Trunk strength profiles of rubber tyred gantry crane drivers

ED Watson
Centre for Exercise Science and Sports Medicine, School of Therapeutic Sciences, Faculty of Health Sciences, University of the Witwatersrand, Parktown, South Africa

Correspondence: Ms Estelle Watson, Centre for Exercise Science and Sports Medicine, Faculty of Health Sciences, University of the Witwatersrand, 2050. e-mail: estelle.watson@wits.ac.za

ABSTRACT
Rubber tyred gantry (RTG) crane drivers are at an ergonomic risk for developing low back pain (LBP) due to their working posture which involves an unfavourable flexed position. In addition, co-exposures, such as whole body vibration (WBV) and prolonged sitting, may predispose these workers to neck and back problems. The aim of the study was to develop a morphological profile of RTG drivers. A cohort of 43 male RTG crane drivers volunteered to participate in the study, each of whom completed a battery of strength tests, using an isokinetic dynamometer, and anthropometric tests. Findings indicated that the drivers were overweight, and had poor isokinetic extension-to-flexion strength ratios; both factors may place them at risk of developing LBP. No differences were found between the strength profiles of those drivers with histories of LBP and those without. Descriptive profiles were compiled, which provide a useful base for further research and risk-screening specific to this occupation.

Keywords: low back pain, crane drivers, isokinetic testing, isometric testing

INTRODUCTION
The high cost and prevalence of low back disorders is an ongoing problem in industrialised countries, with an estimated 70-80% of all adults experiencing low back pain (LBP) during the course of their lives. In the working population, LBP accounts for more than half of all musculoskeletal problems and represents 25-40% of all workers’ compensation claims in developed countries.

Although the cause of LBP is multifactorial, it is widely accepted that physical demands of work contribute greatly towards onset, recovery and recurrence of symptoms. Certain activities and occupational factors can predispose a worker to LBP. For example, activities that force the trunk into a non-neutral position, particularly if this position is held for a prolonged period of time, can increase disc pressure. Associations have been drawn between extreme or prolonged forward flexion and disc herniation. Hoogendoorn et al., found extreme trunk flexion to be a risk factor for LBP, particularly when the trunk was in a minimum of 60° of flexion for more than 5% of working time. In addition, co-exposure to whole body vibration (WBV) and prolonged sitting both increase the risk of developing LBP. Lis et al. showed that sitting, in combination with WBV and/or awkward postures, was associated with LBP. It is therefore unsurprising that rubber tyred gantry (RTG) crane drivers are at an ergonomic risk of developing LBP. Their working posture involves an unfavourable flexed position, and the prolonged, awkward, and sedentary postures may also predispose them to neck and back problems (Figure 1). The viewing demands dictate the crane drivers’ working postures, forcing them to look downwards for long periods of time.

In addition to occupational factors, trunk muscle strength and fatigability are risk factors for LBP. For example, decreased isokinetic muscle strength has been found to be associated with chronic LBP. LBP has also been associated with reduced trunk muscle endurance, especially in those who spend most of their working day in a sitting position. Therefore, assessing trunk muscle performance has become essential to provide insight into the strength and endurance capabilities of the back.

Various methods have been used to assess trunk muscle strength, yet there is currently no consensus on which test is optimal. Although it is not the most functional, isokinetic testing with the aid of a dynamometer is widely used, and has been shown to be a valid, reliable and reproducible method of testing muscle strength and function. Isokinetic testing in a semi-standing position, as a quantitative measure of trunk muscle strength, has also been found to be safe and effective. Isometric tests, or maximal voluntary contraction at a specific angle, also produce valid and reliable data on
muscle strength in a certain range of movements. In addition to strength, assessing spinal stability and its relevance for rehabilitation and management of LBP has become increasingly popular in recent years. Dynamic strength tests, as well as assessment of lumbo-pelvic mechanics, have been indicated for prevention, pre-screening and evaluation of LBP.

Anthropometric variables also play a major role in injury onset and recovery from LBP. Factors such as body mass index (BMI), waist to hip ratio (WHR), body fat percentage (BF%), and flexibility can not only affect performance in strength measures but may also increase the risk of developing a low back condition. Although LBP is affected by various factors, the physical and anthropometric variables are the easiest to quantify. Many of these risk factors can be curbed through effective interventions. An understanding of risk factors could help in rehabilitation that could help to manage an acute condition, and enable workers to quickly and safely return to work.

The aim of the current study was to describe anthropometric profiles, flexibility, trunk stability, and trunk strength (both isometric and isokinetic strength) of workers employed in this unique occupation.

METHODS
All 400 RTG drivers working at a port in the United Kingdom (UK), during the period March to June 2007, were invited to participate. Drivers were excluded if they had been diagnosed with any lumbar pathology (e.g. disc herniation) or conditions that could be aggravated by the testing (e.g. cardiovascular disease or orthopaedic injury). Only drivers that were asymptomatic at the time of testing were included. Eligibility was assessed through a questionnaire.

All testing was conducted by two trained rehabilitation specialists at the port’s Occupational Health Department. The anthropometric, flexibility, trunk stability and isometric measurements were performed on one day. The isokinetic strength test was performed five to seven days later, to allow for sufficient recovery.

All participants were asked to complete a questionnaire to determine employment and injury histories. Participants were categorised into two groups, based on their self-reported histories of LBP. Data on sick leave due to LBP were provided by the port’s Occupational Health Department.

Ethical approval for the study was obtained by the port’s Human Resource and Occupational Health Departments.

Anthropometric variables
Kinanthropometric variables were measured according to the ACSM guidelines, and included heights, breadths, girths, circumferences and skinfolds. These measurements were used to determine BMI, WHR, and BF%. Skinfolds were measured using Harpenden Calipers, according to the 4-site method suggested by the manufacturer and previously used by Durin et al.

Flexibility
A goniometer was used to measure range of movement in a straight leg raise test to determine hamstring flexibility, using the method described by Kendall.

Trunk stability
The trunk stability test (TST) level 1 was used to measure the trunk musculature’s ability to maintain a neutral spine during a dynamic lower limb movement. Participants were instructed to lie supine with knees flexed and feet flat on the plinth, with their hands approximately 2 cm medial to the anterior superior iliac spine. A standardised instruction was provided for the participants to find and maintain their neutral spine position. Participants were then instructed to tighten their abdominal muscles and bring their navel’s towards their spines. A pressure biofeedback unit (PBU) was placed under the lumbar spine and inflated to 40 mmHg, as a measure of neutral position. Each participant was instructed to maintain his neutral spine position, and then to lift his right foot approximately 1-2 cm off the bed, extend his leg and return to the start position, before repeating the movement.
with his left leg. The test was scored categorically: a “pass” was the ability to do the full movement whilst maintaining 40 mmHg pressure on the PBU, whilst a “fail” was an increase or decrease in pressure of more than 5 mmHg. Each participant was allowed five practise repetitions, and two tests were performed.

**Trunk strength**

Isometric strength was measured using a Biodex System 3 Isokinetic Dynamometer (Biodex Medical, Inc., Shirley, NY). The test was preceded by a four minute warm up on the Biodex upper body cycle machine. The warm up also included a supine pinformis and “cat-curl” stretch. A semi-standing lumbar extension test was completed at three different angles in the range of movement, viz. 105°, 120° and 135°. This testing position has demonstrated reliability levels of 0.81 – 0.92 and is used as a functional position for spinal testing.²⁹ Participants were instructed to maximally contract for 30 seconds at each angle, with a 20 second rest between each repetition.

The isokinetic testing was done on the same machine used for the isometric testing, and was preceded by the same warm up. A standard explanation of isokinetic testing was provided before each test. The machine was calibrated before each testing session. Each participant was allowed to complete five repetitions at 60°/sec, and one trial repetition for each of the other testing velocities, to familiarise himself with the test. The isokinetic lumbar extension/concentric/concentric test protocol was performed in a semi-standing position. The protocol included five repetitions at 30°/sec, 60°/sec, 90°/sec and 120°/sec, respectively, and 20 repetitions at 150°/sec, with a 20 second rest period between each set. This is a recommended protocol that is conducted in a comfortable, functional range of movements for the participant.

Previous studies in back testing have used peak torque as a measure of muscle strength.¹⁹ Peak torque in relation to body weight (PT/BW) is widely accepted as a valid and reliable measure due to the variation in testing between gender and body weight.³⁰ Mean PT/BW was calculated from the isokinetic concentric lumbar extension/concentric test by summing the values at each speed and dividing by 5. This particular testing protocol was chosen in order to measure the average performance deficit (APD). The APD method of data interpretation for the spinal muscles requires five testing speeds, making it a lengthy test to perform. However, the test has demonstrated high levels of reliability, and it uses a simple reference criterion of 100% as normal spinal function.³⁰ It is calculated using the average performance ratio (APR) from the isokinetic concentric test, using the formula described by Brown.³⁰ The mean ratio of flexor muscle strength to extensor muscle strength (FER) was calculated, using the APR for flexion divided by the APR for extension.³⁰

**Data analysis**

Data management and statistical analysis were performed using the Statistical Package for the Social Sciences (SPSS) version 10.0 software. Descriptive statistics were used to profile the data. Paired t-tests and ANOVA tests were conducted to determine statistical differences in the mean values between the two groups for parametric data, and the Mann-Whitney test was used for nonparametric data, with significance set at 95%.

---

**Figure 2. Absenteeism profile for RTG crane drivers: 1994 – 2003**

*Table 1. Comparison of anthropometric data in those with and without a history of LBP*

<table>
<thead>
<tr>
<th>Variable</th>
<th>All participants</th>
<th>History of LBP</th>
<th>No history of LBP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n =43</td>
<td>n =21</td>
<td>n =22</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td></td>
<td>27.0 (±4.4)</td>
<td>26.4 (±3.3)</td>
<td>27.5 (±5.3)</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>83.8 (±13.6)</td>
<td>81.7 (±12.9)</td>
<td>85.8 (±14.3)</td>
</tr>
<tr>
<td>Body fat (%)</td>
<td>25.1 (±6.0)</td>
<td>24.3 (±6.4)</td>
<td>25.9 (±5.6)</td>
</tr>
<tr>
<td>WHR (cm)</td>
<td>0.9 (±0.1)</td>
<td>0.8 (±0.1)</td>
<td>0.9 (±0.1)</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>90.9 (±13.8)</td>
<td>87.7 (±14.2)</td>
<td>93.9 (±13.1)</td>
</tr>
</tbody>
</table>

*Table 2. BMIs of RTG crane drivers according to the ACSM BMI Classification Criteria*

<table>
<thead>
<tr>
<th>BMI Classification Criteria</th>
<th>Total number</th>
<th>Drivers with history of LBP</th>
<th>Drivers with no history of LBP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=43</td>
<td>n=21</td>
<td>n=22</td>
</tr>
<tr>
<td>Underweight (&lt;18.50)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Normal range (18.50-24.99)</td>
<td>13 (30.2%)</td>
<td>7 (33.3%)</td>
<td>6 (27.3%)</td>
</tr>
<tr>
<td>Overweight (25.00-29.99)</td>
<td>22 (51.2%)</td>
<td>12 (67.1%)</td>
<td>10 (45.5%)</td>
</tr>
<tr>
<td>Obese Class I (30.00-34.99)</td>
<td>7 (16.3%)</td>
<td>2 (9.5%)</td>
<td>5 (22.7%)</td>
</tr>
<tr>
<td>Obese Class II (35.00-39.99)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Obese Class III (≥40)</td>
<td>1 (2.3%)</td>
<td>0 (0%)</td>
<td>1 (4.5%)</td>
</tr>
</tbody>
</table>
RESULTS

Figure 2 shows the absenteeism profile for RTG crane drivers, including days lost due to musculoskeletal conditions, from 1994 to 2003. A large proportion of days lost was due to LBP. Absenteeism due to LBP has been steadily increasing, disproportionately to the number of employees, over the last decade. This is despite innovations in ergonomics, such as new crane operator chairs designed to prevent back and neck pain. These unpublished data, sourced from the port’s occupational health records, showed that sick leave days due to LBP increased more than 4-fold, from 412 days in 1994 to 1908 days in 2003. LBP accounted for 55.8% of total absence for musculoskeletal conditions in 2003, compared to 37.0% in 1994.

Of the 400 questionnaires distributed, 108 (27.0%) were returned. Two drivers were excluded due to previous lumbar disc pathology. A total of 43 (39.8% of the 108) drivers volunteered to participate in the study. The remaining 63 drivers did not complete the testing battery due to lack of time or willingness. All the study participants were male and all were employed on a full time basis. The age of the drivers ranged from 25 to 56 years, with a mean age of 38.9 years (SD ±8.8).

Kinanthropometric profiles

The mean body mass index (BMI) of the 43 RTG crane drivers was 27 kg/m² (SD ±4.5). Twenty-one drivers (48.8%) indicated that they had a history of LBP. The mean ages for the drivers with and without histories of LBP were 36.4 (SD ±8.2) and 41.2 (SD ±8.8), respectively. The means and standard deviations for the various kinanthropometric variables, and the comparison of these data for drivers with and without histories of LBP, are shown in Table 1. Drivers with histories of LBP were younger and leaner than those without, although there were no statistically significant differences in any of these measurements between the two groups. A profile of the RTG crane driver’s BMI values, using the ACSM classification25 criteria, is shown in Table 2. Over half the participants (51.2%) were overweight and 7 (16.3%) were classified as obese Class I; one participant (2.3%) was in the obese Class III category. More drivers with a history than without a history of LBP were overweight (57.1% and 45.5%, respectively; p = 0.663); but fewer were obese Class I (9.5% and 22.7%, respectively; p = 0.318).

Flexibility

The mean hamstring range of motion (ROM) for all the drivers was 69.3º (SD ±14.0; range 92.0-17.5). The mean hamstring ROM for the group with a history of LBP was 70.1º (SD ±10.4) which was marginally greater than the group with no history (68.6º±16.9), i.e. drivers with histories of LBP were more flexible than those without, although the difference was not statistically significant (p=0.721). Both groups fell below the normal value of 80º as described by Kendall.27

Trunk stability

Eighteen drivers (41.9%) passed the trunk stability test (TST). Twelve of the drivers with no LBP history failed the test (54.5%), while 13 drivers with a history of LBP failed (61.9%). The difference was not statistically significant (p=0.122).

Trunk strength

Table 3 shows the isometric strength profiles of the drivers. Peak torque (PT) values remained similar for each angle, with a slightly higher PT generated at 135º. All values were 14-20% lower than normative data. The isokinetic trunk strength data are shown in Table 4. The drivers’ APD scores showed a 33% and 24% deficit in muscle function for extension and flexion, respectively, which is significantly below the reference criterion of 100% for normal spine muscle function. The mean flexion-to-extension ratio for the drivers
was 0.56. The mean PT normalised to body weight (PT/BW) for the drivers was expectedly higher at slower speeds, and lower at faster speeds. Torque production in extension was greater than flexion, in accordance with the hierarchy of extension torque greater than flexion found in the normative data.30 According to the normative data available for this age group, the extension PT/BW should be 112-118%, and 94-99% for flexion.30 For mean extension strength throughout the five speeds, 11 drivers (25.6%) produced less torque than normal, five drivers (11.6%) were within the normal range, and 27 drivers (62.8%) produced more torque than normal. For mean flexion strength, 39 drivers (90.7%) were below normal, two (4.7%) were within the normal range for their age group, and two (4.7%) produced above average strength values. Drivers without a history of LBP had better isometric strength at 120°, and a higher FER, than those with a history of LBP (Table 5), although these differences were not statistically significant.

**DISCUSSION**

To the author’s knowledge, this study is the first of its kind to investigate morphological variables and strength in RTG crane drivers. Studies have indicated that crane driving can increase the risk for LBP due to a variety of occupational factors.11,32,33 RTG crane driving is not an exception, although little research has been done in this area. Anthropometric and strength profiles can provide useful information for occupational pre-screening, to determine strength deficits prior to starting a job, as well as to evaluate a worker after injury for a safe return to work.

Burdorf and Zondervan33 showed an elevated prevalence of LBP amongst crane drivers. Similarly, port machine operators have been found to have a significantly higher incidence of low back symptoms when compared to other occupations.11 Therefore, the high prevalence of LBP history in this population was unsurprising. However, a history of LBP did not significantly affect the drivers’ strength performances, although it was expected that strength performance would be lower in those with a history of LBP. The equality in functional performance could be explained by the fact that all drivers were asymptomatic at the time of testing. The relatively young age of those with a history of LBP may, however, be a cause for concern. Although not statistically significant, the mean age of the group with a history of LBP was 36 years compared to 41 years for those without a history. There is strong evidence in the literature to suggest that a history of LBP is the single, most consistent predictor of future back pain, and work loss. Specifically, history of frequency, duration of attacks, leg pain, surgery and previous sickness absence, are strong predictors of future LBP.34

The high proportion of crane drivers with a history of LBP and their relatively young ages strongly justifies the implementation of interventions of prevention and education for low back care. Such interventions may also help to reduce absenteeism due to future episodes of LBP, which has major cost implications, such as loss in production and sickness pay, and costs associated with staff turnover and compensation claims. Burdorf and Hulshof,35 in a systematic review, estimated that workers lost approximately 47 weeks of their working life (2.5%) due to sick leave from LBP, highlighting the burden and cost implications of LBP.

Our findings showed that the majority of RTG crane drivers were overweight, according to the ACSM’s BMI classification, and their mean BF% was borderline for obesity.28 It is hypothesised that pressure on the spinal structures increases with increased BMI,24 and BMI may play a role in systemic chronic inflammation,26 increasing the risk of developing LBP. In addition, there is evidence that serum lipid levels may block the blood supply to the lumbar region.37 However, the role of body weight in the development and recurrence of LBP remains controversial. Noorloos et al.38 found no increased risk of LBP in workers with a high BMI, but a recent meta-analysis by Shiri et al.36 showed that overweight (BMI ≥25 kg/m²) and obesity (BMI ≥30 kg/m²) are associated with an increased risk of LBP. The RTG crane drivers’ BMI measures were not dissimilar to other studies of port and shipyard workers,11,39 suggesting that workers in these occupations tend to have relatively high BMIs, possibly due to the sedentary nature of their work. Although the association between BMI and LBP is controversial, interventions should be put in place to educate these workers, regarding cardiovascular and other disease risks associated with high BMI.

### Table 4. Isokinetic trunk strength of RTG crane drivers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Extension (Max)</th>
<th>Flexion (Max)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT/BW (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120°</td>
<td>242.9 (±28.1)</td>
<td>242.9 (±28.1)</td>
<td>0.955</td>
</tr>
<tr>
<td>105°</td>
<td>242.9 (±28.1)</td>
<td>242.9 (±28.1)</td>
<td>0.955</td>
</tr>
<tr>
<td>FER</td>
<td>0.56 (±0.11)</td>
<td>0.56 (±0.11)</td>
<td>0.397</td>
</tr>
</tbody>
</table>

### Table 5. Comparison of trunk strength between drivers with and without histories of LBP

<table>
<thead>
<tr>
<th>History of LBP</th>
<th>PT/BW (%) at 105°</th>
<th>PT/BW (%) at 120°</th>
<th>PT/BW (%) at 125°</th>
<th>APD (Extension)</th>
<th>APD (Flexion)</th>
<th>FER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100.4 (±10.3)</td>
<td>120.3 (±10.1)</td>
<td>106.4 (±10.3)</td>
<td>41.8 (±30.5)</td>
<td>24.9 (±15.4)</td>
<td>52.6 (±8.6)</td>
</tr>
<tr>
<td>n=21</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>n=22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Comparison of trunk strength between drivers with and without histories of LBP

<table>
<thead>
<tr>
<th>Variable</th>
<th>History of LBP</th>
<th>No history of LBP</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT/BW (%)</td>
<td>101.4 (±0.3)</td>
<td>101.0 (±0.27)</td>
<td>0.964</td>
</tr>
<tr>
<td>PT/BW (%)</td>
<td>120.2 (±3.1)</td>
<td>120.1 (±12.35)</td>
<td>0.353</td>
</tr>
<tr>
<td>PT/BW (%)</td>
<td>106.4 (±28.1)</td>
<td>106.9 (±30.3)</td>
<td>0.959</td>
</tr>
<tr>
<td>APD (Extension)</td>
<td>41.8 (±30.5)</td>
<td>42.9 (±28.2)</td>
<td>0.065</td>
</tr>
<tr>
<td>APD (Flexion)</td>
<td>24.9 (±15.4)</td>
<td>28.2 (±14.8)</td>
<td>0.136</td>
</tr>
<tr>
<td>FER</td>
<td>52.6 (±8.6)</td>
<td>58.9 (±11.5)</td>
<td>0.004</td>
</tr>
</tbody>
</table>

**References**

In addition to the high BMI scores, the RTG crane drivers also had reduced hamstring flexibility. Normal hamstring length permits hip joint flexion towards the pelvis, and reduced flexibility of the hamstrings may alter lumbo-pelvic mechanics, thereby reducing the musculature’s mechanical efficiency in the area, and increasing the risk of developing LBP. Mechanical efficiency of the lumbar area is also largely dependent on the stability of the pelvic region. In this study, the majority of drivers were unable to sustain a neutral pelvis for a very short period of time. There is much evidence for the preventive and therapeutic application of deep abdominal strengthening to improve spinal stability for LBP. An increase in spinal stability during tasks that load the spine is essential for spinal mechanics and to prevent LBP. Therefore, the results of this study show that a preventive intervention to improve spinal stability may be particularly important for this occupational group where the spine is loaded throughout the working day.

The relationship between trunk muscle strength and LBP remains a mystery. Some studies have shown that reduced muscle strength may be a risk factor for LBP. Whether the decrease in strength is a predictor or a result of LBP remains to be determined. The RTG crane drivers produced similar results to the normative data available for extension strength, but showed deficits in flexor strength. Despite many studies showing that LBP is associated with a loss in trunk muscle strength, there were no statistically significant differences in trunk muscle strengths between the groups with and without previous LBP. This is consistent with a study by Lee et al. who found no difference in peak torque values in patients with LBP compared to controls. However, the same study demonstrated a significantly lower extension-to-flexion ratio in those with LBP. The normal extensor to flexor ratio is 1.2 – 1.5, and has been documented as 1.0 due to a loss of extensor strength for patients with chronic LBP. Ripamonti et al. and other studies have found variations of 0.59 – 0.67 in both healthy subjects and those without LBP. Similarly, the RTG crane drivers had a very poor mean FER, demonstrating a significant deficit in the flexor muscle group, which may place them at risk for developing LBP. The weak flexor musculature, coupled with poor spinal stability in these drivers, present a biomechanical deficit that indicates a need for trunk strength testing and exercise prescription to form part of routine assessments.

A limitation of the study is the poor response rate. Only 27% of the workforce responded to the questionnaires, and of that group, only 40% attended the testing sessions. This may have been due to the lengthy nature of the tests (testing was done over two days), and that the tests had to be completed in the drivers’ own time.

Another limitation is that the testing protocol lacked eccentric strength measures. Large imbalances in concentric versus eccentric strength have been found in patients with chronic LBP. Eccentric testing provides a more detailed view of the muscles’ functional relationships and would have been particularly pertinent for the RTG crane drivers’ ergonomic positions. All the drivers who participated in the study were asymptomatic, which may explain why the results did not elicit the magnitude of deficit found in previous studies.

This study provides a good descriptive profile of RTG crane drivers that can be used for future risk profiling or preventive programmes. It highlights the need for education and intervention programmes aimed at general health (lowering BMI) and low back care. Further studies to identify risk factors for LBP in crane drivers will lead to effective future pre-screening and preventive back-strengthening interventions.

CONFLICT OF INTEREST
None declared.

LESSONS LEARNED
• RTG crane drivers are overweight and have a poor extension-to-flexion ratio, which may predispose them to low back pain.
• RTG crane drivers demonstrated weak flexor muscle strength and poor spinal stability, factors which should be routinely assessed.
• Educational and intervention programmes should be implemented to reduce BMI and improve lumbar strength.

Mobile Occupational Health Services

We provide the solution to maximise productivity.
On Site Mobile job specific and risk driven medical surveillance throughout South Africa and neighbouring countries.
Static clinics/Five audio units and two X-ray units.

We offer: the following services:
• Full medical examinations
• Working on heights medicals
• Large chest X-rays digital or conventional
• Audio-meter and lung function tests
• HIV/AIDS tests
• Submissions of occupational diseases
• Biological monitoring
• Wellness

Contact details:
Head office
Sr Noleen Ackermann: 083 631 6188
Daleen Erasmus: 083 529 0566
Gauteng branch:
Pierre Ackermann: 083 632 9853
KZN Branch:
Ria Mentz: 083 647 5488
Website: www.ohscare.co.za
B-BBEE Contributor: Level 2 & Value Adding

OHS CARE

Occupational Health Southern Africa www.occhealth.co.za
REFERENCES
