

Protecting your Responders' Backs

This white paper from Priority Care EMS addresses what OSHA perceives as one of the major underlying causes resulting in Back Injuries in the EMS environment – Repetitive Micro-Trauma factors.

Over longer periods, this undetected micro trauma can be far more damaging as the progressive nature of the degeneration of responders' backs cannot be attributed to a single traumatic incident.

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About the Author

Mark Bainbridge is President, Priority Care EMS LLC, headquartered in Denver CO.

Mark has written this whitepaper drawing from findings of more than 12 years experience in Australia and 10 years of trans-Pacific relationships in the EMS environment.

With a team of research, design and testing colleagues, Mark has continuously looked to improve pre-hospital emergency kits. Over this time development has had three goals as the focus:

- greater effectiveness,
- improved reliability, and
- safety of emergency workers

Together these three aspects provide enhanced Patient Care, improved Responder Well-being and extended operational life with greater Economic Efficiencies.

When he is not found in the US he is at home in Australia with a myriad of grandkids, growing every day.

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Emergency Services are still experiencing high levels of Back Injuries among their most valuable resource, their highly trained Responders.

This is in spite of significant outlays on power-assisted equipment and a heavy emphasis in training for Patient Handling. Even fitness programs have been introduced.

This white paper addresses what OSHA perceives as one of the major underlying causes resulting in Back Injuries in the EMS environment — Repetitive Micro-Trauma factors. Over longer periods, this undetected micro trauma can be far more damaging as the progressive nature of the degeneration of responders backs cannot be attributed to a single traumatic incident.

The paper proceeds by following the recommendations in several NIOSH publications, in particular, the paper looks at permanent engineering solutions, and associated ergonomic factors

Working through models from the industrial scene using current publications of OSHA and NIOSH, as well as several EMS published papers of the last 10 years; the white paper looks at Repetitive Micro-Trauma and those actions that contribute to it, and proposes some responses. The whitepaper:

- Investigates Micro-Trauma and its impact on Back Injuries in the EMS environment
- Considers the factors to the identification of Micro-Trauma indicators
- Promotes a collaborative approach to identification and remedy
- Considers two of the major causes of repetitive micro trauma in every service
- Looks to engineering solutions as a more definitive answer
- Looks at the ergonomic considerations in equipment selection
- Looks at engineered solutions currently available in the market that directly address the problems outlined by the authorities in the manner they recommend for permanent solutions.

Through work place analysis of these factors and the discussion that follows by both managers and Responders, it recommends ensuring that an awareness of the real effects and costs of Micro-Trauma are understood and considered in light of improving productivity.

The white paper offers a set of suggested guidelines for this vital review including a set of indicators to use in examining possible solutions.

Now that it is clear that earlier approaches, well implemented by Services, are insufficient on their own; Services must address these issues anew to ensure the safety of their Responders and avoid costly compensation and new recruiting costs.

It seems only half the job that OSHA records and NIOSH recommends has been done with regard to preventing responder WMSDs.

Research article after research article show this emphatically; one recently reporting a six to eightfold increase of likelihood when compared to the average of other municipal workers. (1)

A great deal of successful effort has been used on improving Patient Lifting since the concerted activities of the late eighties and early nineties. Further improvement continues to be an item of strong interest, as demonstrated by the present-day activity concerning power-assisted cots/gurneys.

Our EMS Responders are
still clearly at risk of
Work-related
Musculoskeletal
Disorders (WMSDs)

However there is more to the story than correcting Patient Lifting processes that needs urgent attention to help prevent further avoidable Work-related Musculo-Skeletal Disorders (WMSDs).

OSHA warns that dangerous lifting is *coupled with years of weakening of the musculoskeletal support mechanism by repetitive micro-trauma. (2)*

NIOSH recommends that

engineering approaches are preferred over administrative ones because they eliminate the risk factors as opposed to simply reducing exposure to them.

[<http://www.cdc.gov/niosh/docs/97-117/epstep7.html>]

This white-paper considers addressing some causes of the mostly over-looked repetitive micro-trauma factor in the manner recommended by the authorities

Investigating Micro Trauma Factors

As every EMS service provider does every year, you examine where you can improve your service and productivity. A whole list of objectives is used in this analysis – better patient care; faster response times; improved equipment; better working practices and work environment; lower costs; and more

Every year insurance premiums rise and upon review, you find back injuries and the ensuing lost productivity, let alone the cost of replacing injured responders, is high on the list of contributing factors.

So you research

“Although back injuries account for no work-related deaths, they do account for a significant amount of human suffering, loss of productivity, and economic burden on compensation systems. Back disorders are one of the leading causes of disability for people in their working years and afflict over 600,000 employees each year with a cost of about \$50 billion annually in 1991 according to NIOSH. The frequency and economic impact of Back Injuries and WMSD’s on the work force are expected to increase over the next several decades as the average age of the work force increases and medical costs go up.

<http://www.cdc.gov/niosh/docs/97-117/epstep7.html>

But you say to yourself...”We have looked at mechanical lifting devices and implemented power cots and stair chairs — this had been high cost but was effective to a point.”

Yet again...”We also looked at our work place lifting practices and implemented a program of education, training and physical fitness for the staff — this has also been a positive”

But we still have injuries

There is one item that is constantly overlooked and one which appears central to the issue but there is little information directly related to it.

Responders carry gear into a job — and carry it out again, several times a shift.

Sometimes they carry the patient out but they ALWAYS carry the gear both ways, regardless of the need to transport the patient. This repetitive action of lifting and carrying, aggravated if multiple flights of stairs or long distances are involved, can have a combined effect far in excess of the less frequent patient handling issues by the end of each day.

The frequency and economic impact of Back Injuries and WMSD’s on the work force are expected to increase

Back Injuries – What A Pain

While there can be little doubt Patient Handling is a key factor, and is probably the single most significant contributor to Major-Trauma, as highlighted by OSHA, repetitive actions combined with poor ergonomic factors lead to Micro-Trauma.

“Back disorders can develop gradually as a result of micro trauma brought about by repetitive activity over time or can be the product of a single traumatic event. Because of the slow and progressive onset of this internal injury, the condition is often ignored until the symptoms become acute, often resulting in disabling injury ... While the acute injury may seem to be caused by a single well-defined incident, the real cause is often a combined interaction of the observed stressor coupled with years of weakening of the musculoskeletal support mechanism by repetitive micro-trauma.”

[OSHA Technical Manual]

Accordingly the basis of any investigation becomes:

- how to carry this gear
- what containers to carry it in and
- ergonomic factors that impact on Responders, arising from the previous two

Services are very good at evaluating equipment for the purpose of improved patient care delivery and add these new items to their list of ‘must carry’ equipment. Frequently what is not considered is where they are going to put this new piece of equipment in their already over stocked and oversized kit bags.

Just getting a bigger bag is not the answer. In any evaluation, consideration must be given to the:

- ergonomic impact of carrying larger kits
- the amount and weight of equipment
- how this equipment is distributed across a range of transport options

If these pieces of equipment are poor in ergonomic design, further potential for increased injury may result to Responders.

There is a holistic effect throughout the body structure.

It is possible that services are unintentionally causing injury to their staff by the choice of deployment kits they purchase.



Not only is the spine misaligned, but also the head and neck shoulder is dragged down elbow and wrist are awkwardly displaced hip, knee and ankle are similarly affected as the body tries to compensate

Identification Of Micro Trauma Indicators

OSHA provides a list of areas to conduct a review of the work place and this which has given rise to the physical conditioning of responders and improvement of their lifting techniques.

...disorders result from exceeding the capability of the muscles, tendons, discs, or the cumulative effect of several contributors:

- *Bad body mechanics – how one lifts, pushes, pulls, or carries objects.*
- *Poor physical condition – losing the strength and endurance to perform physical tasks without strain.*
- *Repetitive lifting of awkward items, equipment, or (in health-care facilities) patients.*
- *Ageing work force.*
- *Decreases in physical conditioning and exercise.*

[OSHA]

Bad body mechanics and repetitive lifting of awkward items and equipment become the focus

As we cannot reverse the ageing process, and mandatory off-duty exercises can rarely be enforced, then *bad body mechanics* and *repetitive lifting of awkward items and equipment* remain to become the focus.

Patient Handling Improvements insufficient

Patient handling is the obvious bulls-eye and correct lifting techniques are paramount to successfully minimizing back injury, but what about the hundreds of thousands of lifts of the equipment and the kits that carry that equipment into every job?

The frequency of occurrences where a patient is transported is not every time, in fact, it is reportedly more likely less than 50% of the time.

'... "We currently throw everything at an incident when it is proved over and over that 70 per cent of cases do not need to be transported to hospital....Ambulance service medical director Dr Pamela Chrispin said: "Last year less than half of the calls we responded to required a double-staffed ambulance to transport patients to hospital yet we automatically sent one to the vast majority of incidents.'

<http://www.emsworld.com/article/article.jsp?id=17574&siteSection=1>

It is the minor injuries that we tend to work through, or take something for the minor irritation that can lead to an eventual deterioration of mobility and function. This is where hard evidence is difficult to obtain, as many of these instances are not reported.

Micro Trauma Indicators (ctd)

“One survey...showed that at any one time, nearly 10 per cent of EMTs are out of work with an injury. Additionally, 47 per cent of public safety employees described a back injury in the past six months, meaning a fair amount of injury remains unreported. The scary part of that little tidbit is that once you have sustained an injury — even a minor one — your chance of re-injury is much higher. Some studies show a nearly 100 per cent chance of a more severe injury following a minor injury.”

[B. Fass – EMS World 2010]

Examining the two remaining factors highlighted by OSHA

Consider again the list of misalignments. But this is only one of many kits to be carried

Crews still resemble mountain climbers on a Himalayan Trek when they load up to go into a job. If we want to target solving injuries prevention of WMSDs, then rectifying bad body mechanics needs to be addressed within the scope of minimizing all areas of concern, not just aiming at the most obvious.

It needs a broader examination than just focusing on patient handling. Services need to take a holistic view of their work environment and assess the various repetitive tasks carried out daily. There are many tasks that are repeated every day in lifting and carrying that would be potentials for micro trauma in service staff

Consider now two causes of the major causes of repetitive micro trauma events

- The type of bag storing the equipment
- The amount of the equipment itself

which remain to become a starting point in any review.

These items require engineering solutions as recommended by NIOSH

Not only is the spine misaligned but also the head and neck shoulder is dragged down elbow and wrist are awkwardly displaced hip, knee and ankle are similarly affected as the body tries to compensate

Engineering Solutions Required

NIOSH notes engineering solutions are of a more permanent nature.

Design strategies ... target the causes of potential musculoskeletal problems. For this reason, engineering approaches are preferred over administrative ones because they eliminate the risk factors as opposed to simply reducing exposure to them. “Administrative controls ... remain stop-gap measures. They are not permanent solutions.

NIOSH. <http://www.cdc.gov/niosh/docs/97-117/epstep7.html>

So we find that potential major trauma occurring in patient handling is well researched and manufacturers are creating mechanical aids to answer the challenge. A challenge set by the market place in response to the major focus being ‘patient lifting’.

Just getting a bigger bag to put everything in may be asking for even more costly trouble

Power gurneys and stair chairs are being developed for ‘minimum’ and ‘no lift’ scenarios, automatic cardio pulmonary machines to eliminate the physical challenge of delivering the number of compressions required through the change in resuscitation guidelines and all sorts of mechanical devices to lift and lower equipment from the ambulance are constantly being developed and introduced.

But where is the focus on micro trauma?

What has been engineered to remove the day to day

Bad body mechanics, especially carrying and Repetitive lifting of awkward items and equipment

Manufacturers can change outcomes through innovative design incorporating ergonomic principles in their products and Services need to look for these and value them in their review.

The equipment is important, but how the equipment is designed, and the process of transporting is critical to limiting the effects of micro trauma.

Just getting a bigger bag to put everything in may be asking for even more costly trouble — trouble that is not suddenly evident and will appear at a later time as micro trauma develops into a major debilitating, career ending event.

If you look at the current design of equipment kits available in the market place today, one would be excused for thinking that the implications of years of research on back injuries in the EMS environment continue to be glossed over, even totally ignored.

The trend to retain big duffle type bags, slung from the shoulder with webbing straps is one of a historic background, where hiking bags and backpacks were adapted to carry pre-hospital emergency gear.

Little or No Change in Ten Years

It seems little has changed, with packs still being large to keep pace with all the equipment that a responder needs to carry, and basic designs unaltered through time and replicated by every supplier in the country.

It also seems little is considered of the weight and strain on the Responders who have to carry it, and the ensuing back injuries. The earlier picture of the overweight, bulky bag reinforces our understanding of the stresses and strains it puts on the carrier.

Any basis of engineering solutions for these issues lies in the associated ergonomic principles.

NIOSH leads the way

... proactive approaches are geared to preventing ... problems from developing in the first place. Proactive ergonomics emphasize efforts at the design stage of work processes to recognize needs for avoiding risk factors that can lead to musculoskeletal problems

A *proactive* approach is needed for the evaluation of the equipment responders carry to be developed. A set of criteria along referring to ergonomic considerations is paramount in accounting for all the elements of a holistic examination of potential micro trauma resulting in back injuries WMSDs.

Services should look for equipment that fills the criteria developed and evaluate it accordingly. Such a list should include

- weight of the equipment
- shape of equipment
- frequency of use
- mandatory equipment
- optional equipment
- placement or position in the ambulance
- storage space availability

The shape and bulk of the equipment that we have to lift and carry into every job – time and time again – is something that can be altered and made safer for operations

The human body can be a lumpy, large and an awkward proposition to maneuver and lift at the best of times. As such we cannot change this. But the shape and bulk of the equipment that we have to lift and carry into every job – time and time again – is something that can be altered and made safer for operations.

The design of monitors, carry cases and equipment deployment packs becomes as important an issue to the saving of Responders backs as power stretchers and lifting techniques, simply due to the fact that in every job, the equipment is lifted, carried and returned at every incident.

Management commitment and employee involvement in the planning activity are essential.

Design strategies emphasize fitting job demands to the capabilities and limitations of workers.”

It requires a combined effort from management and operational staff as they both groups need to grasp the economic considerations along with the practical implications. Management need to recognize the savings that prevention of injuries provides; while Responders need to work collaborate in finding practical solutions.

Equipment Rationalization

In recent years, economic considerations and tight budgets have taken precedence over other vital indicators like the long term health and safety of the most valuable asset in any service, the Paramedics and EMT's that respond.

Review of the increased cost of Staff replacement for both long and short term injury, increased insurance premiums and the resultant decrease in effectiveness of providing the quality service would suggest the strong potential for false economy.

Most managers know this and great care and research is used when evaluating new equipment for consideration for inclusion into EMS Service.

However, this is often not the case when dealing with the deployment kits that carry this equipment. Many Services still have a mentality of *One bag fits all*.

A discussion needs to be initiated by every service and center around the vital process of rationalization of equipment due to the reality of the EMS environment and the lifting and carrying capability of the Responders available. Adding to the equipment list and just buying a bigger bag is the reality of where we have come from.

As part of this discussion OSHA recommends
Large-sized units could be broken into smaller, more manageable ones and equipment could be selected that most helps the workers using it.

Rationalization of equipment and breaking it down into smaller related groupings will provide a better direction as to the right sort of deployment kits one needs to transport the selected equipment while limiting the micro traumatic effects.

Additionally, identifying the ergonomically designed equipment best suited for the purpose will go a long way to creating a safer and more effective EMS Service.

Often such discussions are deferred on the pretext of a tight budget situation. In many cases such deferment will be false economy, as can be indicated by considering the following savings:

- reduction in associated workers' compensation costs
- reduced staff turnover and associated training and administrative costs
- reduced absenteeism
- increased productivity
- improved employee morale
- increased patient satisfaction

Rationalization of equipment and breaking it down into smaller related groupings will provide a better direction as to the more effective sort of deployment kits needed

Engineering Solutions Are Currently Obtainable

In answering the need for deployment kits that have ergonomic principles underpinning their design, Priority Care Emergency Management Systems have designed, tested and manufactured a range of kits which embody these concepts to minimize micro trauma. All Priority Care EMS products are subject to a rigorous and continuous improvement process. They are kept up-to-date and incorporate any innovations discovered while dealing with associated products.

Priority Care EMS kits have a profile that reduces the tension and stresses of those that large, over weight products in wide use today cause.

The kits are designed specifically to carry a reduced and task-related inventory of essential equipment and are set out internally in a set, logical and ordered manner.

These designs specifically address and resolve the following observed problems

- Specific gear placement minimizes weight from over-stocking and minimizes associated awkward twisting previously caused by search and select issues
- Shoulder is in correct lifting position
- No lateral pressure causing any distortion
- Weight is evenly distributed — alleviating skew stresses in the body
- Constructed in such a way as to maintain their ergonomic shape

Additional benefits incorporated in Priority Care EMS designed deployment kits include

Securing and easy identification of specifically chosen contents provides a well-organized and efficient kit. Ordering the components in priority of protocols following likely use makes Priority Care EMS system of internal organization highly functional for operations.

As materials used are fluid proof and they are able to be cleaned, if necessary de-contaminated, they make for safer use in operations a welcome benefit.

The kits are constructed to a very high standard which produces a highly durable product, meaning a long operational life. This factor must be considered as an investment over the longer term and there are additional potentials for economic savings for every Service. See Priority Care EMS White Paper Optimizing Use of Hard-won Budget Funds in Pre-hospital Emergency Services

Priority Care EMS deployment kits are designed with a vast degree of flexibility which means a service can configure layouts for particular uses to suit their own operational needs. One very valuable consequence of this flexibility is that Services are no longer locked into regimes, but may re-configure to meet changing needs without replacing kits



Priority Care EMS kits have a profile that reduces the tensions and stresses caused by the large, over-weight products in wide use

The adoption by any Service of Priority Care Emergency Management Systems deployment kits will not only address the hidden causes of Responder WMSDs and reduce the costs and pain currently caused in the course of everyday duties of EMS Responders; but come with additional benefits to improve spending efficacy of meager budget dollars.

Both OSHA and NIOSH have recorded indications of the bases of Responder WMSDs and provided recommendations for methods of alleviating them.

Some have been widely adopted and successfully used by Services to achieve better performance.

However many of the underlying causes remain unaddressed in general use, though practical solutions are now obtainable from a market leader.

Priority Care EMS deployment kits directly address the problems outlined by the authorities in the manner they recommend for permanent solutions.

Priority Care EMS products can assist Services to stretch their budgets, improve general performance and protect their most valuable resources from debilitating and non-productive injuries and compensation.

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Head

Neck

Shoulder

Elbow

Hip

Wrist

Knee

Ankle

NOW YOU HAVE A CHOICE!

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