

AIRLINE BAGGAGE HANDLER BACK INJURIES: A SURVEY OF BAGGAGE HANDLER OPINION ON CAUSES AND PREVENTION

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ABSTRACT

The most common type of injury suffered by people at work are back injuries. This paper summarises the opinions of one hundred and fifty six baggage handlers from ten airlines and two ground handling companies worldwide, regarding their perceptions on the causes and prevention of baggage handler back injuries. Handling and stacking baggage within narrow body aircraft baggage compartments were considered by most to be the highest risk tasks. Transferring baggage from the baggage trailer directly into the aircraft, pushing and pulling loaded trailers, and pushing loaded containers inside wide body aircraft when the aircraft systems are unserviceable were also high risk tasks cited by many baggage handlers. Among the solutions identified were the need for redesign of some aircraft baggage compartments and ground handling equipment, and provision of mechanical assistance devices, both within the aircraft and in baggage sorting rooms at airports. The need for improved training of baggage handlers in the area of manual handling was also identified.

INTRODUCTION

Back injuries are among the most common ailments experienced by people during their working lives. In 1994, 20% of all injuries and illnesses in USA workplaces were back injuries which cost over \$US 20 Billion (*NIOSH (1994¹)*). In the period 1992 to 1994, 25% of compensation claims lodged by workers in Victoria, Australia recorded back injuries as the most serious ailment suffered by the claimants (*Health and Safety Organisation (1995)*). In 1996, New South Wales Workcover, reported back injuries to be 30% of all New South Wales workplace injuries in the period 1993 to 1995 (*Workcover New South Wales (1996)*). There is also evidence that this workplace back injury problem has existed for some time. In 1987 back injuries accounted for 27% of all lost time compensation claims in Ontario Canada (*WCB (1988)*). Also, *Saraste (1993)*, in a study of Swedish male workers with back ailments, and *Stubbs (1986)* in a report of a study of the nursing profession in England, both suggested that 80% of workers experienced lower back ailments during their working life.

Since the early 1980s there has been some interest shown in the back injury problem faced by airline baggage handlers¹. Amongst the earliest investigators into baggage handler back injuries was the

¹ For the purpose of this study, a baggage handler is defined as a person who loads or unloads baggage and/or cargo from commercial transport aircraft. It includes those persons who work within the airport terminal who handle baggage and those who consolidate baggage and cargo for particular flights.

International Air Transport Executive of the National Safety Council Of America (ARTEX). In their 1981 report (*ARTEX (1981)*), ARTEX found that 340 baggage handler back injuries occurred in 10 airlines in the one year (1977) of the study. Furthermore, that study also found that narrow body aircraft² loading or unloading was involved in 85% of the injuries.

More recently, *Dell (1997)* found that back injuries to baggage handlers cost 15 airlines and a ground handling company an average of US\$21 million per annum over the period 1992 to 1994, 8.5% of baggage handlers suffered back injuries each year and the average annual Lost Time³ Back Injury Frequency Rate (LTFR) over the period was 41.5 (per million hours worked). Airline safety professionals surveyed in the *Dell (1997)* study also rated loading and unloading narrow body aircraft as the top back injury causation risk.

There is clearly a need to further investigate the baggage handler back injury problem to identify all the injury causation factors as well as appropriate and effective preventive interventions.

This paper summarises the opinions of 156 baggage handlers from 10 airlines and 2 ground handling companies concerning what they perceive to be the high back injury risk tasks, what parts of the baggage handling system and equipment are considered to present significant manual handling problems, and what solutions may be appropriate. The paper is one in a series by the writer looking into various aspects of the baggage handler injury problem.

METHODOLOGY

A total of 156 baggage handlers from the following organisations were interviewed: Aerolineas Argentinas - Argentina, Austral Airlines - Argentina, Delta Airlines - Germany, Delta Airlines - USA, Lufthansa - Germany, Northwest Airlines - USA, Midwest Express USA, Qantas Airways- Australia, Scandinavian Airline System - Scandinavia, Service Master - USA, CLT Aviation - USA.

Interviewees were selected from the work force at each organisation at random and a standard set of structured interview questions were put to each participant They were:

- How long had the participant worked as a baggage handler, what was their age and gender?
- Had they personally experienced a back injury?
- How often did they experience back pain?
- Whether baggage handlers in their organisation were required to lift baggage and cargo exceeding 32Kg (70lb) weight? (32Kg is a pre-existing notional industry limit on passenger baggage weight).
- From a list of 5 baggage handler workplaces, which were considered most and least likely to cause back injuries?
- From a list of twelve manual handling tasks routinely carried out by baggage handlers, which did they consider to be the five (5) most likely to cause baggage handler back injuries?
- What back injury control measures had been applied in their companies? In particular, information was sought on use of back support belts, back care training, use of equipment, use of narrow body aircraft in-plane baggage stacking systems and details of any attempts at building re-design to reduce the instance of baggage handler manual handling injuries.
- What measures did they believe would be necessary in future to reduce the instance of back injuries to baggage handlers?

² In the *Artex 1981* study, narrow body aircraft were defined as B727, B737 & DC9 aircraft. For this study, the definition should also include A320, A319, MD80, BAe146, F28, F100 and B757 aircraft.

³ In *Dell (1997)*, Lost Time Back Injury was defined as the failure, following the injury, to report for duty at commencement of the next work shift.

FINDINGS

Opinions Concerning Back Injury Causation

Of the 156 baggage handlers surveyed, 148 were males and 8 were females. Baggage handlers had baggage handling experience ranging from 6 months to 32 years with the average being 10.6 years. The age of baggage handlers surveyed ranged from 17 to 62 years at last birthday with the average age of the group of 36.3 years.



Figure 1 - Working Inside Narrow Body Aircraft Baggage Compartments

Seventy percent of baggage handlers (110) felt that the narrow body aircraft baggage compartment (see Figure 1) was the workplace likely to cause most back injuries (see Figure 2). All other workplaces were considered most hazardous by significantly less respondents. Baggage check-in was the next most common response, with only 13 baggage handlers suggesting it was the location likely to cause most injuries, followed by “Outside the Aircraft on the Tarmac” (11), “Baggage Sorting Room” (9) and “Inside Wide

BAGGAGE HANDLER OPINION: WORKPLACE LIKELY TO CAUSE MOST BACK INJURIES	
Inside Narrow Body Aircraft Baggage Compartments	110
Baggage Check-in	13
Outside Aircraft On the Tarmac	11
Baggage Sorting Room	9
Inside Wide Body Aircraft Bulk Hold	9
No Response	4

n= 156

Figure 2

On the subject of heavy baggage, one hundred and thirty nine (139) of the respondent baggage handlers reported that they were required to lift baggage over 32kg (70lb), while 141 considered such heavy baggage to be a significant injury risk.

Figure 3 summarises baggage handler responses to a range of questions regarding which manual handling tasks were considered to cause back injuries.

BAGGAGE HANDLER OPINIONS: MANUAL HANDLING TASKS LIKELY TO CAUSE BACK INJURIES			
TASK	LIKELY	UNLIKELY	N/R⁴
Pushing Bags from Doorway into Narrow Body Compartment	136	18	2
Stacking Bags Inside Narrow Body Baggage Compartment	135	16	5
Transferring Bags from Trailer Directly into Aircraft	131	21	4
Pushing & Pulling Loaded Trailers	129	25	2
Pushing Containers Inside Wide Body Aircraft (Systems U/S)	118	27	11
Stacking Baggage Inside Wide Body Aircraft Bulk Holds	113	30	13
Loading Bags onto Trailers in the Baggage Room	107	47	2
Loading Containers in Baggage Room	104	42	10
Transferring Bags from Trailer to Mobile belt	103	49	4
Unloading Containers in the Baggage Room	101	44	11
Unloading Trailers in the Baggage Room	93	61	2
Lifting Baggage on & off Conveyors	69	83	4

Figure 3

The baggage handling tasks within the narrow body aircraft, “Pushing Baggage from Doorway into Narrow Body Compartment” and “Stacking Bags Inside Narrow Body Baggage Compartment”, were considered likely to cause back injuries by the most respondents (136 and 135 respectively). “Transferring Baggage From Baggage Trailers Directly Into The Aircraft” was the task next most considered to cause back injuries (131), followed by “Pushing and Pulling Loaded Containers” (129).

Pushing containers inside wide body aircraft when the mechanical loading systems were unserviceable was thought likely to cause back injury by 118 respondents, and stacking baggage inside wide body aircraft bulk holds was considered a back injury risk by 113 baggage handlers.

Lifting baggage on and off conveyors was the only manual handling task that a majority (83, or 53%) of the baggage handlers felt was not an injury risk.

BAGGAGE HANDLER OPINIONS: PERSONAL INJURY EXPERIENCE				
QUESTION	Yes	No	N/R	n
Have you personally experienced a back injury while handling baggage?	72	84	0	156
Has the Back Injury Reduced Your Ability to Handle Baggage?	40	32	0	72
Has the injury recurred since the first occasion?	43	29	0	72

Figure 4

Seventy-two (46%) of the baggage handlers reported that in the past they had experienced a back injury while handling baggage. Of those, forty (55%) felt that their back injuries reduced their ability to carry out the work, and 43 (60%) reported that the injury had recurred at least once since the first occasion.

In response to the question “How often do you experience back pain when handling baggage” hundred and ten (71%) baggage handlers reported experiencing back pain more than once. Twenty-seven (17%) reported having back pain daily, twenty-four (15%) reported having back pain weekly, eighteen (12%) monthly and forty-one (26%) seldom.

⁴ N/R means “Nil Response”

Opinions Concerning Back Injury Prevention

When questioned concerning the design of existing baggage sorting rooms, only slightly more than half (88, 56%) of the baggage handlers in this survey felt that the design of baggage sorting rooms made their job easier and the heights of conveyor belts were considered adequate by only 52% (82).

Only 53 of the 156 baggage handlers (34%) reported their airlines having stacking systems installed in narrow body aircraft. Of those, 47 (89%) felt the system made baggage handling easier and reduced exposure to back injuries. However, all 53 (100%) preferred loading aircraft fitted with a stacking system over loading aircraft that do not have stacking systems installed.

Figure 5 summarises baggage handler responses concerning possible engineering or redesign solutions to the back injury problem

BAGGAGE HANDLER OPINIONS: ENGINEERING /RE-DESIGN SOLUTIONS			
SOLUTIONS	Yes	No	N/R
Develop In-plane Baggage & Cargo Stacking Systems	122	27	7
Redesign Baggage Handling Systems to Reduce Injury Risk	111	41	4
Provide Mechanical Assistance Devices for Lifting Baggage	93	49	14
Introduce Robotics to Eliminate Manual Handling	89	60	6
Redesign Aircraft Baggage Compartments	78	69	9

n= 156

Figure 5

Development of in-plane baggage and cargo stacking systems was the most popular redesign solution. One hundred and twenty two (78%) baggage handlers felt that this was a viable method of reducing the risk of back injury in the aircraft loading task. The second most popular engineering solution was to redesign baggage handling systems, which was supported by 111 baggage handlers (71%). Although all engineering redesign solutions were supported by a majority of baggage handlers, provision of mechanical assistance devices, introduction of robotics to eliminate manual handling and aircraft baggage compartment redesign were favoured the least (93, 89 and 78 respectively).

Figure 6 gives details of baggage handler opinions concerning possible administrative or procedural solutions to back injury problem.

BAGGAGE HANDLER OPINIONS: PROCEDURAL AND ADMINISTRATIVE SOLUTIONS			
SOLUTIONS	Yes	No	N/R
Put "Heavy" Tags on Heavy Baggage to Warn Staff	140	3	13
Introduce Better Baggage Handler Training	138	14	4
Better Maintenance of Equipment	121	27	8
Introduce Better Baggage & Cargo Acceptance Procedures	120	23	13
Better Rostering of Staff to Meet Work Demands	119	31	6
Educate the Public Concerning Injury Risks to Baggage handlers	118	26	12
Should a Lower Baggage Weight Be Enforced	114	28	14
Slow the Baggage Handling Process Down	104	48	4
Make Passengers Re-pack Heavy Baggage to Reduce Weight	101	42	13
Introduce Back Support Belts	100	47	9
Introduce Warm-up Exercises	98	52	6
Improve Quality of Supervision	67	81	7

n= 156

Figure 6

The most popular procedural intervention, and the most popular over all, was the possible introduction of "heavy" tags to warn staff of the increased injury risk presented by those bags. One hundred and forty baggage handlers supported this potential intervention. Almost as popular (138 positive responses) was the potential solution of improving baggage handler training. Better maintenance of equipment was the third most preferred solution (121 positive responses). "Introduction of Warm-up Exercises" and "Improvement In The Quality Of Supervision" (98 and 67 positive responses respectively) were the least favoured solutions, the latter being the only suggested solution where a majority support was not achieved.

Since some airlines and handling companies had required or permitted the use of back support belts in the past, baggage handlers in this survey were asked a number of questions regarding the their use. Figure 7 summarises the responses.

BAGGAGE HANDLER OPINIONS: BACK SUPPORT BELTS			
QUESTION	Yes	No	N/R
Have you personally worn a back support belt to help prevent back injuries?	63	90	2
Have you experienced a back injury while wearing a back support belt?	10	123	23
Do back support belts improve a wearers ability to do baggage handling tasks?	93	52	11
Back support belts help prevent lost time back injuries?	94	52	10
Back support belts should be worn for all lifting tasks	86	60	10
Back support belts make lifting technique training unnecessary	13	133	10
If you wear a back support belt at work, you must wear it when lifting at home	66	78	10

Figure 7

Only sixty-three (40%) of the baggage handlers surveyed had worn back support belts and ten of those had suffered a back injury while wearing the support. A majority (93, 59%) of baggage handlers believed that back support belts improve a wearers ability to carry out baggage handling tasks, ninety-four

(94, 60%) consider back support belts prevent lost time back injuries and eighty-six (55%) believed back supports should be worn for all lifting tasks. Only thirteen (8%) baggage handlers considered that wearing back supports negated the need for lifting technique training.

As Figure 8 shows, the majority of baggage handlers support the use of training as a means to reduce the risks related to baggage handling tasks. Nearly all baggage handlers (94%) felt that training needed to include techniques for lifting with restricted postures in confined spaces. Eighty-two percent (129) felt that back care training will help to prevent lost time back injuries, and seventy-eight percent (123) believe it will enhance baggage handlers' ability to carry out their work.

BAGGAGE HANDLER OPINIONS: TRAINING			
QUESTION	Yes	No	N/R
Training must include techniques for lifting in restricted postures/confined spaces?	145	9	2
Back care training will help prevent lost time back injuries?	129	25	2
Back care training improves baggage handler ability to conduct handling tasks?	123	30	1
Warm up exercises should form part of baggage handlers' daily routine	105	48	2
Lifting technique (back straight/knees bent) training benefits baggage handlers	104	48	11

Figure 8

DISCUSSION

Several previous authors, *ARTEX (1981)*, *Hogwood (1996)*, *Berubé (1996)* & *Dell (1997)* agreed that poor ergonomic design of narrow body aircraft cargo compartments placed significant limitations on baggage handler working postures and increased the risk of injury. While most modern narrow body aircraft have the latest technology systems installed in the cockpit and passenger cabins, there is no similar situation below the cabin floor. The baggage compartment, particularly in aircraft such as the Boeing B737, McDonnell Douglas DC9, British Aerospace BAe146 and Fokker F100, is little more than a space left for the purpose of stacking baggage and cargo. Manual handling with restricted working posture is usually the only option available to load and unload the aircraft.

A significant majority (86%) of the baggage handlers in this study also felt that that stacking baggage inside narrow body aircraft was most likely to cause back injuries.

There is little doubt, the evidence damning the current narrow body aircraft baggage compartment designs is mounting, as is the pressure on airlines and aircraft manufacturers to address this design shortcoming.

However, *Briggs (1997)* correctly predicted that “*there will have to be airline industry consensus before the aircraft manufacturers will carry out design changes to their aircraft*”. It is true that without OHS regulatory intervention, the manufacturers will only react to market demand.

So why have the airlines not demanded such changes long before now? The answer is simple. In the first instance, the ergonomic problems of the narrow body baggage compartments have only been identified and quantified recently. More importantly, the current generation of aircraft (and their predecessors) were designed to satisfy three criteria required by the airlines: range, payload and low operating cost, especially low fuel burn. Accordingly, only those systems essential for the airliner's operation were considered in the design. This kept the weight of the aircraft as low as possible, directly reduced the resultant fuel burn and maximised the potential payload capabilities of the design. Until now, the cost of injuries to baggage handlers was never factored into the equation.

A significant number (44%) of the baggage handlers in this study were so convinced that the aircraft design was sacrosanct, that they felt there was no likelihood of any engineering redesign solutions being achieved.

However, there is some hope for a solution, albeit perhaps a part solution, to the baggage compartment design problems of narrow body aircraft. Some airlines have retro-fitted semi automated systems in baggage compartments in narrow body aircraft. These systems provide a moveable wall which can be positioned near the cargo compartment door and eliminate the need for baggage to be shifted manually down the length of the cargo compartment. However, these systems still require the baggage handler to stack the baggage in the baggage compartment. Figure 9 depicts the Scandinavian Belly Loading Company "Sliding Carpet" system. The American ACE system is another example.

Although not yet in wide spread use, systems such as *Sliding Carpet* have been installed by some airlines and information available to date is encouraging. *Johansen (1995)* reported a 25% reduction in baggage handler sick leave rates, 50% reduction in the occurrence of damage to baggage and the lining of the baggage compartments and a 3% reduction in the number of baggage handlers required in the operation. *Johansen (1995)* also claimed a \$US 2 million saving over the first 3 years of operation of 17 B737 aircraft with the system installed. If these results are what can be expected, the slow rate of adoption of these systems by the industry may change.

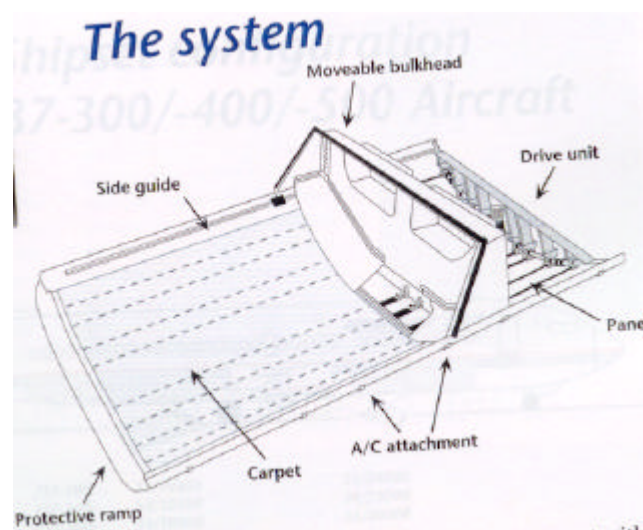


Figure 9 - Scandinavian Belly Loading Company Sliding Carpet Loading System

There has also been considerable consensus amongst previous authors (*ARTEX (1981)*, *Dell (1994)*, *Berubé (1996)* & *Dell (1997)*) that the weight of passenger baggage is a major injury causation factor. Almost all (90%) of the baggage handlers in this study agreed that heavy passenger baggage was a significant injury risk. However, few airlines have addressed this issue with any real success. Those that have introduced OHS based baggage weight restrictions, such as Qantas, Ansett Australia and Air New Zealand, have had mixed success (*Dell 1997*). The primary reason for the limited success of these programs is their lack of widespread adoption. This causes those airlines that do attempt to address the issue, by introducing these programs, to be placed at a commercial disadvantage. Passengers who are permitted to lodge heavy baggage on one airline react negatively when asked to re-pack their baggage on another. No doubt many airline commercial managers would rather not refuse to uplift a passenger's heavy bag, or put the passenger to the inconvenience of re-packing their bag to reduce weight.

There is a need for an industry-wide solution to the heavy baggage problem. If engineering solutions cannot be found for the manual handling tasks associated with passenger baggage and cargo, then as contemporary OHS legislation (eg *Government of Victoria (1995)*) requires, the airlines must find other methods to reduce employee exposure to the manual handling risks. Reduction of the weight of baggage handled by baggage handlers may well be the only effective method to reduce that exposure.

To date, it seems, that the various OHS regulatory bodies worldwide have not enforced their legislation in this area. In the past, there is little doubt they lacked the necessary information about the problem, or were unsure if a viable solution existed. However, the evidence is mounting that, while there is

no panacea, there are solutions available to some of the baggage handling risks, and these are not being adopted across the industry.

In the absence of OHS regulatory mandates, there is a need for the industry associations such as the International Air Transport Association and the US Air Transport Association to play a leading role in setting global baggage standards which take the manual handling risks into consideration.

Airport design is yet another area where opportunities to reduce employee exposure to manual handling risks have been missed. As this study shows, over 70% (see Figure 5) of the users of the baggage handling systems believe there is a need to redesign the systems to reduce injury risk. However, there will need to be a paradigm shift in the industry for solutions in this area to be found also.

In the past, baggage system design has centred on solutions to the volumetric problems associated with baggage transfer and sortation. Only rudimentary ergonomic principles, such as integration of average height and reach distances, have been applied to account for the needs of the system users in the past.

Moreover, mechanical lifting assistance devices, such as ErGoBag (see Figure 10), which are now commercially available and could be retrofitted at many existing airports, are not being adopted. Indeed, as reported in *Dell (1997)* there is a reluctance on behalf of airport terminal and systems designers, to provide workplaces which meet the ergonomic needs of all baggage handlers.

This is another area where the industry associations and the OHS regulators have an obligation to intervene, or it is doubtful there will ever be wholesale improvements in the ergonomic design of baggage transfer systems. It seems the airport owners and operators do not have the resolve to self regulate and achieve viable solutions.



Figure 10 - The AirGro “ErGoBag” Mechanical Assistance Device

There needs to be an holistic view taken of the manual handling problems in passenger baggage and cargo transfer. It is a fact that airport, baggage sortation system and ground equipment design are all linked and dependent on aircraft systems design. Clearly, the aircraft manufacturers are the key to providing long term design solutions. Appropriate changes in aircraft baggage systems design to address the manual handling issues are needed as a catalyst for wide spread change.

Meantime, the industry must improve other aspects of the overall manual handling injury prevention system. As this study showed, there is a need to provide better training (see Figure 6) and improve maintenance and serviceability of existing baggage system equipment. Indeed, the same emphasis needs to be placed on the maintenance of baggage systems, as is the case for other aircraft related systems.

This study found that roughly equal numbers of baggage handlers had used back support belts as had not. However, there was a belief among many that back support belts were at least a part of the overall solution.

The literature concerning use of back support belts as injury prevention devices, is also mixed in its findings. For every paper supporting their use, there is at least one recommending they should not be used as a preventive solution. As *Perkins and Bloswick (1995)* suggest "*The impact of back belts on the prevention of back injuries due to manual material handling remains unclear*" and "*There is no clear evidence that back belts reduce the incidence or severity of back injuries*". Similar conclusions were also made by *NIOSH (1994²)* who criticised the unscientific methodologies of many earlier studies into back support belts as a possible injury prevention tool.

Some authors (eg *Congleton J. et al (1993)* and *McGill S. (1993)*) clearly have a bias away from use of back support belts in the prevention role. This is no doubt due to the emphasis in modern OH&S teaching of application of the hierarchy of hazard controls (*Dept. of Labour (1990)*). However, until adequate permanent engineering controls are developed in the baggage handler back injury area, any control measure, even one on the low end of the hierarchy, is better than no control measure.

Accordingly, it is a pity that researchers in the back support area have been unable or unwilling to undertake studies with sufficient scientific rigour to prove one way or the other, if back support belts could be used as a prevention tool, even as a short term solution. The baggage handler back injury problem is begging for a short, as well as long term solution.

CONCLUSIONS

The majority of baggage handlers in this study felt the narrow body aircraft baggage compartment was the workplace where back injuries were most likely to occur. Furthermore, pushing, pulling and stacking baggage inside those aircraft compartments were considered the tasks most likely to cause those injuries. The restricted working environment in these baggage compartments forced baggage handlers to adopt poor lifting postures that exacerbate the manual handling problems associated with loading and unloading passenger baggage.

Almost three quarters of the baggage handlers in this study had experienced back pain while handling baggage. Indeed, almost half of the baggage handlers had sustained back injuries while handling baggage and half of those felt their ability to carry out the work was adversely affected.

More than three quarters of the baggage handlers in the study felt there was a need to develop in-plane baggage and cargo stacking systems to reduce the manual handling load inside the narrow body aircraft compartments.

Accordingly, aircraft manufacturers need to review aircraft baggage compartment design criteria to take manual handling injury risk into consideration. It is no longer acceptable to just provide a cavity within the aircraft where baggage is expected to be stacked by personnel.

In-plane retrofit systems, such as *Sliding Carpet* and *ACE*, which existing evidence suggests reduce exposure to manual handling injury, should be seriously considered by all airlines that operate narrow body aircraft. Almost 90% of the baggage handlers in this study who had used these systems felt they made baggage handling easier and reduced the likelihood of injuries.

Those airlines that already have installed these systems should share their experience with others, in the interests of injury prevention.

Only half of the baggage handlers felt the design of baggage sorting rooms met their manual handling needs. Accordingly, there needs to be an improvement in airport building and baggage systems design in the area of ergonomics. Past reliance on designing for the dimensions of the average baggage handler must come to an end. Unless the manual handling tasks are entirely eliminated, future systems must be designed to maximise the ergonomic advantage for all system users, not just those baggage handlers with average dimensions.

Mechanical lifting aids, such as *ErGoBag*, should be considered by all airport owners and operators. There are many places in existing airport baggage sorting rooms where these aides could be retrofitted and significantly reduce the manual handling injury risk.

Three quarters of the baggage handlers felt that better maintenance of baggage handling equipment was necessary. All airlines need to review their equipment maintenance programs. The serviceability of ground equipment and aircraft loading systems must be maintained to a high standard. The risk of injury to baggage handlers increases significantly when personnel are required to manually handle the heavier loads that were intended to be moved by the failed equipment.

Ninety percent of the baggage handlers in this study considered baggage over 32kg was a significant injury risk and that airlines should introduce "heavy" tags to warn staff of the increased injury risk of such bags.

There is little doubt that while long term solutions to the manual handling injury problem are being developed, there is an urgent need for the industry to place a limit on the weight of baggage to be accepted by the airlines. To be effective, the weight limit must be applied across the industry so that the injury risk from baggage handling is not exacerbated by over weight heavy bags. Furthermore, systems should be developed by all airlines to tag baggage and label cargo with accurate weights. This will permit baggage handlers to properly prepare for each lift and assess the injury risks of handling items of baggage and cargo.

Almost 90% of baggage handlers in this study clearly expressed a desire for improvements in the manual handling training provided. Indeed, baggage handlers cannot be expected to perform their duties at optimum level, unless they have acquired the required skills and techniques. There is no doubt that comprehensive back care and lifting technique training should be provided by airlines as a minimum.

The aviation industry associations have a clear role to play. There is a need to set realistic standards across the industry, which address the baggage handlers injury risks. Their secondary role is to provide a focal point for bringing all the stakeholders together. The long-term solution relies on the co-operation of all parties; the airlines, airport operators, equipment and aircraft manufacturers, and the baggage handlers.

Without industry co-operation, long-term solutions are unlikely to be forthcoming, unless the OHS regulators around the globe overcome their current inertia.

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