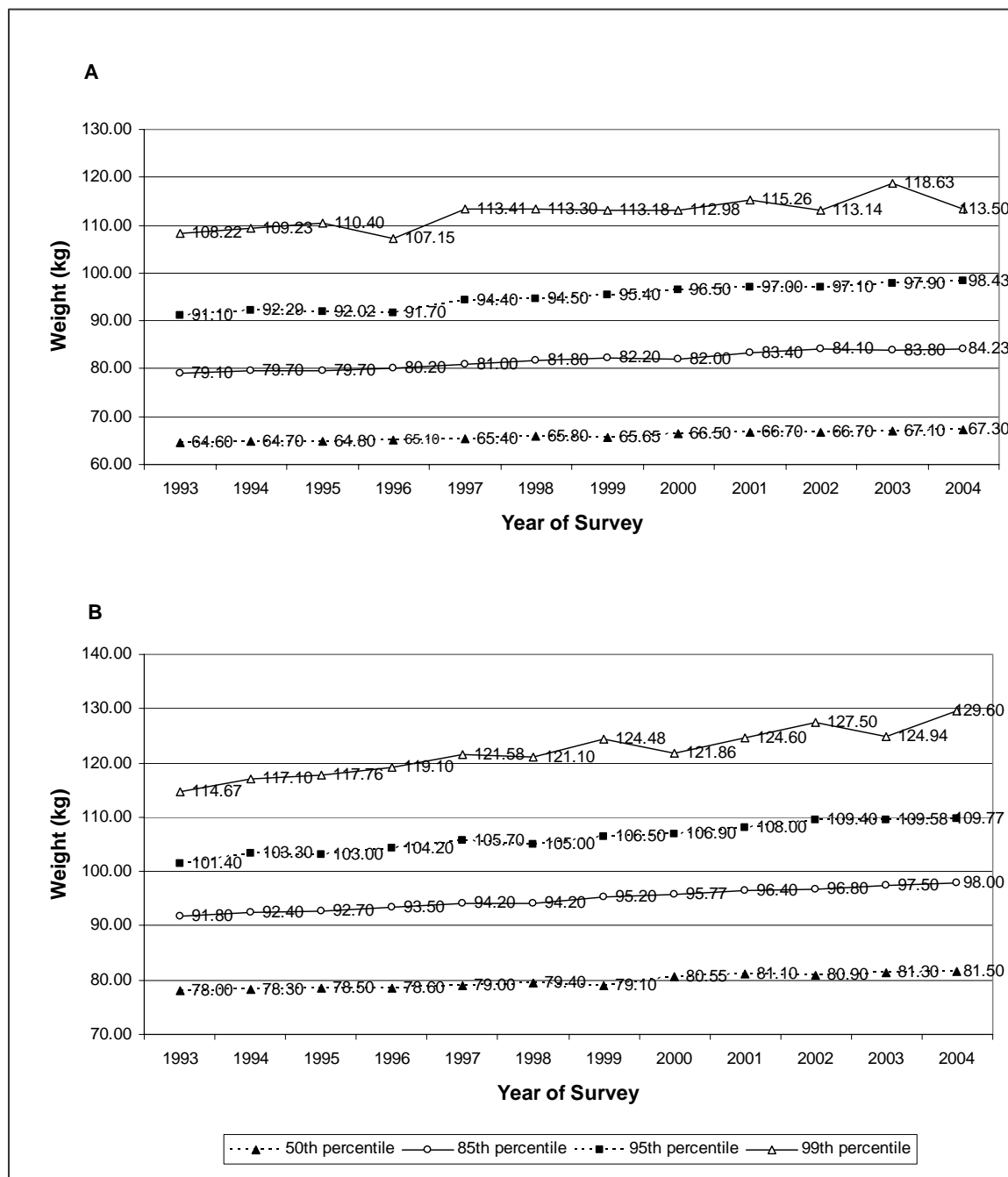


Figure 16 Weight percentiles (50th, 85th, 95th, and 99th) for males (A) and females (B) aged 15 years and over for the period between 1993 and 2004

4.3.3 BMI estimations

Figure 17 graphically represents the increase in the proportion of the entire population, and the proportion of males and females separately, with a BMI over 30, 35, and 40. These graphs suggest that since 1993 there has been approximately a 50% increase in the proportion of individuals with a BMI over 30, and close to a 100% increase in the proportion of individuals with a BMI over 35 and 40. In 2004, the proportion of the sample with a BMI over 30 is estimated as being 23.7% of the English population aged 15 and over. Using the mid-population estimate for adults in England (409,890,000) (National Statistics, 2005), this suggests that 9,637,404 individuals living in England were obese in 2004.

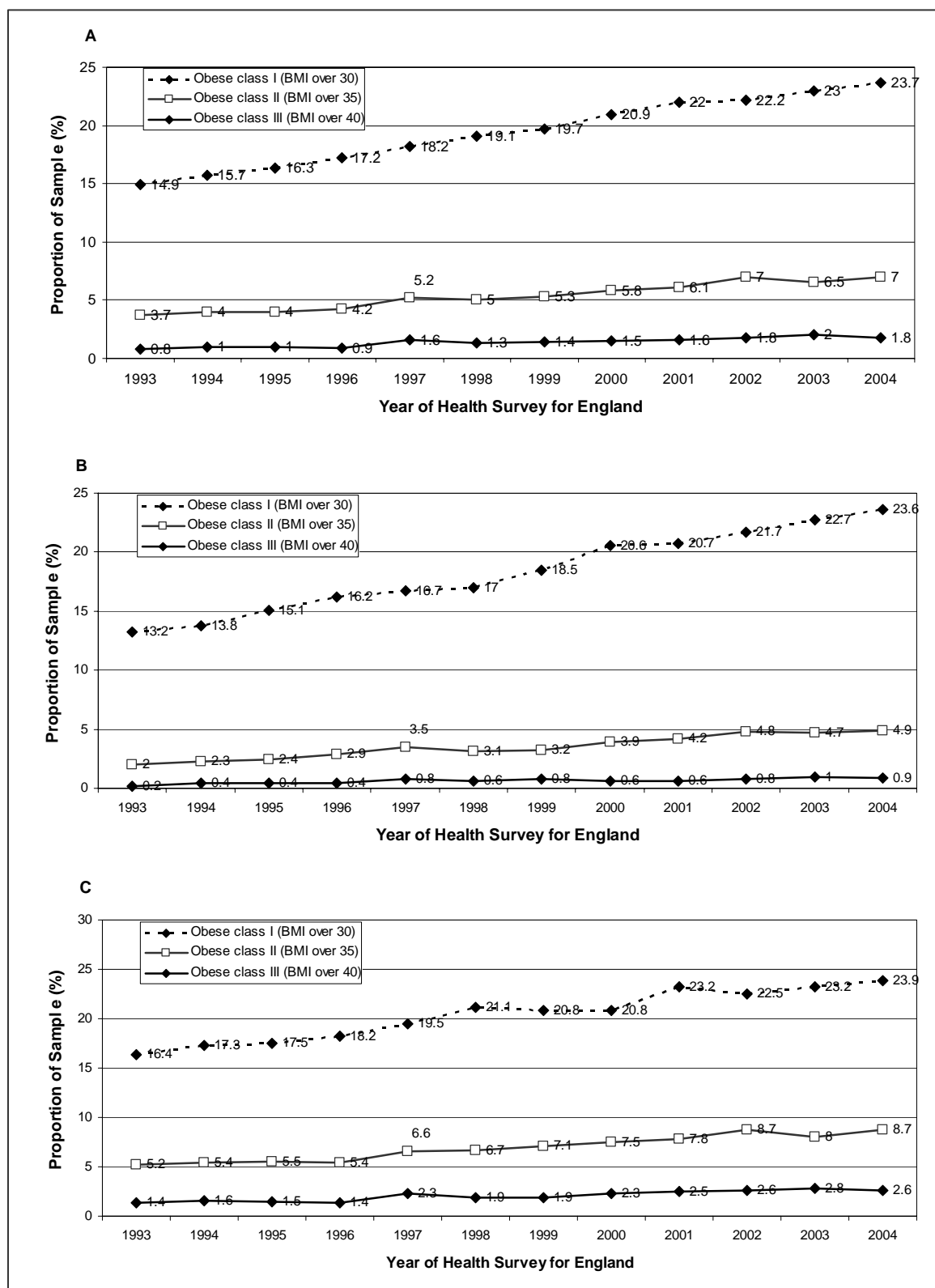


Figure 17 Increase in proportion of adults in obesity Class I (BMI over 30) Class II (BMI over 35), and Class III (BMI over 40) for males (B) and females (C) separately, and for the overall population (A)

After reviewing the current estimates of obesity, the proportion of individuals with a BMI over 30 was predicted for the years 2005 to 2010, for males and females separately, and for the overall population. The regression parameters used in these equations and the confidence intervals of the estimates are reported in table 3. The trends shown in figure 18 suggest that, if current trends continue, the proportion of the overall population who will be obese by 2010 is 26.17%. For females, this suggests that 27.39% will be obese by 2010, and for males it suggests that 24.87% will be obese. These estimates are important because they suggest that by 2010 just over one quarter of the population will be obese.

Table 3 Parameter estimates used to predict the trends in obesity from 2005 to 2010

<i>Population</i>	<i>Constant</i>	<i>b1</i>	<i>b2</i>	<i>b3</i>	<i>CI (%)</i>
Male	12.539	0.633	0.054	-0.002	0.81
Female	-15.712	0.612	0.040	-0.003	1.15
Overall	14.228	0.623	0.044	0.003	0.30

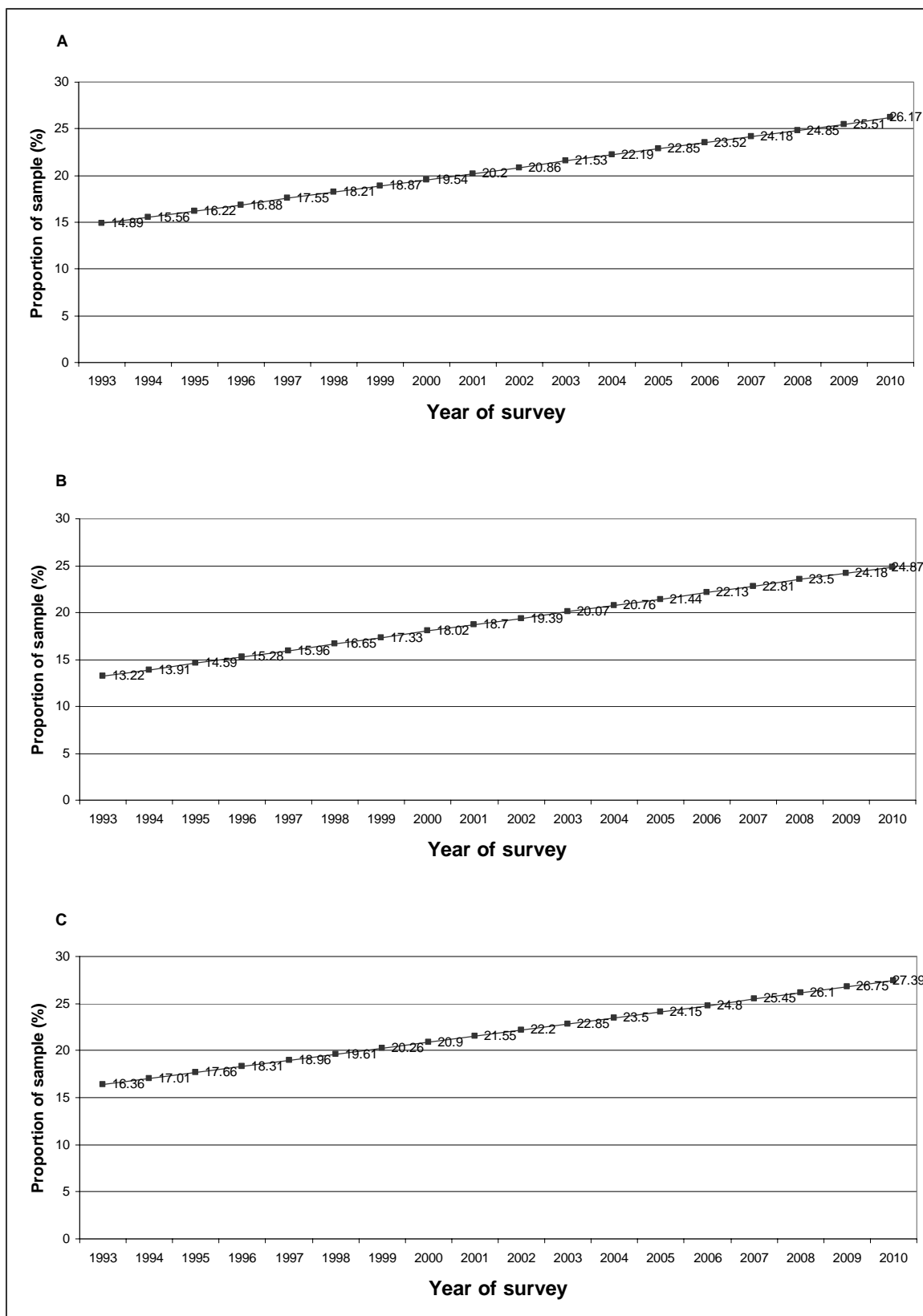


Figure 18 Proportion of adults in obesity Class I (BMI over 30) predicted by 2010 based on Health Survey for England data 1993-2004

4.4 QUESTIONNAIRE SURVEY

4.4.1 National Back Exchange questionnaire

Response rate

The NBE questionnaire was sent out using a service provided by the NBE. This took 2–4 weeks to process the questionnaire resulting in slippage and delayed receipt of the questionnaire by members of the NBE. For this reason the original deadline of the 1st August 2006 was extended to the 31st August 2006. This extension was communicated to the members of the NBE by an email via the chairs of the regional groups of the NBE. A number of members of the NBE contacted the researchers to give reasons for not returning the questionnaire (figure 19).

A total of 212 responses were received from back care advisors (BCAs). 78 were from NHS acute Trusts; as there are approximately 176 (Davies, 2004) acute Trusts, this suggests a response from 44%. Responses were also received from 68 Primary Care and combined Trusts; as there are 303 Primary Care Trusts (Davies, 2004), this suggests that responses were received from 25% of PCTs. However, this figure might be under-estimated given that many PCTs share a BCA.

- Organisation has not yet worked with/treated any bariatric clients
- No experience of bariatric patients
- Respondent has recently retired
- Change of job role and respondent no longer is involved in manual handling/NHS/adult care
- Respondent is an independent trainer who problem solves specific handling issues with bariatric clients but has no continuous involvement with the client/patient group
- Respondent works for independent training and consultancy company and does not work in the NHS, nursing home or care homes
- Questionnaire was received after the deadline of 1st August so was not returned
- Lack of sufficient involvement in area of bariatrics to be able to provide information required
- Job role does not involve manual handling issues
- Respondent away on annual leave at time of questionnaire and did not return until after deadline
- Respondent works in a mental health trust and has had no contact with bariatric clients
- Questionnaire not returned to avoid duplication, because a colleague of the respondent who works in the same department has completed and returned questionnaire
- Respondent works for a company supplying equipment and has no direct involvement with clients/patients
- Respondent is a university lecturer and has no direct client/patient contact

Figure 19 Reasons for non-return of questionnaires

Respondent characteristics

The characteristics of those individuals who responded to the questionnaire are summarised in table 4, giving information about job titles, the sector for which advice was provided and the region of the UK. The majority of the respondents were employed as manual handling, or back care, advisors (74.6%), suggesting that the questionnaire respondents constituted the target group. The majority of participating Trusts had a designated individual for manual handling

issues. Only approximately 20% of the responding Trusts had second designated individual responsible for manual handling, for example, a Risk and Safety Manager (table 4). The data reported in table 4 suggests that the sectors for which a majority of the respondents provided MH advice or guidance were the acute and Social Services, and a complex combination of the different sectors listed¹. The regions were mostly equally distributed throughout the UK, with a slightly larger proportion of respondents from the South East; this may simply reflect the higher population density in the South East.

Table 4 Job titles, employment sectors, and the regions of the UK, (n = 211)

<i>Job title</i>	<i>Percentage of respondents (%)</i>
Manual handling/back care advisor/ trainer/ facilitator/ coordinator	74.6
Risk and Safety Manager	7.0
Clinical Effectiveness manager	0.5
Allied Health Professional (Occupational Therapist/Physiotherapist)	5.2
Other	11.8
Missing	0.9
<i>Sector</i>	
NHS Acute Trust	29.6
NHS Primary Care Trust	6.6
Ambulance service	2.3
Social Services	12.2
NHS Mental Health trust	3.3
Other NHS trust e.g., combined acute and primary, social, and SHA	4.2
Commercial	1.9
Nursing home and care agencies	1.4
Education	1.9
Private healthcare	5.2
Hospice	2.3
NHS Acute Trust and NHS Primary Care Trust	7.5
NHS Primary Care Trust and Social Services	2.3
Serves a complex combination of all services	15.7
Other	2.3
<i>Region of the UK</i>	
East Midlands	6.6
East of England	6.1
London	5.2
North East	5.6
North West	8.5
Scotland	10.3
South East	13.6
South West	9.9
Wales	8.5
West Midlands	7.0
Yorkshire and Humber	6.6
Northern Ireland	6.1
Combination of regions	4.2
Missing	1.9

¹ Combinations of sectors were not listed separately as each combination represented less than 1% of the sample.

Respondents were asked to recall the number of bariatric patients they had encountered, or given telephone/written guidance about, in the previous twelve months. It was found that the majority (47.4%) had provided advice for between one and 20 bariatric patients over the previous twelve months (figure 20). Only a small percentage (6.4%) reported providing advice for 21 or more bariatric patients and 14.2% reported that they had not encountered any bariatric patients over the previous twelve months.

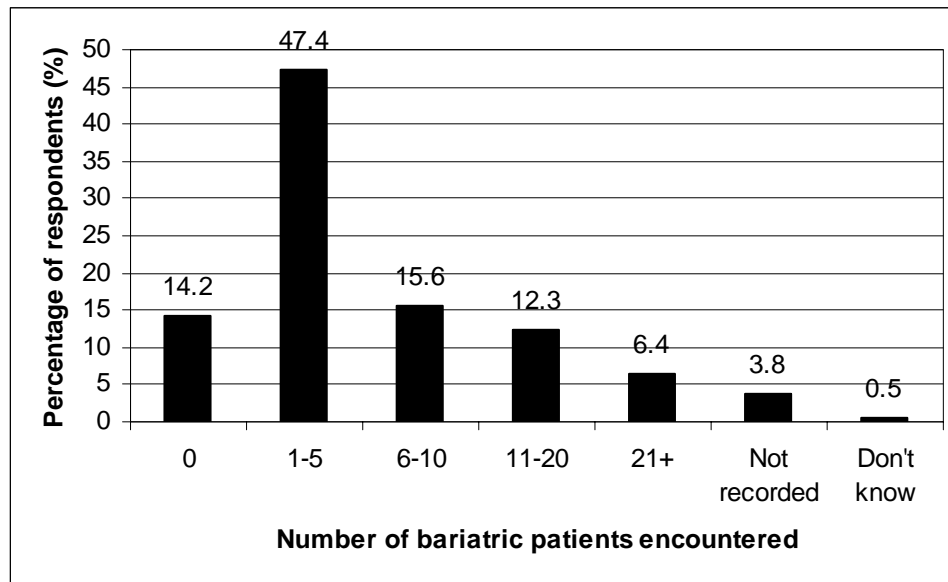


Figure 20 Number of bariatric patients encountered and/or written guidance provided in the previous twelve months (n = 212)

Defining 'bariatric'

Definitions of 'bariatric' are shown in figure 21. Over 14% reported that their organisation did not attempt to define 'bariatric'. The remaining respondents suggested that their organisations defined bariatric patients by a predefined weight (table 5), with a wide range between the minimum and maximum predicted weight definitions for bariatric.

Although individuals' weights were the most common method used to define 'bariatric', other less prevalent definitions were also used (figure 21). These included a definition based upon the extent to which bariatric patients weight or size exceeds equipment, and a definition combining a patients weight and this propensity for their weight/size to exceed equipment capacity. A final definition reported by respondents was based on a patient's BMI (table 5). It is important to note that individuals with a BMI of 30 and typical heights ranging from 1.63m (5ft 4 inches) and 1.83m (6ft) would be expected to have a weight within the range of 84.67kg (13.33 stone) and 100.47kg (15.82 stone). Similarly, an individual with a BMI of 40 and the same typical heights would be expected to weigh within the range of 112.90kg (17.78 stone) and 133.96kg (21.10 stone). This suggests that when BMI is used to define bariatric patients, the weight of these patients is likely to be much lower than when a specific predefined weight is used.

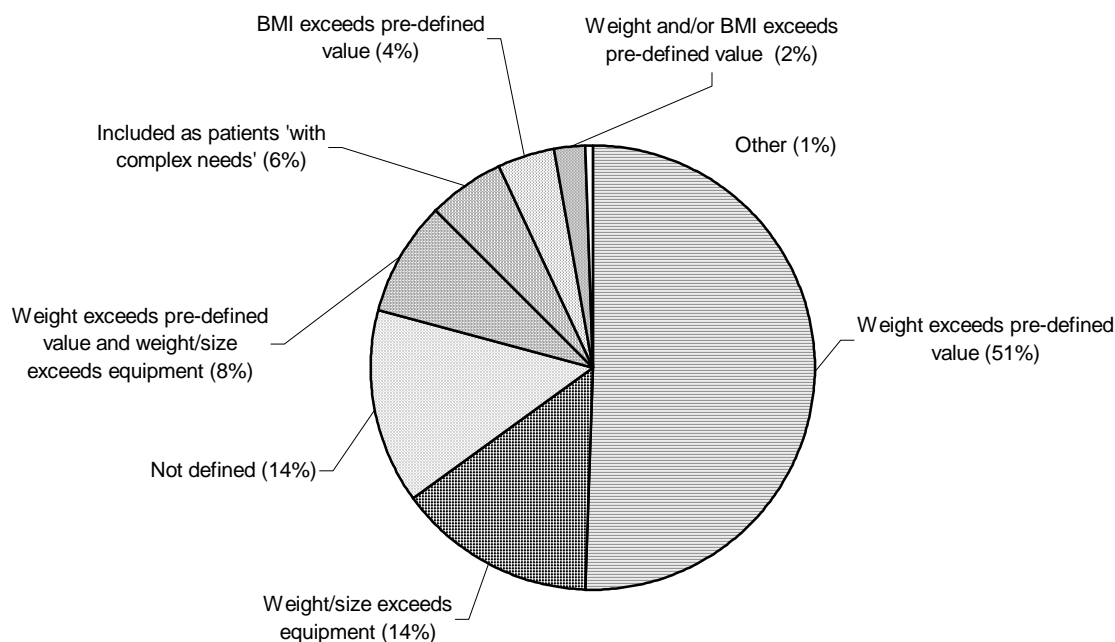


Figure 21 Definition of 'bariatric' in percentages (n = 210)

Table 5 Minimum and maximum pre-defined weight and BMI to define 'bariatric'

<i>Predefined value</i>	<i>Minimum value identified</i>	<i>Maximum value identified</i>
Pre-defined weight (kg/stone)	107.95/17	190.51/30
Pre-defined BMI	30	40

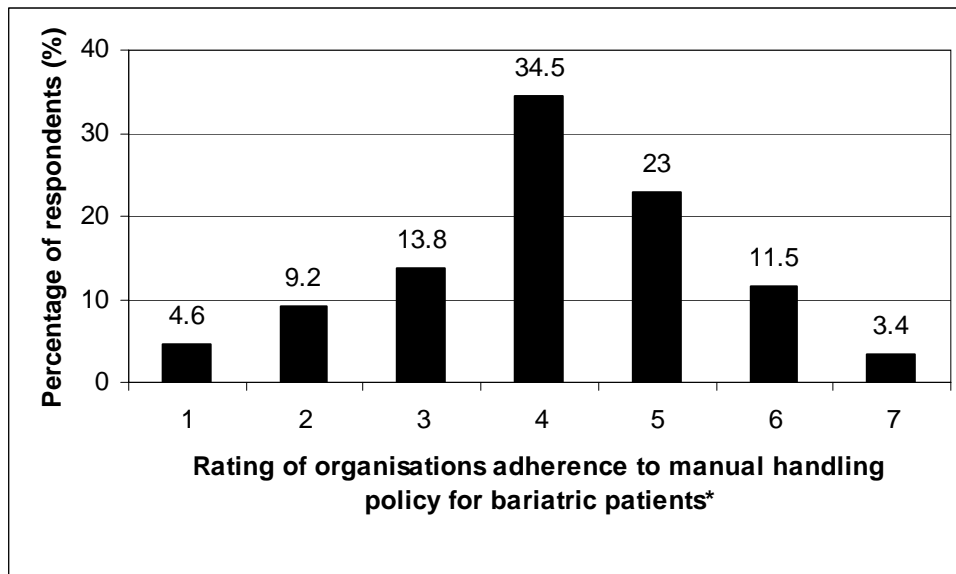
Bariatric manual handling policy

42.3% of the respondents reported that their organisation had a policy for bariatric patients - some supplied copies of these policies (n=34). Each policy was read to assess the extent to which they addressed the generic risks (patient factors, building/vehicle space design, equipment, communication, organisational and staff issues) during the bariatric journey identified in the focus groups (figure 13). All the policies addressed risks associated with equipment (table 6). Most addressed risks associated with communication and a smaller number addressed risks associated with organisation and staff issues, patient factors, and building/vehicle space and design.

Table 6 Bariatric policies addressing the generic risks (n = 34)

<i>Generic risks</i>	<i>Number of policies addressing these risks</i>
Equipment	34
Communication	28
Organisational and staff issues	24
Patient factors	23
Building/vehicle space and design	18

Of those respondents with no current bariatric manual handling policy, 51.3% reported that their organisation was in the process of writing one. For those respondents with a bariatric policy only approximately 40% stated that their organisations adhere to this policy reasonably well (figure 22). Approximately 28% reported that their organisation did not adhere to this policy very well, and 34.5% of the respondents neither rated their organisations as adhering reasonably well to the policy, nor as adhering more poorly to this policy (figure 22).



*1 = Not at all well, 7 = Extremely well

Figure 22 Adherence to the manual handling bariatric policy (n = 87)

Respondents were asked to identify any barriers to the effectiveness of the bariatric policy with a list of prompts provided from the focus group analysis (see section 4.2). As the majority of respondents cited more than one, each barrier was treated as a question in its own right. If respondents had identified this barrier they were regarded as responding 'yes', allowing the percentage for each barrier to be calculated (table 7). Over half suggested that (1) staff did not read the policy (57.4%) and (2) there was a lack of resources/equipment (53.7%). Almost 40% of the respondents felt that not all areas of the organisation allocated importance to the policy.

The question relating to the effectiveness of bariatric manual handling policies also asked for other barriers to the effectiveness of the policy other than those already proposed in the question. Some responses were relevant to the barriers already proposed in the question and were coded into these responses. For some of the ‘other’ barriers this was not possible, including: staff not thinking about the policy perhaps due to them not being given enough time to think about the policy because of the pressure of work; and the organisation’s propensity to ignore problems until they arise (i.e., crisis management).

Table 7 Percentage of respondents who identified each of the barriers to the effectiveness of their bariatric manual handling policy

<i>Barriers</i>	<i>n</i>	<i>Percentage (%) of respondents identifying this barrier in their organisations</i>
Staff do not read the policy	136	57.4
Lack of resources/ equipment	136	53.7
Not all areas of the organisation allocate importance to the policy	136	39.0
Lack of management support	136	24.3
Staff do not see the policy as a priority	136	23.5

Experience of risks and risk assessments

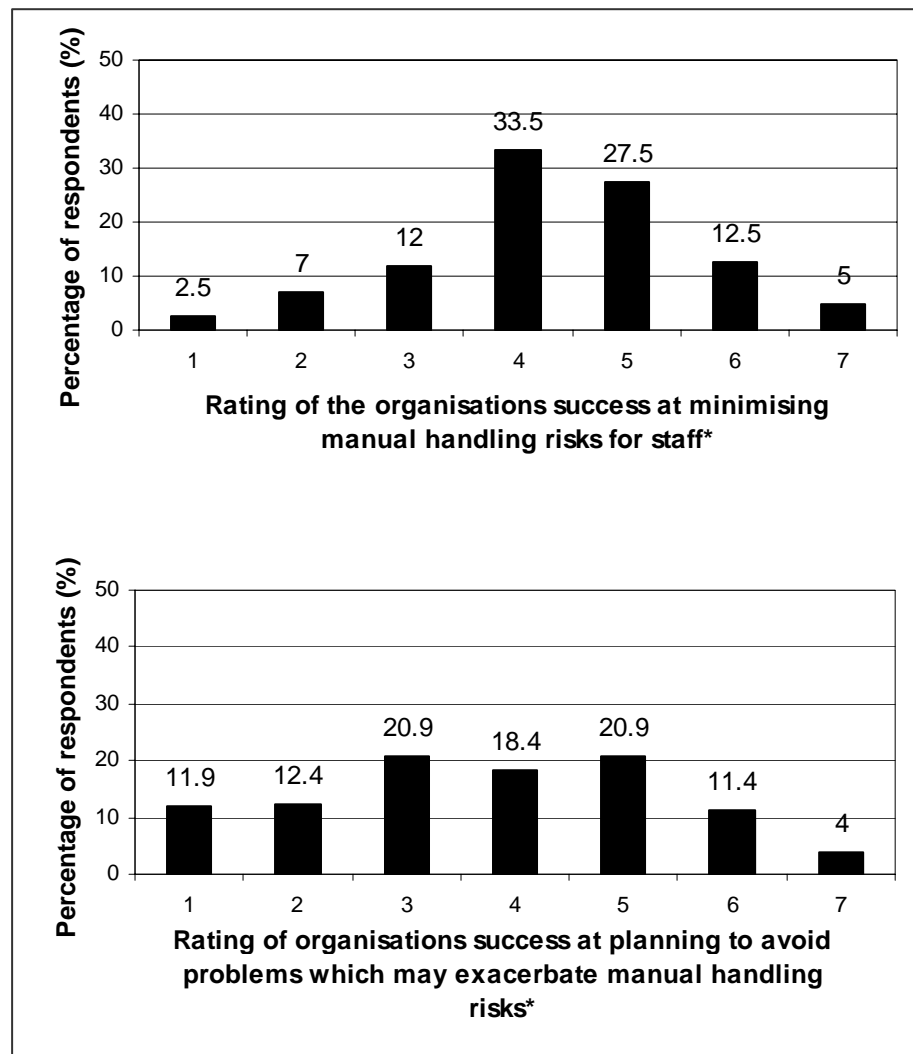
Over 78% of the respondents rated the success of their organisation at minimising manual handling risks for staff as quite to extremely successful (figure 23). A slighter lower percentage of the respondents rated their organisations planning in advance to avoid problems that may exacerbate manual handling risks positively (figure 23). Specifically, only approximately 34% rated the organisation as successful to extremely successful at planning to avoid such problems, whilst only 18.4% rated their organisation as quite successful.

Patient Issues

82% of the respondents rated the organisation as quite to extremely successful at achieving a high level of patient safety (figure 24), but less felt that their organisations were successful at achieving a high level of patient dignity (69.5%) and a high level of patient comfort (74%).

Only 40% reported that manual handling risk assessments were done for bariatric patients before admission and discharge (table 8). For these, information relevant to admissions was shared by others agencies involved with the patient (i.e., from community staff, nursing homes and other hospitals). Risk assessments were also done by the Ambulance Service, Police Service, Fire Service or at pre-assessment/pre-operative clinics. The risk assessments alerted hospital staff, members of the back care team and occupational therapists and facilitated the provision of advice, support, and equipment.

Discharge risk assessments were done by hospital back care advisors, occupational therapists, manual handling staff etc. and/or might also be integral to the discharge list and done by a discharge liaison team or the Ambulance Service. The process might start on, or before, admission i.e., at pre-operative assessment, with hospital staff liaising with family members and community staff. Ambulance staff were informed of patient needs to ensure the use of the correct equipment. Finally, a joint risk assessment could be done by the hospital and the Ambulance Service or other outside organisations. The risk assessments may include an environmental visit to assess access to the property.

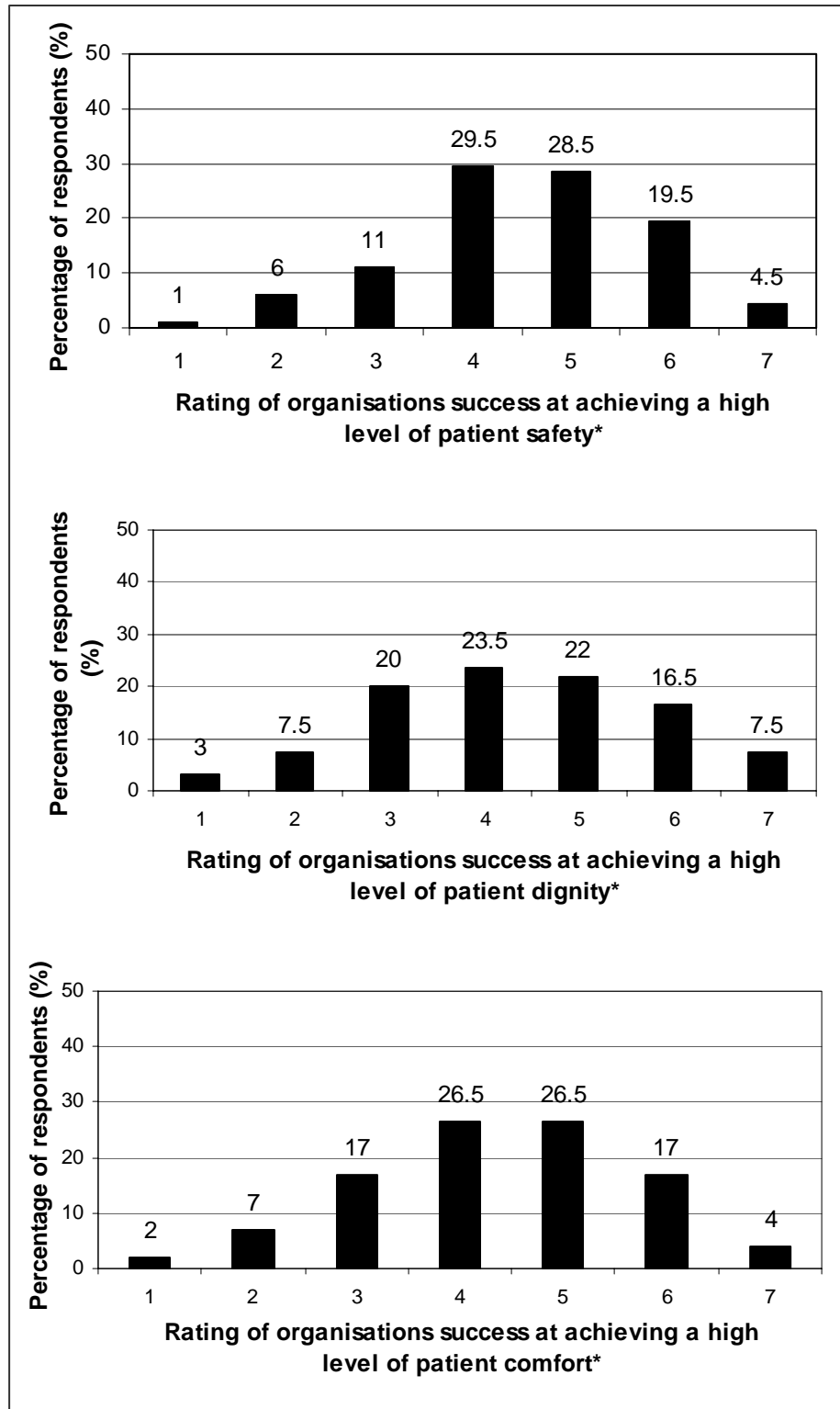


1 = Not at all successful, 4 = Quite successful, 7 = Extremely successful

Figure 23 Organisational success at minimising manual handling risks and planning to avoid problems (n = 200)

Table 8 Risk assessments for admission and discharge

Question	n	Yes (%)	No (%)	Don't know (%)
When <u>admitting</u> a bariatric patient to hospital as a non-emergency are risk assessments ever conducted in advance of admission?	189	41.3	25.9	32.8
	(127)	(61.4)	(38.6)	
When <u>discharging</u> a bariatric patient from hospital are risk assessments ever conducted in advance of requesting transport by the ambulance service?	190	40.0	16.3	43.7
	(107)	(71.0)	(29.0)	



1 = Not at all successful, 4 = Quite successful, 7 = Extremely successful

Figure 24 Organisational success at achieving a high level of patient safety, dignity, and comfort (n = 200)

Building space/design

38.2% of respondents (n =199) suggested there were parts of the building essential to patient care that could not be accessed by bariatric patients. Only 30.7% of the respondents explicitly stated that this was not a problem with 31.2% unsure of the extent of the problem in their organisations.

Manual handling training (bariatric)

The majority of respondents (over 80%) reported that the organisations in which they work provide staff with general manual handling training and provide a refresher annually or more frequently (table 9). Some respondents also suggested that general manual handling training might occur on an ad-hoc basis, for example when staff are required to use new equipment. In contrast only 30% identified that staff were trained to use bariatric equipment and/or in specific techniques for bariatric patients. Training might be provided for individual patient cases and/or incorporated into the general manual handling training. 40% explicitly stated that extra manual handling training for bariatric patients was not provided in their organisations (table 9).

Table 9 Frequency of general and specific bariatric manual handling

	<i>n</i>	<i>Percentage of respondents who identified training (%)</i>
<i>General manual handling training</i>		
At induction when start	212	83.5
Annual refresher or more frequent refresher	212	80.2
Refresher less than once a year	212	19.8
No training given	212	1.4
<i>Bariatric patient training</i>		
Trained how to use bariatric equipment	212	32.1
Trained in techniques in manual handling relating to bariatric patients	212	29.2
No extra training given relating to bariatric patients	212	37.7

Bariatric equipment

76.6% of respondents (n=209), who provided information on equipment reported that their organisation, had specialist bariatric equipment. The different types of available bariatric equipment is shown in table 10. Equipment was least likely to be available in theatre and x-ray, but when available it was more likely to be used with every bariatric patient. The availability of equipment for moving and handling was also poor and was the least likely to be used with every patient even if it was available.

Most popular storage places for bariatric equipment were on individual hospital wards (43.6%) and central storage units (table 11). Multiple sites were also used to store equipment but often equipment had no storage place and could be found wherever it was previously used.

Table 10 Availability and use of bariatric equipment

<i>Bariatric equipment</i>	<i>Percentage of respondents who identified availability of equipment for use with every bariatric patient (n)</i>	<i>Percentage of these respondents who reported that this piece of equipment is used with every bariatric patient (n)</i>
<i>Moving and handling</i>		
Bariatric sling for hoist	88.3 (128)	80.5 (95)
Wide slide sheets	81.1 (116)	53.8 (56)
Bariatric mobile hoist	77.5 (107)	83.2 (79)
Bariatric overhead gantry hoist	48.1 (65)	70.4 (19)
Bariatric patslide	37.4 (34)	38.2 (13)
Mangar cushion Elk/Camel	36.4 (48)	33.3 (13)
Bariatric stand aid	24.0 (31)	74.7 (68)
Bariatric bed mover	14.4 (13)	100(6)
Bariatric A&E trolley	13.5 (12)	72.7 (8)
<i>Furniture</i>		
Bariatric armchair	82.8 (120)	70.1 (75)
Bariatric bed	73.1 (117)	76.9 (80)
Bariatric electric profiling bed	70.5 (98)	60.9 (56)
Bariatric commode	56.0 (75)	54.9 (39)
<i>Theatre and X-ray</i>		
Bariatric theatre table	61.1 (58)	78.6 (44)
Bariatric overhead lifting hoist	48.1 (65)	60.3 (35)
Bariatric radio translucent bed/trolley	13.5 (12)	72.7 (8)
Bariatric weighting scales	6.9 (6)	83.3 (5)
Bariatric x-ray table	5.7 (5)	80.0 (4)

The number of respondents are not included in this question because the exact number of respondents who identified the availability for use, and the actual use with bariatric patients, is reported alongside the percentages. Not all respondents who identified the availability of bariatric equipment answered the question relating to whether this piece of equipment is used with every respondent. The percentage of these missing responses for each of the questions ranged between 0% and 13%.

Table 11 Storage places for bariatric equipment

<i>Storage place for bariatric equipment</i>	<i>n</i>	<i>Percentage of respondents who Identified this place (%)</i>
On individual hospital wards	156	43.6
Central storage room on hospital site	156	28.2
Central storage unit in community	156	24.4
At manufacturer's premises as part of 'just in Time;' contract	156	17.3
Manual handling advisor's office	156	13.5
In patient's home	156	5.8

Of those with bariatric equipment, 90%² (n = 159) reported problems accessing specialist bariatric equipment. Only 7.5% of the respondents reported no problems and the remaining 2.5% of respondents did not know about problems. The most commonly reported problems (table 12) related to staff not being aware of equipment (52.4%); not being able to find it (52.4%); not being able to use it due to confined spaces (44.1%); or not knowing how to use it (41.3%). Less commonly cited problems related to cleaning (16.8%) and maintenance (13.3%). Other problems accessing bariatric equipment were the space required to erect and use equipment and availability, with equipment often in use in other parts of the Trust or being used with non-bariatric patients.

Table 12 Problems accessing specialist bariatric equipment

<i>Problems experienced when accessing specialist bariatric equipment</i>	<i>n</i>	<i>Percentage of respondents who identified this problem (%)</i>
Staff are not aware of the existence of equipment	143	52.4
Staff can't find equipment	143	52.4
Staff can't use equipment due to confined space	143	44.1
Staff don't know how to use equipment	143	41.3
Difficult to transport to desired location	143	35.7
Equipment has not been cleaned	143	16.8
Equipment broken	143	13.3

4.4.2 Ambulance questionnaire

Response rate

The questionnaire was emailed out on the 30th May 2006 to 32 Ambulance NHS Trusts. Eighteen (56.3%) were returned by October 2006. No reasons were given for non-return of the questionnaire.

Respondent characteristics

The majority of respondents were Risk and Safety Managers (50%) rather than manual handling/back care advisors (table 13), suggesting that most of responding Ambulance Trusts did not have an individual directly responsible for manual handling issues. There was a wider range of job titles including: environmental safety and security manager, ergonomics advisor, paramedic team leader and head of governance. All respondents reported providing advice/guidance with regard to manual handling risks to the Ambulance Service. The geographic location of respondents were reasonably equally distributed throughout the UK with a higher proportion working in the South East region, possibly reflecting the greater population density.

² This percentage indicates the number of respondents to the question who identified problems experienced by staff when accessing bariatric equipment. One respondent who reported that their organisation possessed equipment for bariatric patients did not provide an answer to this question.

Table 13 Job titles and the regions of the UK (n = 17)

<i>Job title</i>	<i>Percentage of respondents (%)</i>
Manual Handling/Back Care Advisor	22.2
Risk and Safety Manager	50.0
Other	27.8
<i>Region of the UK</i>	
East Midlands	5.6
East of England	5.6
London	5.6
North East	0
North West	16.7
Scotland	0
South East	22.2
South West	16.7
Wales	5.6
West Midlands	11.1
Yorkshire and Humber	11.1

Over 70% had encountered, or provided advice about, bariatric patients (figure 25). Only a small proportion (5.6%) reported not having encountered, or provided guidance, for any bariatric patients within the previous twelve months.

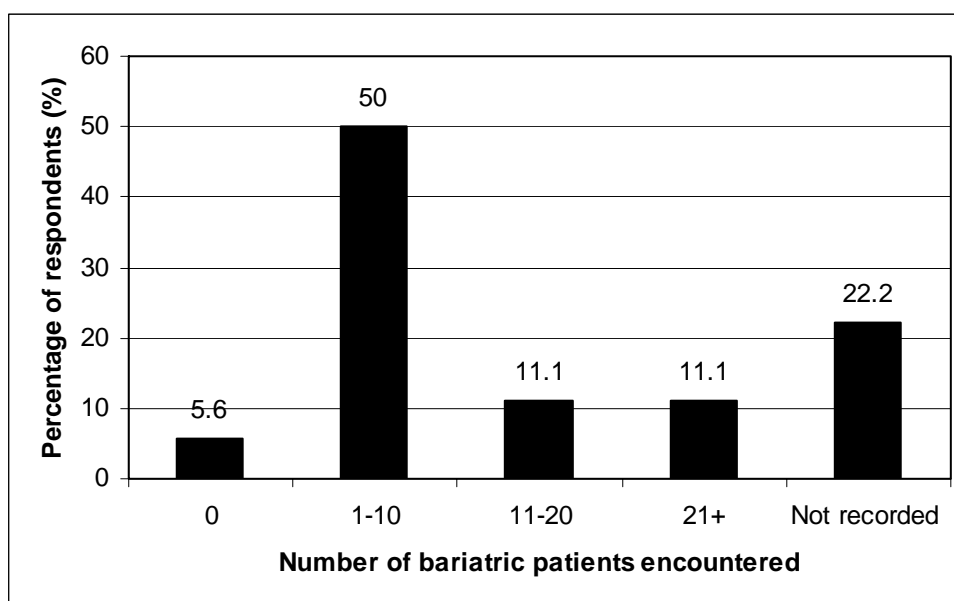


Figure 25 Number of bariatric patients encountered and/or written guidance provided in the previous twelve months (n = 18)

Definition of 'bariatric'

The definitions of 'bariatric' reported by those working with Ambulance Service are summarised in figure 26, with three main definitions: (1) if weight exceeds a predefined value (25 stone/156.76kg); (2) if weight/size permits the use of the required equipment; (3) patients with complex needs. Other ways in which bariatric patients were defined included: an individual basis (11%), for example, a patient weighing 18 stone (114.31kg) with no muscle capacity; and if two double crews were unable to move a patient safely. Finally 17% of the respondents, almost one fifth of the sample, reported that bariatric patients were not defined in their Ambulance Trust.

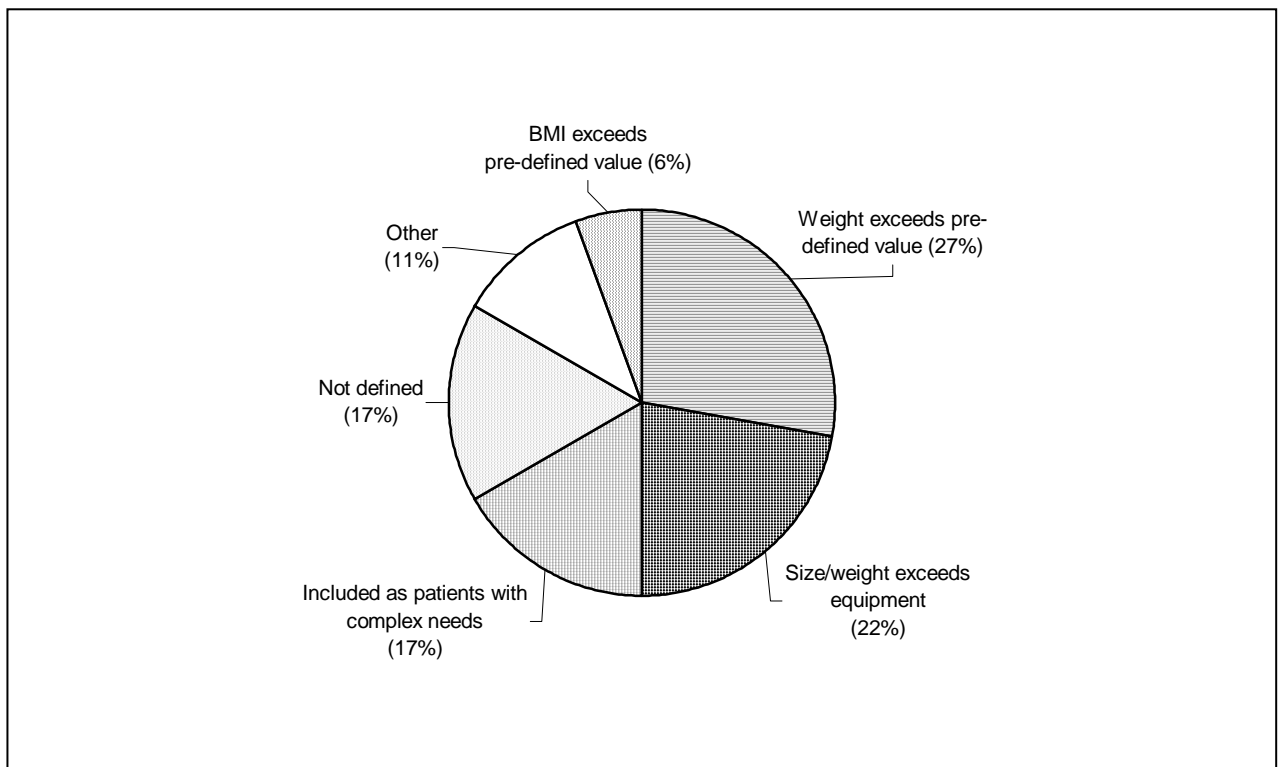


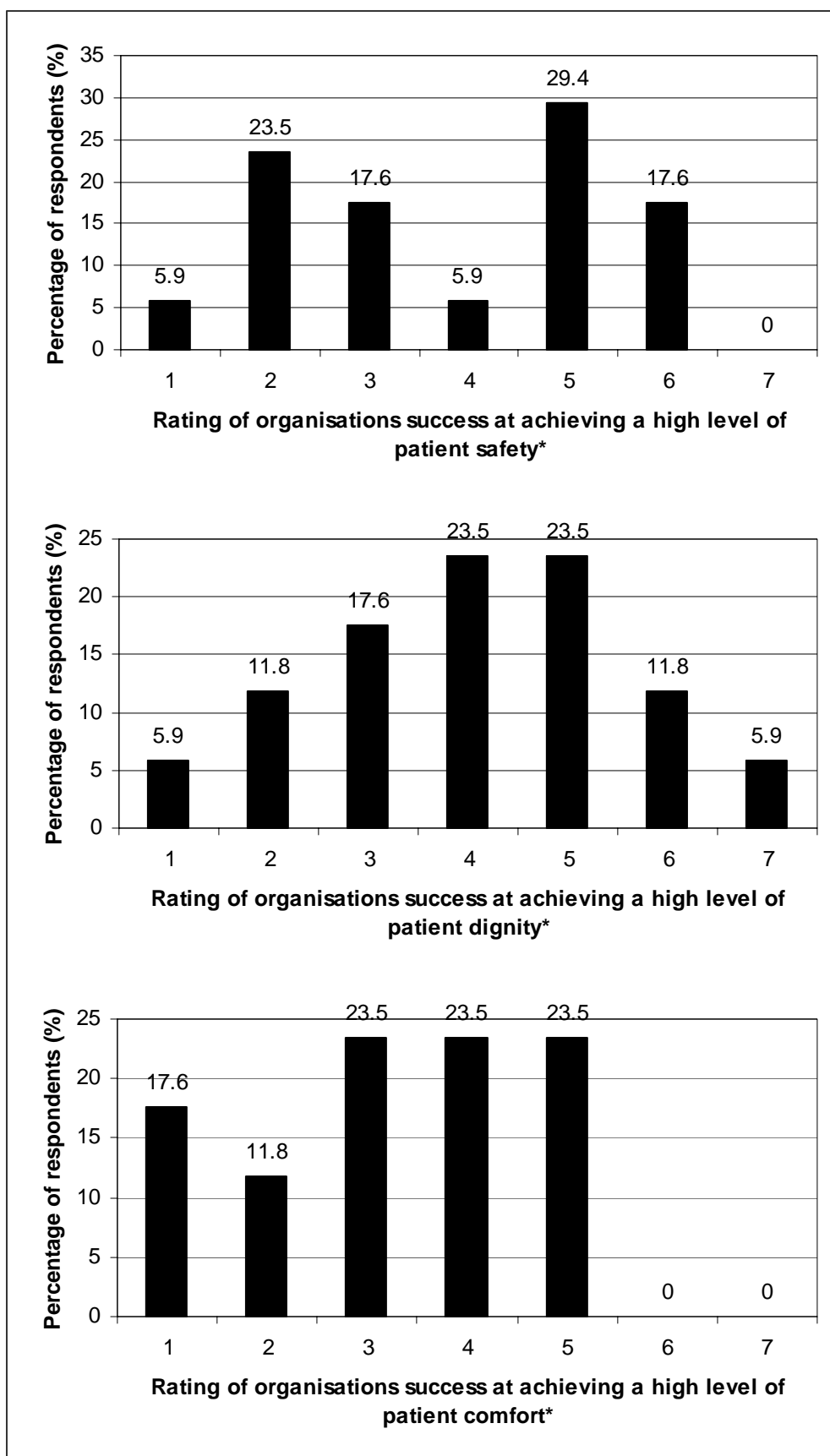
Figure 26 Definition of 'bariatric' (n = 18)

Manual handling policies and procedures

72.2% of the respondents reported their Ambulance Trust did not have a policy referring specifically to bariatric manual handling and 44.4% stated that there were no recommended procedures for moving and transporting bariatric patients. 52.9% (n=17) stated that there was no dedicated person in their Ambulance Trust to investigate issues relating to patient safety.

Patient Issues

Over half the respondents (52.9%) rated their Trust as quite successful to extremely successful at achieving a high level of patient safety and dignity (figure 27). Furthermore 47% of the respondents rated their Trust as quite successful to extremely successful at achieving a high level of patient comfort.

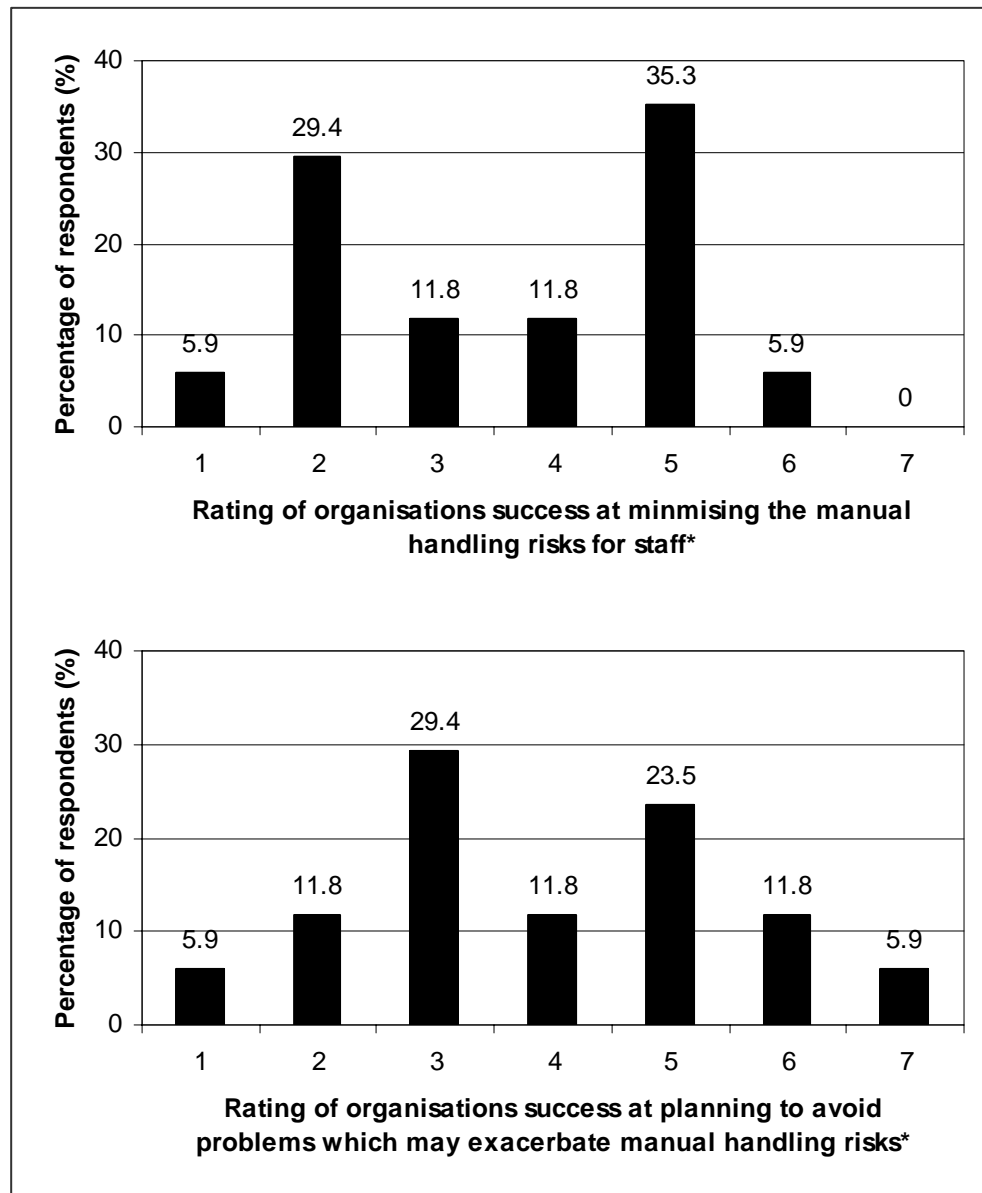


* 1 = Not at all successful, 4 = Quite successful, 7 = Extremely successful

Figure 27 Patient safety, comfort, and dignity in the Ambulance Service (n = 17)

Risks and Risk assessments

Over 50% of respondents rated their Ambulance Trusts as quite successful to extremely successful at minimising manual handling risks and planning to avoid exacerbating problems (figure 28).



* 1 = Not at all successful, 4 = Quite successful, 7 = Extremely successful

Figure 28 Ambulance Trusts: Minimising manual handling risks and planning to avoid problems (n = 17)

Respondents were asked to report whether their Trusts conducted risk assessments prior to admitting, and discharging, a bariatric patient. 82.4% of the respondents reported that risk assessments were conducted before admitting a bariatric patient to hospital and prior to

discharge. A site visit would be carried out (and at a hospital for discharge planning) to do a risk assessment and plan a safe system of work.

Communication

A series of questions explored communication between the ambulance control centre, paramedics and the hospital. For non-emergency calls only 27.8% of the respondents reported that questions about the patient's size/weight were asked before the ambulance crew went to a patient. For emergency calls 94.4% reported that, on occasion, ambulance staff did not discover that the patient was bariatric until arrival at the call site. 50% reported that, on occasion, information was collected by the ambulance control centre at the time of the 999 call, with 22.2% being able to retrieve information from the database of bariatric patients at the control centre.

44.4% reported that no official system was in place for the transporting ambulance to notify the receiving hospital that they were bringing a bariatric patient, but only 5.6% reported that they did not provide this information in advance. So 50% would inform the receiving hospital whilst on their journey that they were bringing a bariatric patient and 38.9% informed the receiving hospital earlier (on their arrival at the patient's home).

Manual handling training (bariatric)

The majority of respondents reported that their Trust provided manual handling training at the induction, at the start of employment, and as part of an annual, or more frequent, refresher (table 14). 64.7% reported that no additional bariatric training was provided, with less than 30% reporting training in the use of bariatric techniques and equipment.

Table 14 Ambulance Service: Frequency of general and specific bariatric manual handling

	<i>n</i>	<i>Percentage of respondents (%)</i>
<i>General manual handling training</i>		
At induction when start	16	76.5
Annual refresher or more frequent refresher	16	64.7
Refresher less than once a year	16	23.5
No training given	16	5.9
<i>Bariatric patient training</i>		
Trained how to use bariatric equipment	16	17.6
Trained in techniques in manual handling relating to bariatric patients	16	29.4
No extra training given relating to bariatric patients	16	64.7

Equipment

Approximately half of the respondents (61.1%) had specialist equipment available to use with bariatric patients (table 15), including wide slide sheets (90%) and Mangar Elks/Camels (88.9%). 45.5% of the respondents with specialist equipment (n = 11) reported that it was stored on bariatric ambulances and 54.5% reported that it was stored in the ambulance station. Other storage locations included treat and response vehicles, rapid response vehicles, officer and supervisors cars, and hospitals.

Table 15 Availability of bariatric equipment in the Ambulance Service

<i>Bariatric equipment</i>	<i>n</i>	<i>Percentage of respondents who reported this equipment was available to use with bariatric patients (%)</i>
Wide slide sheets	7	90
Mangar cushion elk/camel	9	88.9
Bariatric trolley/stretchers	9	60
Bariatric wheelchair	8	50
Bariatric mobile lifting hoist	8	37.5
Bariatric sling for hoist	9	33.3
Bariatric patslide	6	0
Bariatric spinal board	6	0
Bariatric portable overhead gantry	7	0

All respondents reported experiencing problems accessing specialist bariatric equipment (table 16). The main reasons related to confined space (60%) and staff not being able to use equipment (50%), not being aware of it (40%), and not being able to find it (40%) because it was shared or not stored on vehicles.. Other problems related to difficulties transporting it to the desired location (30%) and maintenance (20%).

Table 16 Problems accessing specialist bariatric equipment

<i>Problems encountered when accessing specialist bariatric equipment</i>	<i>n</i>	<i>Percentage of respondents who identified this problem</i>
Can't use equipment due to confined spaces	10	60.0
Staff don't know how to use equipment	10	50.0
Staff can't find equipment	10	40.0
Staff are not aware of the existence of equipment	10	40.0
Difficult to transport equipment to desired location	10	30.0
Equipment is broken	10	20.0
Equipment has not been cleaned	10	0

The time to access specialist equipment is summarised in figure 29, with 63.7% reporting that bariatric equipment could be available within two hours of arriving at the patient's location.

Transporting patients

55.6% reported that the majority of bariatric patients whom they have transported to hospital were taken as planned admissions, with only 27.8% reporting that the majority were taken as emergency admissions.

To determine the method by which these bariatric patients were transported to hospital a series of questions were designed to identify the transport modality. 61.1% of respondents reported that they did not have bariatric ambulances available for transporting bariatric patients (figure 30). Those with specialist ambulances had between one (16.7%) and three (5.6%) ambulances. One Trust reported using a laundry van to transport bariatric patients with mattress/tarpaulin on the floor (figure 31).

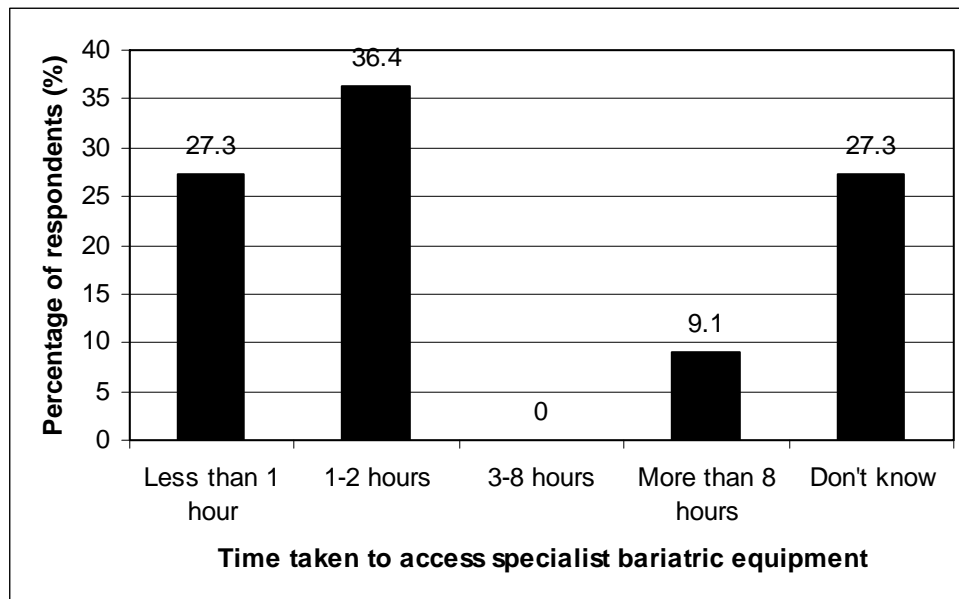


Figure 29 Time to access specialist bariatric equipment (n = 11)

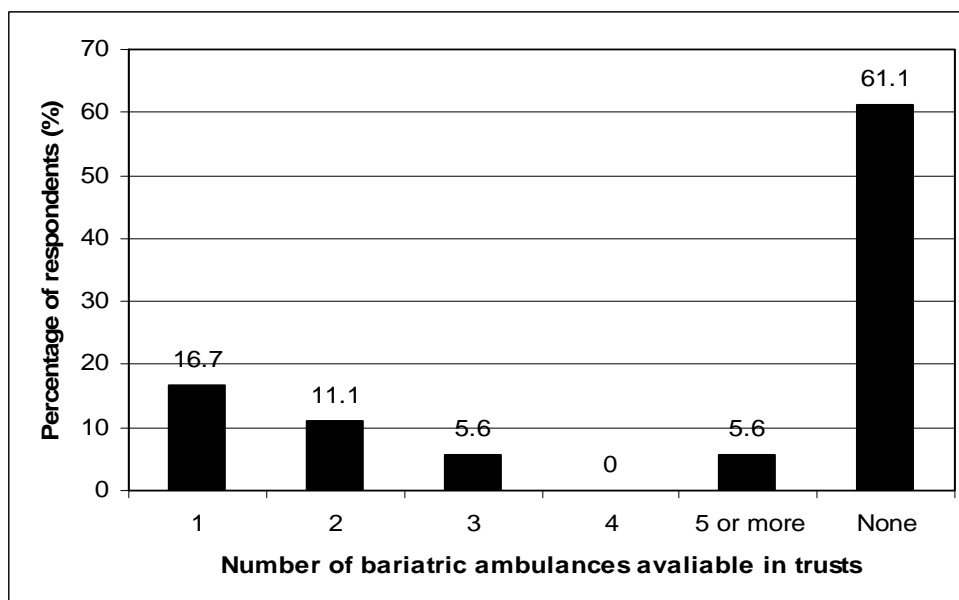


Figure 30 Number of bariatric ambulances available (n = 18)

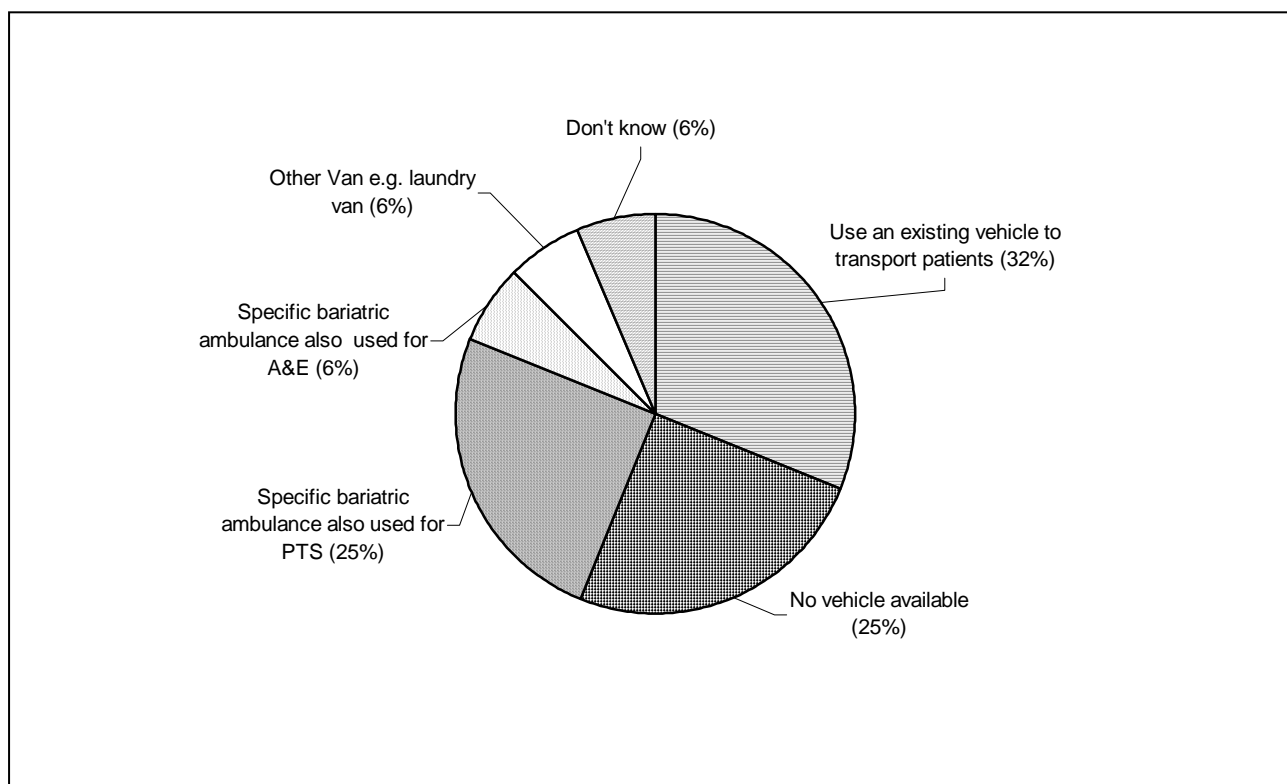


Figure 31 Types of vehicles used to transport bariatric patients (n= 18)

72.2% reported that patients were loaded into the ambulance using a tail lift depending on the vehicle loading system. As most ambulance services have vehicles with different loading systems, multiple answers were possible for this question. 38.9% reported using a ramp and winch system, with 33.3% pushing the stretcher/patient manually up a ramp and 27.8% lifting the patient manually into the ambulance.

Table 17 Methods used to load/lift patients into ambulances

<i>Methods used to lift patients into transport vehicles</i>	<i>n</i>	<i>Percentage of respondents who identified this method (%)</i>
Using a tail lift	18	72.2
Winched up a ramp using a pulley	18	38.9
Pulled/pushed manually up a ramp	18	33.3
Manually lifted into the vehicle	18	27.8

A final question was asked about the extent to which the Fire Service provided assistance with the transportation of these patients. 88.9% of respondents reported that the Fire Service did assist with the extraction and transportation of bariatric patients, but 56.3% reported that this was only in an emergency. The remaining respondents (43.8%) stated that they do help for both emergency and non-emergency cases. None of the respondents reported having an official contract with the Fire Service.

4.5 CASE STUDIES

Detailed information was collected to provide case studies on specific incidents and manual handling risks as shown in figure 32-figure 41.

4.5.1 Booked, routine, urgent inter-hospital transfer with 2 days notice from urban ambulance station.

The generic risks successfully managed in this case study of a booked, (planned) urgent inter-hospital transfer were patient factors [A], equipment [C], communication [D], and organisational and staff issues [E] (figure 32).

The success of this case study related to the advance communication between the hospital and ambulance service, including pre-assessment. Equipment was available and booked for the transport but even with advance notice the receiving hospital did not have all of the appropriate equipment available, leading to a delay in the later part of the pathway.

Figure 32 Case Study: Inter-hospital transfer (urgent)

[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Routine 'urgent' journey booked by ward staff with 2 days notice due to concerns about the patient weight. Ward also notified receiving hospital about patient needs. [A, D]
2. Specialist assessor sent from Ambulance Trust to hospital to do pre-assessment to gather information on patient weight and mobility. [E]
3. Patient was independently mobile but a bariatric hoist was available in the originating hospital if required. [C]
4. Specialist ambulance (tail lift with SWL of 200kg) booked for the transfer. Specialist advisor rostered to assist with transfer. [C]
5. Transfer. Patient self-transferred onto stretcher with bariatric walking frame. Concerns raised about width of stretcher (not bariatric stretcher) but patient agreed to be moved as no alternative available so moved with one side rail lowered and strapped on to the stretcher. Elevated handles used to move stretcher. Back rest had to be lowered as not strong enough for patient weight.
6. Arrival at receiving hospital. Delay in transfer as no bariatric walking frame or bed available.
7. Transfer was successful as the ambulance staff were able to plan the move [D]

4.5.2 Emergency admission to hospital (ambulance perspective)

The generic risks successfully managed in this case study of an emergency medical admission (GR referral) were patient factors [A], equipment [C], communication [D], and organisational and staff issues [E] (figure 33).

The ambulance service had a policy for responding to bariatric calls, resulting in 3 vehicles and staff crews attending the call. One of the vehicles was specially equipped to accommodate bariatric patients, and collected the appropriate equipment en-route to the patient's home. The

response was complicated due to a complex extrication but the process was co-ordinated by the ambulance service throughout the pathway (to the mortuary).

Figure 33 Case Study: Admission from GP referral (emergency)
[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Patient referred to hospital by GP as emergency admission. GP provided information about the patient weight and size in referral. [A]
2. Ambulance control sent 3 responses (1) a Fast Response Vehicle to achieve the 8 minute response time and start clinical treatment; (2) the Bariatric vehicle via the Ambulance station to collect the bariatric equipment before attending the call [C]; and (3) Operational Manager as more than 2 crews were attending. [E]
3. Patient assessment. Patient was located downstairs in a back room and in pain. Paramedics asked GP to administer pain relief [A]. Extrication was complex and the Fire Brigade was requested to assist [D].
4. Extrication co-ordinated by the Ambulance Operational Manager and Fire Brigade Station Officer. [E] During extrication assessment patient's conditioned worsened and he passed away in his own bed. GP certified death on scene. [A]
5. Applying/inserting the equipment. Rescue stretcher from Fire Brigade (basket stretcher in 2 halves) was placed under the patient and the patient was rolled on to a hoist sling. [C]
6. Large number of people (number unknown) then lifted the patient onto the forks of the fork lift truck and hoist sling attached to the forks. Patient extricated via the back windows of the house, with forks of the fork lift truck inserted through the window [C. D. E].
7. Patient transferred to the bariatric stretcher using the bariatric hoist. The patient was loaded onto the bariatric ambulance using a tail lift and taken to an unstaffed community mortuary with a tracking hoist with appropriate SWL [C].
8. Patient transferred from the bariatric stretcher to the mortuary with the tracking hoist by the crew from the bariatric ambulance (2) and the Operational Manager. Patient was rolled to remove the sling [C. E].

4.5.3 Emergency admission to hospital (hospital perspective)

The generic risks successfully managed in this case study of an emergency admission following a fall were patient factors [A], equipment [C], communication [D], and organisational and staff issues [E] (figure 34).

The journey from the patient's home to the hospital was not ideal (travelling on the floor of the ambulance) but on arrival at the hospital the manual handling risks were managed. This was due to the advance notice given by the ambulance service to the hospital and the policy/equipment at the hospital for bariatric patients. At all stages of the patient journey within the hospital appropriate equipment was provided to ensure that care and treatment were provided with minimal manual handling risks.

Figure 34 Case Study: A&E orthopaedic admission (emergency)
 [A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Patient (approx. 222kg) admitted to A&E with suspected fracture after a fall. Ambulance notified A&E of patient weight so that the hospital bariatric bed was available when patient arrived. [A, C, D]
2. Ambulance and Fire Brigade brought patient in to A&E on tarpaulin on the floor of the ambulance and manually lifted the patient on to the bed. [D]
3. A&E staff notified Manual Handling Advisor and X-Ray of patient's arrival. Porters pushed patient to X-Ray where they were laterally transferred (using Pat Slide and 8 staff) on to the X-Ray table (too narrow, over-hanging). [C, D, E]
4. Patient returned to bariatric bed and taken to orthopaedic ward (side room). Fracture diagnosed. Ward staff requested Manual Handling Advisor to arrange for the Gantry hoist to be erected (this is not longer an option as the hospital do not have resources to move it). [C]
5. Additional equipment was provided for the patient: bariatric armchair and commode. Patient had own wheelchair delivered to the hospital by Mobility Services (new chair). The room was too small for all this equipment so had to be moved in/out as required. [C]
6. Patient hoisted into wheelchair and taken to another ward to be weighed with a overhead hoist weigh scale. Bariatric bed did has a weighing scale but had not been zero-ed before use and the patient could not be hoisted clear of the bed due to low ceiling height.
7. Patient was able to use the bed rails to mobilise in the bed (rolling) and electric mechanism to sit up. [C]
8. Rehabilitation. The bariatric bed did not lower sufficiently for the patient to stand up straight from the bed so the patient was hoisted into the bariatric arm chair. A bariatric walking frame was used to assist standing and walking practice. [C]

4.5.4 Advanced planning for an emergency admission to hospital (Community Equipment Specialist Nurse)

The generic risks successfully managed in this case study of a planned admission were patient factors [A], building design [B], equipment [C], and communication [D] (figure 35). The community team (Occupational Therapist and Clinical Nurse Specialist) liased closely to facilitate the modifications to the patient's home in advance of a foreseeable admission. This advance planning resulted in a smooth, managed discharge with home adaptations, equipment and organisational issues managed to minimise the manual handling risks.

Figure 35 Case Study: Admission following proactive assessment (Community Nurse)
[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Occupational Therapist requested Clinical Nurse Specialist (Equipment) to see patient, located up stairs in small house. Patient weighed approx. 190kg and was bed bound. [A, D]
2. CNS discussed options with the family. Agreed to provide a new 4 foot wide bed, hoist and riser-recliner chair. Furniture (dressing table and wardrobe) was moved out of the room to make room for the bariatric equipment. [A, C, D]
3. SWL of floor (up stairs) was assessed by the Structural Surveyor (Council-owned property) for patient, bed, visitors (delay of 1 week). [B]
4. CNS contacted Ambulance Trust to notify them of the bariatric patient so that a proactive assessment could be conducted before any transfer was needed. [D]
5. Patient needed to be admitted, 3 weeks later, a safe transfer was carried out (no details available).
6. Discharge was managed smoothly as the home adaptations were in place and the ambulance service had assessed the patient. [B, C, D]

4.5.5 Emergency admission to Hospital (Lead Handling Advisor in an Acute Hospital)

The generic risks successfully managed in this case study of an emergency medical admission were patient factors [A], building design [B], equipment [C], communication [D], and organisational and staff issues [E] (figure 36). This pathway starts at admission (no information about journey to hospital). The communication with the hospital department ensured that appropriate equipment/furniture was available.

Figure 36 Case Study: A&E medical admission (emergency)
[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Patient admitted to A&E with shortness of breath, immobile and weighing 127kg [A]. Staff contacted MH dept as in policy [E] to notify arrival. Mobile weighing hoist borrowed from nearby ward [A, C]
2. Patient transferred to medical ward on standard trolley that was only just wide enough though acceptable SWL [C]
3. Single bed space use as a wider bed was not required, electric profiling bed was used [C]. Manual Handling Advisor arranged for rental of bariatric riser/recliner chair [C] and patient could be transferred from bed-chair with the hoist.
4. Patient was in hospital for 17 days and then died on the ward [A]
5. Porters transferred the patient to the mortuary and laterally transferred (slid) the patient onto the mortuary trolley and was accommodated in the large fridges [C]
6. There were no issues with SWL of the floors, all the areas where the patient was moved had wide corridors and no inclines [B]
7. There was smooth communication between the different departments in the hospital and the manual handling advisory service [D]

4.5.6 Bariatric maternity patient (Lead Handling Advisor in an Acute Hospital)

The generic risks successfully managed in this case study of a maternity admission were patient factors [A], equipment [C] and organisational issues [E] (figure 37).

The manual handling risks were identified in advance of admission so that all appropriate equipment and furniture was available for treatment and care during the patient's stay.

Figure 37 Case Study: Maternity admission (planned)

[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Maternity patient (203kg) was regularly attending outpatient appointments in the hospital [A].
2. Maternity staff contacted the MH advisor as a standard procedure through a formal referral process for any patient over 127kg at 30 weeks gestation [E]
3. Patient admitted early due to clinical risks and used an electric profiling bed [C].
4. MH advisor co-ordinated regular weighing using mobile weighing scales [A, C]
5. Maternity bariatric delivery bed delivered 2 weeks in advance of planned delivery date of patient [C]
6. A bariatric operating table was available (SWL 248kg) [C]
7. Delivery was uneventful as the patient and staff had the necessary equipment [C]

4.5.7 Planned Surgical Admission (Manual Handling Advisor at Acute Hospital)

The generic risks successfully managed in this case study of a planned surgical admission were patient factors [A], building design [B], equipment and furniture [C], communication [D], and organisational and staff issues [E] (figure 38). As the patient had been assessed 6 weeks before admission and regular communication was maintained both before and during the admission all the required equipment/furniture was available. Space was a problem, so 2 bed spaces were allocated to the patient and the recovery procedure was altered (with additional theatre time) to allow the patient to assist with the lateral transfer from the operating table to the bariatric bed.

Figure 38 Case Study: Surgical/Orthopaedic admission (planned)
[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Patient admitted for planned bilateral knee arthroscopy. Patient weighed 242kg, was partially mobile and could walk for short distances [A]
2. MH Advisor and admitting ward given 6 weeks notice of planned admission [D]
3. MH Advisor, Theatres and admitting ward again notified from Pre-operative assessment clinic 2 weeks before admission as per standard protocol [D, E]
4. MH Advisor booked rental equipment (bed, chair, walking frame) and arranged for hospital-owned equipment to be available (Commode)[C]
5. Patient located near a toilet to facilitate independence. The adjacent bed space was kept vacant for the duration of stay (2 days) [B]
6. Patient taken to theatres on the bariatric bed using an electronic bed mover. There were no narrow corridors, the lifts are wide enough with adequate SWL [B]
7. Patient assisted with the lateral transfer on to the bariatric operating table and was not repositioned during the procedure [A, C]
8. Patient recovered on the operating table and when she was able to assist, was transferred back on to the bariatric bed. Extra time was allowed for the patient recovering on the table [A, C, E]
9. Patient returned to the ward using the electric bed mover [C]
10. At discharge the patient was collected by her family.

4.5.8 Emergency Admission (Manual Handling Advisor, Acute Hospital Trust)

The generic risks successfully managed in this case study of an emergency medical admission were patient factors [A], building design [B], equipment [C], communication [D], and organisational issues [E] (figure 39). Although the Ambulance Service were unable to provide specialist moving and handling equipment a bariatric vehicle was provided. Close collaboration from the Manual Handling Advisor from the hospital resulted in a much improved journey for the patient (than previously experienced). On admission the hospital had excellent communication with all relevant managers being notified of the arrival of the bariatric patient. Alternative equipment (bed) was trialed to improve patient comfort and the hospital had back-up systems for out-of-hours service/equipment (mobile bariatric hoist as well as a gantry system).

Figure 39 Case Study: Medical admission (urgent)

[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Patient weighed approximately 254kg, had pressure sores on abdomen, was diabetic, and had breathing problems (on continuous oxygen) [A]
2. Ambulance service called by GP as urgent admission and first vehicle attending identified that specialist equipment and capabilities were needed.[A]
3. MH Advisor from hospital asked to assist in admission planning by Ambulance Service [D] as patient's wife did not want the Fire Brigade to drag the patient out of the house on a canvas as had previously occurred [A]. Ambulance service did not have any specialist moving and handling equipment.
4. MH Advisor borrowed bariatric trolley and bariatric mobile hoist from Hospital A&E [C] (policy listing location of equipment is available [E]).
5. Ambulance crew met MH Advisor with bariatric vehicle with floor tracking to fasten hospital bed/trolley and tail lift [B, C], collected MH Advisor and drove to patient home, arriving within 60 minutes of MH Advisor being contacted.
6. Patient's home had been modified to widen doorway, laminate flooring so trolley could be taken into living room [B]
7. Patient in riser/recliner chair. Was hoisted onto trolley (back rest raised to assist breathing). No straps to secure patient on trolley but 'jammed' in place by side rails (padded by blankets) and loaded onto ambulance with tail lift. Patient's wife said this was the most dignified admission that patient had experienced [A].
8. At hospital patient was kept on bariatric trolley. A&E staff contacted bed manager to request bed space (2 bed spaces were allocated for this patient) and notify of bariatric status [D]. Bed manager notified relevant managers, senior divisional nurses and consultants for safety reasons [E].
9. MH Advisor arranged for gantry hoist to be installed [C] but was not available after 5pm so mobile bariatric hoist used overnight [C]
10. Bariatric bed made available as per policy [E] and patient transferred along flat route (no inclines) to ward [B]
11. Alternative bariatric bed was trialed due to difficulties with safety rails on first bed limiting staff access [C], but patient found second bed too narrow [A, C]
12. Discharge plans were made at multi-disciplinary team meetings [D] with MH Advisor, consultant, social services, patient's wife, ward staff. Plans were made to discharge to nursing home and hospital MH Advisor agreed to provide specialist training.
13. Patient died before discharge. No appropriate concealment trolley available so patient transferred on bariatric bed.
14. Patient transferred to mortuary table and to post-mortum table in body bag with lateral sliding transfer (porters and mortuary staff) [E]

4.5.9 Emergency admission to hospital (Ambulance Service)

The generic risks successfully managed in this case study of an emergency admission were patient factors [A], building design [B], equipment [C], communication [D], and organisational issues [E] (figure 40). There was a difference in opinion about the patient's weight resulting in a re-assessment before the journey could commence. Three options were considered and risk assessed by the Ambulance Service and Fire Brigade before the final extrication plan was agreed. The appropriate equipment was available in the hospital during the admission, and the patient's home was modified before discharge to minimise future extrication and transport risks.

Figure 40 Case Study: Medical admission (urgent)

[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. Female patient with chest infection and immobile weighing 235kg
2. District Nurse asked GP to request urgent admission (within 2 hours). GP notified ambulance control that patient was >127kg, within the SWL of standard ambulance [A, D]
3. Ambulance crew re-assessed patient to be >190kg, and requested additional assistance [A]
4. Ambulance control requested assistance from Ambulance Risk Manager (BCA). BCA checked patient assessment with GP and District Nurses resulting in conflict of information [A]
5. Re-assessment was needed, so BCA attended call [A]. BCA called Fire Brigade, second ambulance crew and requested GP to re-visit to sedate patient [A, D]
6. Detailed collaborative risk assessment conducted by Ambulance and Fire Service to consider whether to extricate via (1) bed room window – not possible as required structural work; (2) landing window and over garage roof – not possible due to width of window and SWL of garage roof; (3) down stairs – difficult as banisters needed to be removed, but best option. [D] Considerable concerns about SWL of stairs. [B]
7. All furniture was removed from patient bedroom [C]
8. Ambulance control liaised with receiving hospital [D]
9. Patient was rolled onto slide sheets, a body bag (reinforced) and spinal board by 6+ staff, and secured to the board with ropes (fire brigade). [C]
10. 8 staff lowered patient to floor and slid her to top of stairs. Patient lowered feet first down stairs by Fire staff, with 2 ambulance staff supporting head/feet. [E]
11. Due to doorway ridge patient was carried out of house (approx 1 metre) by 5 staff and placed on the stretcher. [C]
12. Loaded onto ambulance with ramp and winch [C], taken to hospital and pushed/pulled into hospital by 4 staff.
13. Patient transferred onto bariatric bed with slide sheets and patslide [C] by 8 staff in side room with wide door [B]
14. For discharge, ward notified ambulance service [D].
15. Ambulance service 'flagged' the address so that future emergency calls would ask about bariatric issues [D]
16. Patient home adapted for sleeping downstairs, ramps to doorways and wider doorways [B]

4.5.10 Planned discharge of patient to home from community hospital (Social Services)

The generic risks successfully managed in this case study of a planned discharge were patient factors [A], building design [B], equipment and furniture [C], communication [D], and organisational and staff issues [E]. The discharge was discussed, risk assessed and planned by a multi-disciplinary, inter-agency group. Space in the hospital was a problem, with 2 bed cubicles being occupied by the patient for the 3-4 month stay. Space was also a problem in the patient's home with future risks identified if the patient was no longer able to mobilise independently.

Figure 41 Case Study: Planned discharge

[A=Patient Factors; B=Space; C=Equipment; D=Communication; E=Organisational Factors]

1. 46 year old patient, weighing 350 kg, 190cm tall. Post treatment for sleep apnoea, falls, heart problems and pressure sores on legs [A]
2. Social services notified by MH Advisor at hospital to discuss discharge as policy [E].
3. Multi-disciplinary meeting co-ordinated by Social Worker, with ward staff, physiotherapist, occupational therapist, home help manager, MH Advisor (hospital), MH Advisor (Social Services), Continuing care manager, social worker/care manager [D]
4. Patient transferred to community hospital in 2 bed cubicles [B] with a gantry hoist [C] while discharge planned (3-4 months) and home adaptations made [B].
5. Electric bed used to support legs (weighing approx. 76kg each) for dressings. [C]
6. Environmental assessment by occupational therapist and architect to check SWL and plan installation of ramps [B]
7. Motorised riser/recliner, bariatric hospital bed, commode and walking frame supplied by NHS & Social Services (joint funded) [C]
8. Patient weighed during discharge transfer by bariatric ambulance stopping on public weighbridge [A]
9. Handling plan agreed with patient and nursing staff: if patient mobilising staff left the room to avoid risk of entrapment in the event of a fall. [E]
10. Patient home too small to accommodate mobile/gantry hoist and patient was mobilising independently (and with assistance from family) at discharge. [A, C]
11. Regular case conferences were held for future planning with Housing Association Manager, Care manager/social worker and District Nurse [D]

5 DISCUSSION

The discussion links the findings from the five data sets: equipment survey, population data, focus groups, questionnaires and case studies under the headings of the five generic risks: patient factors, building/vehicle space and design; equipment (manual handling and clinical) and furniture; communication; and organisational and staff issues.

5.1 PATIENT FACTORS

Key factors/risks for manual handling identified by the focus groups were the patient factors: pain, weight, shape, mobility, co-operation, privacy, comfort and dignity. Weight and shape might limit equipment options and the spatial requirements for building/vehicle space.

The population data suggest that risk factors for the patient pathway associated with weight and shape have increased considerably over the past 11 eleven years. Specifically, the proportion of the English population who are overweight and obese have increased dramatically from 1993 to 2004. Furthermore, these risks will inevitably increase given predictions that the rate of obesity will continue to increase over the next few years. As weight is increasing the population shape is also changing with waist and hip circumference of the top 50% and top 1% of the English population having increased substantially between 1993 and 2004 and likely to continue to increase.

Other patient factors that might present risks for the bariatric journey are pain, degree of mobility, and issues relating to dignity, safety and privacy. Dignity is particularly important for bariatric patients as they may already have a fear of prejudice and embarrassment and in fact many postpone hospitalisation for as long as possible due to these fears (Stunkard, 1996).

The data from the case studies of successful bariatric pathways suggest that patient factors such as weight and shape are fundamental to the success of the bariatric patient journey. These specific factors were considered at the process planning stage of the patient journey. Evidence from two of the case studies suggests that managing pain and achieving high levels of personal safety, dignity, and privacy can contribute to a successful pathway.

Evidence of organisations recognising patient risk factors within the bariatric patient journey is equivocal. The majority of NBE and Ambulance Service questionnaire respondents suggested that they did have a definition for bariatric patients. Patients were defined in the Ambulance Service and NHS PCTs and Acute hospitals by a predefined weight (or BMI value) or because their weight/size exceeded the available equipment suggesting that weight (and perhaps shape) is considered within the bariatric pathway. However 14%-17% of the questionnaire respondents from the Ambulance services and other Trusts reported that they did not define bariatric patients suggesting that they fail to consider weight or shape.

82% of the acute and primary care Trusts rated their organisations as quite to extremely successful at achieving a high level of patient safety in contrast to only 53% of the ambulance Trusts. Again the acute and primary care Trusts felt that they were mostly successful at achieving a high level of patient comfort (74%) in contrast to the ambulance Trusts (24%). The reason for this failure to achieve high levels of patient comfort and dignity might be related to the inability to procure appropriate equipment and transportation for these patients. Appropriately sized equipment and transportation is important for attaining high levels of

patient comfort and dignity, but a third of the ambulance respondents reported that existing vehicles were used to transport bariatric patients, with these vehicles unlikely to provide sufficient space.

5.2 BUILDING/VEHICLE SPACE AND DESIGN

Analysis of the data collected from the focus groups suggested that many of the risks associated with the bariatric journey are related to building/vehicle space and design at each stage of the bariatric patient pathway: space, clearance (for doors, stairs, corridors,) SWL of floor, floor surface. Initially members of the Ambulance Service are likely to encounter such difficulties when attempting to extricate a bariatric patient from the emergency scene and transport these patients to hospital. For example, at a patients home, or similar location, there may be difficulties extricating the patient due to limited door widths, stairways, corridor width, and due to the cluttered furniture. The next stage has risks associated with the design of the vehicle with insufficient space for the patient and the bariatric equipment. Similar risks, associated with the extrication and transportation of bariatric patients, were identified by Grimshaw (2003). He observed that the extrication of the patient from the patient's bedroom on the first floor of the house was constrained by space within the bedroom itself and on the staircase. His analysis of focus groups held with paramedics suggested that older ambulances might be too cramped for bariatric patients and that the newer ambulances might be more adaptable as they have seats that can be folded up to create more space.

Once the patient has arrived at hospital spatial factors can continue to present risk factors for the care of the patient on a hospital ward, during transportation of a patient between departments, and within specialist departments such as theatre, diagnostics, maternity, and the mortuary. The analysis of the focus group data suggested that these risks were likely to be corridor width, MWL of lifts, and insufficient space in toilets. In the questionnaire survey a third of the NBE respondents reported that there were areas of the building within their organisations that could not be accessed by bariatric patients.

Many of the case studies of successful bariatric journeys suggested that addressing risks associated with building/vehicle space and design were fundamental to the success of the bariatric pathway. For example, several of the case studies suggested that careful consideration was required when deciding how to extricate the patient, and that modifications might be required to a patients home to allow successful extrication. In addition to this, at least one of the case studies highlighted the importance of using ambulances specifically designed for the transportation of bariatric patients to ensure a successful patient journey.

Despite the fact that building/vehicle space and design represent fundamental risk factors it seems that these issues are not addressed by the majority of NHS Acute, PCTs and Ambulance Services. Almost two thirds of the Ambulance Service questionnaire respondents reported a lack of ambulances designed specifically for bariatric patients in their Trusts, with a third of respondents stating that existing vehicles were used to transport bariatric patients. In the ten case studies, only one reported the use of a bariatric ambulance.

The analysis of the 34 bariatric manual handling policies suggested that half of the Trusts did not consider risks associated with building space and design in their bariatric policies, with those considering these risks merely stating that space might represent a risk factor, but failing to highlight the provision of specialist accommodation for bariatric patients. Finally, the results from the bariatric patient functional space experiment (chapter 7) found that the required space

advised by Health Building Notes (NHS, 2005) provided an inadequate working space for bariatric patients due to the use of larger equipment restricting space within wards and certain diagnostic areas. Spatial limitations may also reduce the ability to mobilise obese patients (Grant & Newcombe, 2004; Barr & Cuneen, 2001; Murphy & Gallagher, 2001).

5.3 EQUIPMENT (MANUAL HANDLING AND CLINICAL) AND FURNITURE

Risks associated with manual handling and clinical equipment, and general furniture occurred throughout the bariatric pathway, for example fit, inserting, maximum weight capacity, availability, suitability, compatibility, size, effort to move (patient/equipment interface). These risk factors are likely to have increased given that the hip and waist circumference, and weight of the English population has increased dramatically since 1993 (population data analysis). The focus group analysis suggested that risks associated with equipment use present themselves at each stage of the bariatric patient pathway; from extrication of the patient to transportation, through to their pathway across various departments within the hospital.

Grimshaw's (2003) investigation of transportation of bariatric patients presents direct evidence of risks associated with equipment use within one specific element of the patient journey, i.e., transportation. His analysis of incident reports highlighted a number of cases where standard equipment was used to transport bariatric patients which resulted in the breakage of equipment. This observation is important because it suggests that the weight of a patient might prevent the use of standard equipment. However it is important to note that a patient's weight might not prevent use of standard equipment in some instances, for example, the MWL of equipment which might be typically used in the Ambulance Service ranges from 181kg-227kg for a stretcher, and between 159kg and 200kg for a carry chair; or for a hospital bed (SWL 178-191kg), hoist (SWL 140-190kg). The data from the Health Survey for England data suggests, in 2004, even the weight of the top 1% of the male and female population did not exceed these values. So, rather than exceeding the MWL of equipment, it might be the shape/width of bariatric patients that prevents the use of standard equipment, or that their weight compromises efficient manoeuvrability of the equipment (Gallagher, 1999; Mathison, 2003; Grant & Newcombe, 2004). For example one of the case studies reports that although the patient's weight was within the SWL of a standard hospital trolley the width of the trolley was only just able to accommodate the patient's size.

Other risk factors for the bariatric pathway relating to equipment use from the focus groups were associated with staff/equipment interface and equipment/equipment interface. Some equipment might not be compatible for combined use with bariatric patients and may present a risk factor (equipment/equipment interface, or staff may be unable to quickly procure appropriate equipment for bariatric patients due to problems with availability, and they might experience problems manoeuvring bariatric patients using larger sized equipment (staff/equipment interface).

The case studies of successful bariatric journeys highlighted the importance of using appropriately-sized equipment for bariatric patients. Cases where appropriate equipment was procured in advance of an admission were successful. By contrast, in one case study, equipment was procured by the Ambulance Service responsible for extrication and transportation of the patient in advance of the admission but there was a delay in procuring suitable equipment at the hospital leading to delays at this stage in the pathway.

Given the risks associated with the use of incorrect equipment for bariatric patients it is perhaps surprising that the findings from the questionnaire surveys in this study revealed that bariatric equipment is absent in many Ambulance, and other NHS, Trusts. For example, almost 25% of the respondents from the NBE stated that the organisation they work within do not have equipment appropriate for bariatric patients and approximately 40% of the Ambulance Service respondents reported that their Trust did not own any equipment suitable for bariatric patients. Even those reporting the availability of bariatric equipment within their Trust, reported that only selected items of equipment were available. For example, where Trusts had equipment, they were more likely to possess equipment required for manual handling of patients within wards, but less likely to have equipment to mobilise patients, to transport them between departments, or to care for them within departments such as x-ray and theatre. Likewise, the data suggested that the majority of Ambulance Services possessed Mangar Elks and wide slide sheets but less than half of those who reported having some equipment had lifting equipment available within their trust. This might account for repeated reports of Fire Services or other agencies providing assistance to the Ambulance Service to extricate bariatric patients (Boatridge, 2002).

Even where bariatric equipment was available in Trusts, respondents to the two questionnaires suggested that it is not consistently used with each bariatric patient. The reason for this is likely to be accounted for by the problems encountered when attempting to access this equipment as was reported by the majority of respondents. The main problem associated with accessing the equipment related to insufficient space to use equipment, and inability to use, find, or to be aware of the existence of, equipment. Inability to use equipment is likely to be associated with insufficient training, with only a third of questionnaire respondents saying that staff were trained in the use of bariatric equipment. Many respondents stated that any training might be provided ad hoc as and when required. Other problems cited when attempting to access bariatric equipment related to availability. This was also reported by Anderton (2003) in his investigation of healthcare equipment. He found that within the ambulance services, equipment might be shared, or could be stored on other vehicles, so if the equipment was required it needed to be accessed and transported to the desired location. Consequently the procurement of suitable equipment might result in a delay in the extrication of the patient. It was reported that in the majority of cases it could take up to two hours to access bariatric equipment and 10% of respondents reported that it could take more than eight hours.

5.4 COMMUNICATION

Another major risk factor associated with the bariatric pathway derived from the focus group analysis related to the absence of communication between different agencies (e.g., Ambulance Service-hospital, hospital-community care) and within the agencies themselves (e.g., ward-ward within hospitals and emergency call control and paramedics in the Ambulance Service). This communication presents a risk factor because in its absence, different agencies within the bariatric pathway will fail to procure adequate equipment for the patient, and will fail to ensure that suitable numbers of staff are available to move and care for the patient (between-agency communication). In a similar way, if information obtained from an emergency call regarding the weight of a bariatric patient is not communicated to paramedics, they will fail to procure suitable equipment, a suitable vehicle, adequately-sized crew, and any further assistance required from other services e.g., Fire Service (within-agency communication).

The case studies suggested that the success of bariatric patients journeys were in many respects determined by communication between, and within, the different agencies. For example, if ambulance staff were informed that they would be transporting a bariatric patient either by the hospital, or community staff, they could conduct a risk assessment and ensure the procurement

of appropriate equipment. Likewise, if information about a patient's weight was communicated to all appropriate hospital departments, these departments could take the necessary planning steps. However, it is important to note that communication of forthcoming transportation, or admission, does not eliminate all the risk factors from the bariatric pathway as it may not be possible to manage all the risks. In the first case study even when a hospital had been informed by the Ambulance Service that they would be receiving a bariatric patient, they failed to ensure that appropriate equipment was available for this patient. There are several reasons why this might have been the case. Firstly, appropriate equipment might not have been available within the hospital. Secondly, the hospital staff might have been unable to access the equipment (see previous section).

Evidence from the questionnaire surveys suggested that, despite the risk associated with agencies failing to communicate information internally and to external agencies, many Ambulance Services failed to provide this communication. Almost all respondents (94%) reported that they did not discover that a patient was bariatric until they arrived at the patient's location. Consistent with this, in an investigation of the transportation of bariatric patients, Grimshaw (2003) found that no warning was given by emergency control to accident and emergency crews. Furthermore 44% of the Ambulance Service respondents reported that there was no official system for notifying hospitals that they would be receiving a bariatric patient. Despite this only 5% of ambulance respondents reported that they did not notify the receiving hospital that they were transporting a bariatric patient. Therefore, whilst communication between the emergency control and accident and emergency crews might be absent, it seems that Ambulance Staff are efficient at informing hospitals that they will be receiving a bariatric patient.

Unfortunately, the present investigation did not look at the extent different departments within hospitals communicate plan and manage the risks for bariatric patients. Respondents from NBE reported that where risk assessments were conducted before admission or discharge of a bariatric patient, the information obtained from the risk assessment was shared with receiving departments and community staff where necessary. This suggests that in some instances there is inter-department communication regarding the transfer of bariatric patients within hospitals.

5.5 ORGANISATIONAL AND STAFF ISSUES

The two final risk factors associated with the bariatric pathway relate to organisational and staff issues, for example policies, culture, number of staff, training, competence, and delays. These will be discussed separately in the following subsections.

5.5.1 Organisational Issues

The main risk factor associated with the organisational issues is the absence of policies relating specifically to manual handling of bariatric patients. The case studies suggested that a bariatric manual handling policy contributes to a successful bariatric pathway. In almost all the case studies of successful pathways a bariatric manual handling policy was reported to assist. For example, these policies addressed issues related to the number of staff required, the importance of procuring appropriate equipment for these patients, and the need for communication with manual handling advisors prior to admission of a bariatric patient, and with social services prior to discharge of such a patient. This suggests that bariatric handling policies are important because they instruct staff to take the necessary planning steps when admitting bariatric patients, reducing some of the generic risk factors associated with these patients.

Despite the fact that many of the generic risks associated with the bariatric pathway might be reduced by a bariatric manual handling policy, the responses to the two questionnaire surveys presented in this report suggest that many NHS Trusts do not have these policies. For example, 40% of the NBE respondents, and 70% of the respondents from the Ambulance Service, reported that their organisation did not have a specific policy. Almost half of the Ambulance Service respondents also reported that their organisation did not have any procedures for moving and handling bariatric patients, so it is not surprising that many of the generic risks associated with the bariatric patient pathway were not addressed in many organisations.

As part of the questionnaire survey respondents were asked to provide a copy of this policy. Inspection suggested that not all policies considered all the generic risks associated with the bariatric pathway highlighted. For example, all policies instructed staff to procure appropriate equipment for bariatric patients, and almost all policies advised that sufficient communication should occur along the bariatric journey both between- and within-agencies. However, a smaller number of policies addressed risks associated with patient factors, and organisational, and staff, issues, and only approximately half of the policies considered risks associated with building/vehicle space and design. This is surprising as patient factors and building/vehicle space and design might present some of the most serious risk factors associated with the bariatric patient pathway. This means that even where policies that advise on the manual handling of bariatric patients exist, they might fail to consider all the risks associated with the bariatric patient pathway.

In addition to the problems associated with policies failing to address all the risk factors, there were also problems associated with the barriers to the effectiveness of these policies. For example, analysis of the NBE questionnaire suggested that common barriers to the effectiveness of these policies might be staff not reading the policy, a lack of resources/equipment available to follow the policy, and not all areas of the organisation supporting the policy. This suggests that establishing a manual handling policy for bariatric patients is only the first step in avoiding/reducing risks associated with the bariatric pathway and that support for the policy must be gained from all areas of the organisation; staff must be actively encouraged to read the policy; and required equipment/resources must be procured.

5.5.2 Staffing issues

The final risk factor for the bariatric pathway is related to staffing issues. For example, risks were presented if an inadequate number of staff were available to move the patient, or if they had not received sufficient training in manual handling of bariatric patients and in using suitable equipment. The focus group analysis suggested that there were particular concerns in the community with regards to staff availability. Likewise, evidence from the case studies suggested that successful bariatric journeys often required a larger number of staff to successfully extricate the patient.

Staff training is important to minimise the risks associated with manual handling bariatric patients. 40% of the NBE questionnaire respondents and 70% of the respondents from the Ambulance Service reported that there was no training in bariatric handling provided by their organisations, suggesting that a large number of staff within NHS Trusts are handling bariatric patients and using equipment designed for these patients without training. This is dangerous as it is likely to exacerbate the manual handling risks and might be reflective of the general organisational and/or safety culture. Evidence that Trusts often failed to minimise manual

handling risks for staff were found in the questionnaire analysis, with less than half of the NBE and Ambulance Service questionnaire respondents rating their organisation as successful for minimising manual handling risks for staff.

5.6 LIMITATIONS

The limitations of the equipment survey included the scope and timing. Appendix 3 is unlikely to be exhaustive or fully inclusive with equipment being withdrawn from the market and new designs and models being introduced.

The population data are limited by the sampling and reporting strategies of the Health Survey for England. The recruitment strategy for the Health Survey for England used selection from postcode frame, with multi-stratified randomised cluster sampling. In the latest survey year analysed, 2003, the recruitment was described as: stratified probability sampling design, an advance letter was sent to those at the sampled address to let them know that an interviewer would be calling to seek permission to interview. Height and weight measurements were obtained at the end of the interview. After the first interview and if the respondent agreed an appointment was made for a nurse to visit at a later time, at this time the Nurse took hip and waist measurements. In some years smaller samples of the general population were available for analysis (boost samples of minority groups); these were excluded from the analysis to avoid over representing minority groups. This resulted in smaller samples of the general population being used in the analysis of the proportion of obese individuals for some years, so confidence that the results from the sample are representative of the entire population may be lower. Yet, calculation of the confidence intervals for the proportion of obese individuals data suggests that the confidence intervals are reasonably small (approximately 0.1) irrespective of the sample size, giving reasonable confidence with regards to the estimation of the proportion of the population who are obese. A further limitation may be the limited numbers of very large people in the sample and people with disabilities may be under represented as respondents were only recruited from private households, not from residential or nursing homes. Data were analysed on ages 15 years and above, to coincide with office for national statistics population information. However, in 1997-2000 hip and waist measurements were only taken for 16 years and above so it was not possible to accurately compare with population figures for those aged 15 years and above for hip and waist measurements.

The limitations for the focus group data are general, relating to the impact of the moderator and theoretical saturation of the data (Robson, 2002).

For the questionnaire survey it is possible that, although the questionnaires were piloted before distribution some important themes might have been missing from the questionnaire options, with a number of respondents providing 'other' responses to some the questions. As will all postal questionnaires the sample were self-selected and will limit the conclusions that can be drawn. However the post hoc analysis shows a wide regional coverage of the questionnaire.

6 CONCLUSIONS

Based on the analysis of data from 1993-2004 there is an upward trend with almost one third of the population likely to be obese (BMI greater than 30) by 2010. Five generic risks were identified from the focus groups and validated through the case studies: patient factors; building (and vehicle) space and design; equipment (manual handling and clinical) and furniture; communication; and organisational and staffing issues.

Most acute and primary care Trusts thought that their Trust managed patient dignity, safety and comfort well but the ambulance Trusts rated safety and comfort much lower, especially comfort (24%). The provision of appropriate equipment and successful management of pain, safety, dignity and comfort all contributed to successful pathway experiences.

Spatial risk factors were identified through the pathway but seemed to have a poor management record for both building and vehicle design. Over half of the case studies suggested that addressing these risks were fundamental to the success of the pathway but over half of the Trusts with policies did not consider space in the policy and almost 30% of ambulances did not have specialist vehicles and 33% of NBE respondents had inaccessible areas in their buildings.

Many of the equipment and furniture risks related directly to the weight, shape and size of the patient. So although a wide range of manual handling equipment is available, the demand is likely to grow and more focus should be placed on 'fit' rather than just the SWL. Specialist equipment was mostly available or could be accessed within 2 hours but there were barriers for use. These related to space (as previously mentioned) and training, with over 35% of Trusts not providing extra bariatric handling training for assessment and use of specialist equipment.

The case studies suggested that the success of the pathway was determined by communication between and within the different agencies. However, even with good communication it was not always possible to manage all the risks, e.g. equipment availability and space constraints. Despite no formal process, 95% of the ambulance Trusts reported that they would notify the receiving hospital about the arrival of a bariatric patient.

40%-70% of Trusts did not have a bariatric policy. These policies are needed to lead the process planning, assessment and management of manual handling risks including the number of staff, provision of appropriate equipment and intra- and inter-agency communication. For a policy to be successful it must be supported throughout the organisation; staff must be encouraged to follow it (training) and resources (equipment and spaces) must be available.

6.1 RECOMMENDATIONS

- Strategic policies need to be formulated to equip the NHS for the rapidly growing obese population in England.
- Operational policies are needed to lead the process planning, assessment and management of the manual handling risks for the care and treatment of bariatric patients.
- Buildings and vehicles need to be designed to accommodate bariatric patients in safety and comfort and with dignity.

- Equipment needs to be designed to ‘fit’ a range of bariatric shapes and sizes (using population data).
- Training is needed to support the assessment of bariatric patients and the use of specialist manual handling and clinical equipment.

7 BARIATRIC FUNCTIONAL SPACE EXPERIMENT

A functional space experiment (FSE) was carried out to determine the spatial requirements for the tasks treating and caring for a bariatric patient on a general medical ward. The dimensions are defined as 'Ergonomics Envelopes'. These are incompressible spaces required for defined functional activities rather than room dimensions (Hignett et al, 2007).

7.1 METHOD

The FSE used a repeated-measures experimental protocol developed and tested in previous research projects to analyse the interactions between nursing staff, equipment/furniture and the environment using hierarchical task analysis and link analysis (Lu and Hignett, 2006; Hignett and Keen, 2005). Two templates from the Department of Health guidance were used as the benchmark for the minimum spatial requirements: 2.7m x 2.9m (ward bed cubicle; NHS Estates, 1995) and 3.1m x 3.7m (single room; NHS Estates, 1997).

The Healthcare Ergonomics and Patient Safety research Unit (HEPSU) has an experimental laboratory with a full-size hospital room mock-up. For this experiment floor lines were installed to measure the space used at 100mm intervals.

7.1.1 Participants

28 Back Care Advisors (BCAs) were recruited via email from NHS Trusts across England. This gave a convenience sample of 22 women and 6 men, with 12 BCAs with a nursing background and 17 with a physiotherapy background. 6 BCAs were needed for each FSE, so two participated twice to give 5 FSEs (sessions).

The FSE was approved through the Loughborough University Ethics Committee. Each participant was given an information sheet and a consent form to ensure they understood their rights in taking part in the study.

A bariatric model was used for each session over the three days (figure 42).

Figure 42 Bariatric model for FSEs



Age:	52 years
Height:	5ft 10ins (1778cm)
Weight:	37.5 stone (238.6kg)
BMI:	74.5
Profile:	Unable to mobilise independently for the purpose of the FSE

7.1.2 Equipment

Specialist bariatric equipment was used to provide a safe environment for care and treatment. This included a bariatric bed (Huntleigh Contoura 1080), two chairs (one high back (figure 42) and the Huntleigh Transfer chair TC300), hoist (Likorall UltraTwin FreeSpan) as shown in figure 43. Additional manual handling equipment was available: pat slide and sliding sheets.

Figure 43 Equipment for Bariatric FSE

Likorall UltraTwin FreeSpan Huntleigh Contoura 1080 bed Huntleigh Transfer Chair TC300



The researchers received training from the manufacturers to ensure they were competent to train the participants for each FSE.

7.1.3 Tasks

A group of BCAs from local hospitals assisted with the definition of the tasks to determine:

- Number of nursing staff needed.
- List of equipment, furniture and devices.
- Start and end point of the task.

Three tasks were defined as shown in figure 44:

1. Transfer from high back chair to bed using hoist and sliding sheets
2. Resuscitation
3. Lateral transfer from the bed to transfer chair using pat slide and sliding sheets

Before each task the participants were given time to plan their roles and practice using the equipment (in particular the transfer chair). The order of the tasks was randomised across the 5 sessions to account for experience with the equipment. The bariatric model went into position, the participants were told the first task and given a few minutes to prepare and allocate roles. Data were collected using four-way directional video taping for frame by frame analysis. Link Analysis was used to record the movements of the participants, equipment and furniture.

Figure 44 Tasks for Bariatric FSE

Task 1: Transfer from chair to the Contoura 1080 bed using Likorall hoist and sling

Start position: Patient sitting in chair

Task: Insert sling behind patient using sliding sheets

Attach the sling to the hoist

Lift the patient using the hoist

Transfer across to the bed

Remove sling from patient

Stop position: Patient on bed

Task 2: Resuscitation

Start position: Sitting position on the Contoura 1080 bed.

Task: Participants enter room and lower bed using CPR button

Bring in crash trolley and perform resuscitation.

Stop position: Conclusion of resuscitation

Task 3: Lateral transfer from the bed to transfer chair using pat slide and sliding sheets

Start position: Sitting position on the Contoura 1080 bed.

Task: Prepare patient for lateral transfer using slide sheets and a pat slide

Collect and set up transfer chair in bed space

Attach patient to transfer trolley

Transferred patient on to the transfer chair

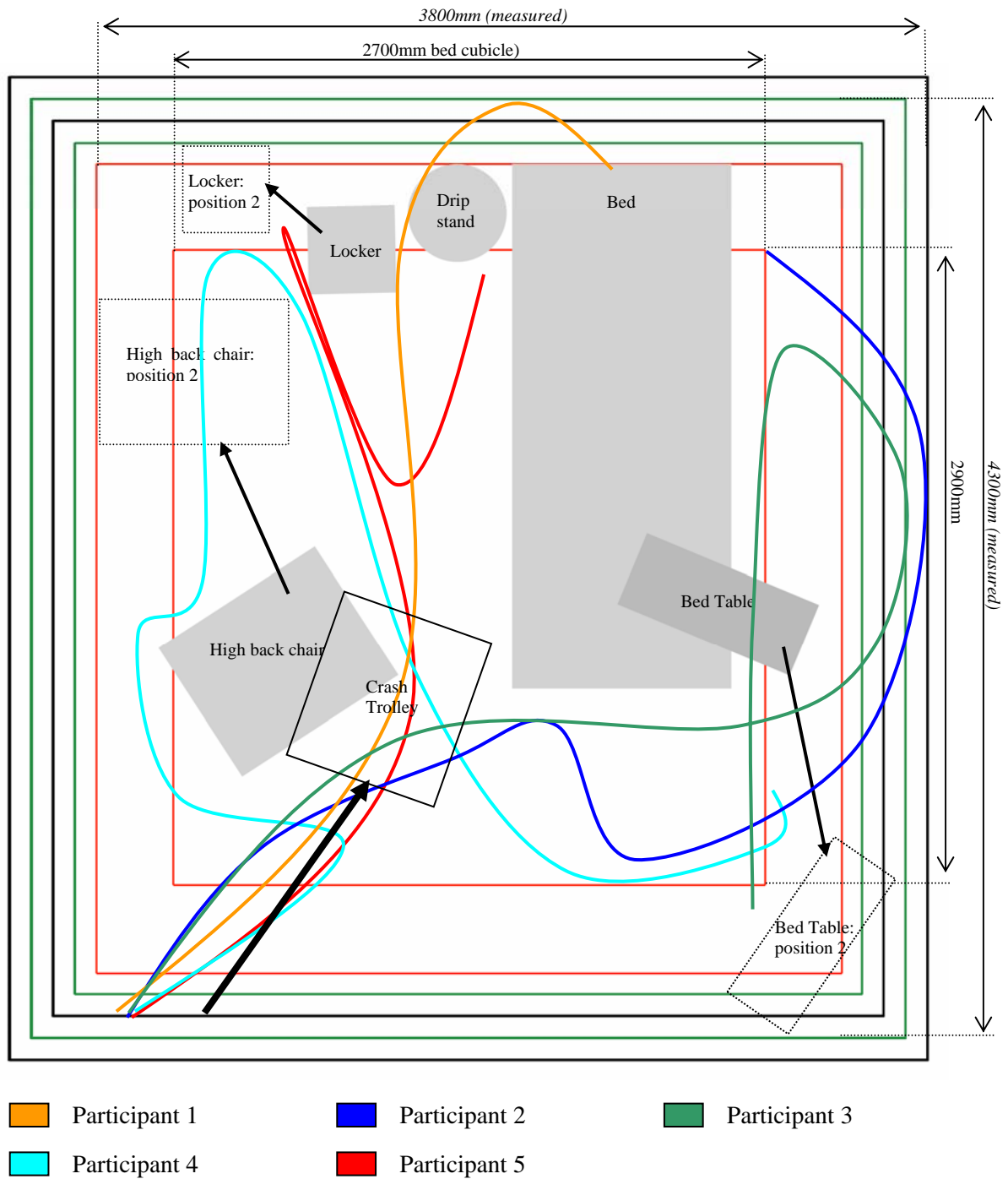
Stop position: Patient on transfer chair

7.2 RESULTS

The width and length of the bed space was recorded for all movements of participants and equipment (for example moving trolley or chair to create more working space) as shown in figure 45. The 15 data sets of the composite link analyses are shown in table 18.

Task 1 (transfer from high back chair to bed using hoist) needed a width of 3.92m and a length of 4.08m to give an average area of 16.0m². Task 2 (resuscitation) needed a width of 3.82m and a length of 4.26m to give an average area of 16.28m². Task 3 (lateral transfer from the bed to transfer chair using hoist) needed a width of 4.04m and a length of 4.34m to give an average area of 17.54m².

Figure 45 Link Analysis for resuscitation task from one FSE (Task 2.5)



The average width was 3.93m, average length was 4.23m, giving an average area of 16.61m². The lateral transfer task occupied the greatest width, length and area of the three tasks. This was probably due to the extra equipment (transfer chair and pat slide) brought into the room and the furniture being moved back to give additional space.

	Width (m)	Length (m)	Area (m ²)
Task 1: Sitting chair-bed transfer with overhead hoist			
1.1	4.3	4.3	18.49
1.2	3.8	4	15.2
1.3	3.5	4.2	14.7
1.4	4	3.9	15.6
1.5	4	4	16
Average	3.92	4.08	16.00
Task 2: Resuscitation			
2.1	3.8	4.3	16.34
2.2	3.7	4	14.8
2.3	3.8	4.3	16.34
2.4	4	4.4	17.6
2.5	3.8	4.3	16.34
Average	3.82	4.26	16.28
Task 3: Lateral horizontal transfer using pat slide and sliding sheets			
3.1	4	4.3	17.2
3.2	3.8	4.2	15.96
3.3	4.1	4.2	17.22
3.4	4.1	4.6	18.86
3.5	4.2	4.4	18.48
Average	4.04	4.34	17.54

Table 18 Link Analysis results

7.3 CONCLUSION

The FSE found that all the recommended bed space dimensions for both a single room and ward bed cubicle from 2005 were exceeded with the bariatric patient needing an average width of 3.93m, average length of 4.23m, giving an average area of 16.61m². The spatial requirements recommended by the Department of Health Estates and Facilities Directorate are currently 3.6m (width) by 3.7m (length) giving an area of 13.32m² (NHS Estates, 2005). This would be insufficient for the safe care and treatment of a bariatric patient.

It is recommended that larger spaces (ergonomic envelopes) are needed for the safe care and treatment of bariatric patients. The minimum spatial requirement is 16.61m^2 but if frequent lateral horizontal transfers were likely to occur (e.g. in surgical areas) then 17.54m^2 would be the recommended dimension. This is not the recommended room dimension, just the incompressible functional space, additional space would need to be added for storage, family and hygiene space.

8 REFERENCES

- American Society of Bariatric Physicians. <http://www.asbp.org/faq.htm> Accessed June 2004.
- Anderton, J. P. (2003). Designing bariatric in-patient accommodation. B.Sc. Dissertation. Dept. of Human Sciences, Loughborough University.
- Barr, J., & Cunneen, J. (2001). Understanding the bariatric client and providing a safe hospital environment. *Clinical Nurse Specialist CNS*, 15(5), 219-223.
- Beebe, R., & Heightman, A. J. (2002). Handle with care. specialized methods & devices for moving morbidly obese patients. *JEMS: A Journal of Emergency Medical Services*, 27(1), 42-44, 48, 98-99.
- Bergstrom, N., Bennett, M. A., Carlson, C. E., & et al. (December 1994). *Treatment of pressure ulcers. clinical practice guideline, no. 15*. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service, Agency for Health Care Policy and Research. AHCPR Publication No. 95-0652.
- Boatridge, J. R. (2002). Transporting the morbidly obese patient: Framing an EMAS challenge. *Journal of Emergency Nursing*, 28 (4), 326-329.
- Braun J, Silvetti A, Xakellis G. (1992) What really works for pressure sores. *Patient Care* 26; 63-76
- Brunette, D. D. (2002). Resuscitation of the morbidly obese patient. *The American Journal of Emergency Medicine*, 22(1), 40-47.
- Chell, E. (1998). Critical Incident Technique. In Symon, G., and Cassell, C. (Ed.) *Qualitative methods and analysis in organizational research: a practical guide*. London: Sage Publications. 51-72.
- Cuiilso, R. Z., Toyoshima, H., Date, C., Yamamoto, A., Kikuchi, S., Kondo, T., Watanabe, Y., Koizuma, A., Wada, I., Inaba, , Y. & Tamakoshi, A. (2005). Body mass index and mortality from cardiovascular disease among Japanese men and women - The JACC study. *Stroke*, 36 (7), 1377-1382.
- Davies, P (2004). *The NHS in England 2004/2005*. NHS Confederation, 2004
- Department of Health and the Welsh Office (1990) *Health Building Note 4. Adult Acute Wards*. London: HMSO.
- Department of Health (2003). Health Survey for England trend data 1993-2001.
- Department of Health (2004). Transforming Emergency Care in England. www.dh.gov.uk/assetRoot/04/09/17/81/04091781.pdf. Accessed 8/11/04
- Department of Health website (2006)
http://www.dh.gov.uk/PolicyAndGuidance/OrganisationPolicy/SecondaryCare/TreatmentCentres/TreatmentCentresArticle/fs/en?CONTENT_ID=4097263&chk=RGATY4. Accessed 14/11/06.
- Dionne, M. (2002). One size does not fit all. *The Interdisciplinary Journal of Rehabilitation*, March 2002. <http://www.rehabpub.com/features/32002/1.asp>
- Dionne, M. (1998) Bariatric rehab. *Rehab Management*, 11(4), 76-79.
- Dionne, M. (2002). 10 tips for safe mobility in the bariatric population. *Rehab Management*, 15(8), 28-28.
- Flanagan, J.C. (1954). The Critical Incident Technique. *Psychological Bulletin*, 51, 4, 327-358.
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Johnson, C. L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *JAMA : The Journal of the American Medical Association*, 288(14), 1723-1727.
- Flegal, K. M., Ogden, C. L., Wei, R., Kuczmarski, R. L., & Johnson, C. L. (2001). Prevalence of overweight in US children: Comparison of US growth charts from the centers for disease control and prevention with other reference values for body mass index. *The American Journal of Clinical Nutrition*, 73(6), 1086-1093.
- Gallagher, S. M. (1999). Restructuring the therapeutic environment to promote care and safety for the obese patient. *Journal of Wound, Ostomy, and Continence Nursing : Official Publication of the Wound, Ostomy and Continence Nurses Society / WOCN*, 26(6), 292-297.
- Gallager, S.M. (1998) Caring for the obese patient. *Nursing* 28(3):31hn-33hn
- Grant, P., & Newcombe, M. (2004). Emergency management of the morbidly obese. *Emerg Med Australas*, 16(4), 309-317.

- Green, S. M., & Gillett, A. (1998). Caring for patients with morbid obesity in hospital. *British Journal of Nursing (Mark Allen Publishing)*, 7(13), 785-792.
- Grimshaw, M. G. (2003). Transporting bariatric patients: investigating the design and safety of equipment. B.Sc. Dissertation. Dept. of Human Sciences, Loughborough University.
- Hays, R., Hignett, S. & Grimshaw, M. (2004). Transporting very heavy (bariatric) ambulance patients. *Ambulance Today*. Sept. 19-21.
- Health Survey for England (2004). Updating trend tables to include 2004 data. Accessed at <http://www.ic.nhs.uk/pubs/hlthsvyeng2004upd>
- Health Survey for England data accessed at <http://www.data-archive.ac.uk/newRegistration/showProjectDataset.asp?pn=23337>
- Hignett, S., Lu, J. & Morgan, K. (2007). *Empirical review of NHS Estates Ergonomic Drawings*. Department of Health Estates and Facilities Management Research Report B(02)13 (in press)
- Hignett, S. (2005). Qualitative methodology for Ergonomics. Chapter 5. In Wilson, J.R. & Corlett, E.N. (Eds.) *Evaluation of Human Work. A practical ergonomics methodology*. (3rd Ed.) Boca Raton, FL: CRC Press. 113-128
- Hignett, S. & Keen, E. (2005). Determining the space needed to operate a mobile and an overhead patient hoist. *Professional Nurse*. 20, 7, 40-42.
- Hignett, S., Crumpton, E., Alexander, P., Ruszala, S., Fray, M. Fletcher, B. (2003). Evidence-Based Patient Handling: Tasks, Equipment and Interventions. London: Routledge
- Joint Health Surveys Unit of Social and Community Planning Research and University College London, Health Survey for England, 1995 [computer file]. 3rd ed. Colchester, Essex: UK Data Archive [distributor], 26 March 2001. SN: 3796
- Joint Health Surveys Unit of Social and Community Planning Research and University College London, Health Survey for England, 1997 [computer file]. 2nd ed. Colchester, Essex: UK Data Archive [distributor], 4 December 2000. SN: 3799.
- Kirwan, B., & Ainsworth, L.K. (1992). *A Guide to Task Analysis*. London: Taylor and Francis.
- Langford, J., & McDonagh, D. (2003). Focus Groups. Supporting Effective Product Design. London: Taylor and Francis.
- Lu, J. & Hignett, S. (2006). Evidence-based Design of Hospital Bed Spaces In Pikaar, R.N., Konigsveld, E.A.P., Settels, P.J.M. (Eds.) *Proceedings of the XVth Triennial Congress of the International Ergonomics Association, Meeting Diversity in Ergonomics* 11-14 July 2006, Maastricht, Netherlands.
- Mathison, C. J. (2003). Skin and wound care challenges in the hospitalized morbidly obese patient. *Journal of WOCN*, 30(2), 78-83.
- McCarthy, H. D., Ellis, S. M., & Cole, T. J. (2003). Central overweight and obesity in British youth aged 11-16 years: Cross sectional surveys of waist circumference. *BMJ (Clinical Research Ed.)*, 326(7390), 624.
- Murphy, K. & Gallagher, S. (2001). Care of an obese patient with a pressure ulcer. *Journal of Wound, Ostomy & Continence Nursing*. 28(3):171-176,
- National Centre for Social Research, University College London, Department of Epidemiology and Public Health, Health Survey for England, 1998 [computer file]. 4th ed. Colchester, Essex: UK Data Archive [distributor], 30 November 2002. SN: 4150.
- National Centre for Social Research and University College London. Department of Epidemiology and Public Health, *Health Survey for England, 1999* [computer file]. 3rd Edition. Colchester, Essex: UK Data Archive [distributor], February 2002. SN: 4365.
- National Centre for Social Research, University College London, Department of Epidemiology and Public Health, Health Survey for England, 2000 [computer file]. Colchester, Essex: UK Data Archive [distributor], 23 April 2002. SN: 4487.

- National Centre for Social Research and University College London. Department of Epidemiology and Public Health, *Health Survey for England, 2001* [computer file]. 2nd Edition. Colchester, Essex: UK Data Archive [distributor], June 2004. SN: 4628.
- National Centre for Social Research and University College London. Department of Epidemiology and Public Health, *Health Survey for England, 2003* [computer file]. Colchester, Essex: UK Data Archive [distributor], March 2005. SN: 5098.
- Office of Population Censuses and Surveys Social Survey Division, Health Survey for England, 1993 [computer file]. 2nd ed. Colchester, Essex: UK Data Archive [distributor], October 1997. SN: 3316.
- National Statistics. (2005) Mid-2004 Population Estimates: Quinary age groups and sex for health areas in England and Wales; estimated resident population revised due to Harrow correction - 20 December 2005. Accessed at <http://www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=9192&More=Y>
- NHS Estates. (1995). *HBN 40 Common Activity Spaces Vol 2: Treatment areas*. The Stationery Office, London.
- NHS Estates (2005). *Ward Layouts with Single Rooms and Space for Flexibility*. The Stationary Office: London.
- Ogden, C. L., Carroll, M. D., & Flegal, K. M. (2003). Epidemiologic trends in overweight and obesity. *Endocrinology and Metabolism Clinics of North America*, 32(4), 741-60, vii.
- Ogden, C. L., Flegal, K. M., Carroll, M. D., & Johnson, C. L. (2002). Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA : The Journal of the American Medical Association*, 288(14), 1728-1732.
- Robson, C. (2002). *Real World Research* (2nd Ed.). Oxford: Blackwell Publishers Ltd.
- Shepherd, A. (2000). *Hierarchical task analysis*. London: Taylor and Francis.
- Stunkard, A. J. (1996). Current views on obesity. *The American Journal of Medicine*, 100(2), 230-236.
- Sturm, R. (2002). The effects of obesity, smoking, and drinking on medical problems and costs. *Health Affairs (Project Hope)*, 21(2), 245-253.
- WHO (1998). Obesity: Preventing and managing the global epidemic. *Report of WHO consultation on obesity*. Geneva: World Health Organization.
- Yeomans, E. (2004). Investigation in to the issues concerning the extrication of patients by ambulance service personnel from confined and difficult situations. M.Sc. Dissertation. Dept. of Human Sciences, Loughborough University.

Risk assessment and process planning for bariatric patient handling pathways

The obese population in the UK is growing and this group are considerably over-represented in their use of health and social care services. This project aimed to identify and explore the manual handling risks and process planning for bariatric patients by mapping the patient pathway for an emergency admission to identify the major risks by:

- reviewing public health data to provide an estimate of the current and future bariatric patient population;
- surveying strategic, clinical and operational policies and procedures for bariatric patient handling; and
- obtaining case studies of specific incidents and risk management actions.

Findings revealed that 40%-70% of Trusts did not have a bariatric policy. These policies are needed to lead the process planning, assessment and management of manual handling risks including the number of staff, provision of appropriate equipment and intra- and inter-agency communication. Spatial risk factors were identified but seemed to have a poor management record for both building and vehicle design with over half of the Trusts with policies not considering space in the policy; almost 30% of ambulances not having specialist vehicles and 33% of respondents reporting inaccessible areas in their buildings. Even with good communication it was not always possible to manage all of the risks, and the provision of appropriate equipment and successful management of pain, safety, dignity and comfort all contributed to successful pathway experiences.

This report and the work it describes were funded by the Health and Safety Executive (HSE). Its contents, including any opinions and/or conclusions expressed, are those of the authors alone and do not necessarily reflect HSE policy.