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Routine drug and alcohol test in a large maritime container terminal in Costa Rica

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Abstract

Introduction: The medical clinic in Costa Rica's Moín Container Terminal, is staffed by three or four doctors and a nurse on rotating shifts, and open around the clock for visits from the dockworkers. The aim was to investigate the characteristics of workers who are referred for drug and alcohol test in the medical clinic over a 5-month period due to suspicion of abuse.

Methods: Anonymous patient records from the medical clinic were analyzed. Of a total of 3050 visits to the clinic (n=673) were selected be tested for doping (ICD-10 Z03.6).

Results: The number of seafarers found positive for alcohol was n=2 (0.3%) and n=31(4.6%) positive for drugs. Other reasons to visit the clinic were mostly diseases of the musculoskeletal system, abnormal clinical and laboratory symptoms, injuries, and diseases of the digestive system.

Conclusion: The number of seafarers found positive for alcohol and drugs were low but still of importance for the safety in the harbor and for driving home. Relative risks in the different work tasks could not be carried out due to lack of information of the distribution of the population in the work tasks. Inconsistency in the coding system complicates analysis, that could be improved by a dropdown menu in the digitalised registration system to prevent errors.

Keywords: Shipping; drugs; alcohol; epidemiology; container; transport.

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Introduction

The approximately 1.5 million seafarers together ensure that essential household items – TVs and PCs are brought via sea to the ports [1]. A well-functioning port sector is a prerequisite for efficient transport and is thus an important factor for continued growth. What the ports have in common will be that they will be put under pressure by increasing demands for effective cooperation between the various actors in order to be able to handle goods and ships quickly and cheaply with a stable high quality. [2] A well-functioning port sector is a prerequisite for transport, and it is thus an important factor for continued growth. Thus, the efficiency and good health of dock workers also become decisive for transport in a global perspective [3,4]. The worldwide shipping company, AP Moller - Maersk operates one of the world's most extensive port networks, of which the newest Moín Container Terminal (MCT), is built on an artificial island off the Caribbean coast of Costa Rica [5]. Terminal operation started in February 2019, MCT as one of the most efficient ports in Latin America with around 1000 employees.

Since dock workers work around the clock with heavy loading cranes and tractors, they must constantly be in excellent physical and mental condition [6,7]. For that reason, MCT maintains its own medical clinic located within the terminal area that is open for service 24/7. As far as we know, no other port has ever investigated the type of alcohol and drug problems presented at the clinic. We are investigating the port workers' use of the medical

clinic at MCT with a view to drug and alcohol problems as a means of improving the quality of the port's functioning.

The aim was to identify the socio-demographic and clinical characteristics of patients who visited the outpatient clinic specifically for possible drug and alcohol problems during an 8-month period. We conducted a descriptive study for drug and alcohol testing based on patient records of all visits to MCT's medical clinic during the first 8 months of 2021. In a previous study we reported the use of medical care by dock workers ((8)), while here we report the use of the medical clinic for routine drugs- and alcohol tests in the maritime container terminal in Costa Rica during the same period. We discuss the use of such data in relation to prevention and the development of a systematic clinical database.

Materials and methods

In the province of Limón on Costa Rica's Caribbean coast, Limón is one of the country's most important port cities with approximately 98,848 inhabitants, which since February 2019 hosts the Moín Container Terminal (MCT). The clinic receives patients every day of the week at all hours of the day and registers approximately 4,500 visits in 12 months.

The staff at MCT's medical clinic consists of four doctors who share three shifts from Monday to Sunday, and a part-time nurse who works from Monday to Friday. To offer round-the-clock coverage, MCT's rotating shift pattern entails three 8-hour shifts, normally (I) 06:00–14:00, (II) 14:00–22:00 and (III) 22:00–06:00. A Red Cross driver and a paramedic are on hand during each shift to assist with transfers and emergencies.

Inclusion criteria

The studied population consisted of n= 3050 dock workers who visited the clinic, from 1 January to 31 August 2021, at least 1 or more times. The n=1749 patients who visited the clinic two or more times were excluded in the frequency analysis of the variables. The 1301 included in the frequency analyzes cover the outpatients who at least once sought help for a medical problem or to be tested for drugs or alcohol.

Measures

All patients are interviewed by the nurse and/or attending physician immediately after arrival at the clinic, and all information is coded in accordance with the clinic's data registration system.

In total, twelve variables are recorded in the clinic for each patient in a pre-designed Excel sheet: date, week, gender, age, time of day, attending physician, rotating shift (i.e., I, II or III), labor department, patient's position, ICD-10 diagnosis group, disease name, the presented medical problem, treatment, and follow-up plan. Fatal injuries are excluded, and all personal data is deleted from the analysis. For drug and alcohol testing, we used ICD-10 code Z03.6, Observation of a suspected toxic effect from an ingested substance.

The kit used for the drug analysis tested for 6 different substances, i.e., marijuana, ecstasy, cocaine, amphetamines, benzodiazepines and, morphine/opioids. It contains qualitive control checks to verify if the urine sample was adulterated to detect false negative results.

Statistical analysis

The collected data were analyzed using SPSS version 28.0, coded into categorical data, and presented in tables in this article. Descriptive statistics were used to identify characteristics of the data to calculate the percentage distribution of the clinical variables related to demographics, work area, and job duties.

Protection of personal data

Costa Rica is currently in the process of reforming data protection law based on the European GDPR model. All data is handled in accordance with Costa Rican legislation in this area, corresponding to the EU's General Data Protection Regulation (GDPR) model. All potentially personally identifiable information in the data was removed, with data aggregated to a level where all patients are anonymous and cannot be identified as individual patients. Such statistical information is not covered by the GDPR [8].

Results

The total group of 1302 different patients included 3050 visits to the clinic from 1 January to 31 August 2021 of. Of these, 12.1% were women and 87.9% were men; Of the 1302 patients who visited the clinic 1 time or more, (64.1%) (n=834) were referred for random screening for drugs and alcohol according to ICD-10 Z036 (i.e., observation of a suspected toxic effect from an ingested substance).

Table 1. The main job groups and their ICD-10 group diagnostic codes.

ICD-10	Tractor (1)	°	Crane (2)	°	Stevedores (3)	°	Other	°	Total	°
Z036 (4)	117	54.2%	178	79.5%	166	84.3%	488	73.4%	834	64.1%
M00-M99(5)	19	8.8%	16	7.1%	5	2.5%	54	8.1%	93	7.2%
R00-R99(6)	16	7.4%	10	4.5%	6	3.0%	48	7.2%	80	6.1%
All other	64	29.6%	20	8.9%	20	10.2%	73	11.0%	210	16.1%
Total	216	100.0%	224	100.0%	197	100.0%	661	99%	1301	100.0%

(1) Tractor drivers **(2)** Crane operators **(3)** Stevedores operate on board the ships **(4)** Observation of a suspected toxic effect from an ingested substance **(5)** Abnormal clinical and laboratory symptoms **(6)** Diseases of the musculoskeletal system.

The most frequent job categories registered for testing for doping ICD-10 Z036 (i.e., observation of a suspected toxic effect from an ingested substance) were crane operators (n=178/224, 79.5%) Stevedores (n =109/140, 77.9%), terminal tractor drivers (n=117/242, 59.1%) and other jobs (n=488/661, 58.5%) Table 1.

Sub-Analysis of the ICD-10 Groups

The top ICD-10 codes among the 384 patients who did not visit the clinic for alcohol and drug screening were diseases of the musculoskeletal system (n=93/384, 24.2%) Abnormal clinical and laboratory symptoms (n=71/384, 18.5%) and Injuries, poisoning of external causes (n=50/384, 13.0%) Table 2. Problems with the musculoskeletal system were primarily back pain (36.1%), muscle contracture (30.2%) and headache (25.3%).

Table 2. Distribution of ICD-10 codes due to other reasons than drug and alcohol test.

ICD-10 Code	Description	n	%
M00-M99	Diseases of the musculoskeletal system	93	24.2%
R00-R99	Abnormal clinical and laboratory symptoms,	71	18.5%
S00-T98	Injuries, poisoning of external causes :	50	13.0%
K00-K93	Diseases of the digestive system:	32	8.3%
Z042	Examination and observation following work accident.	25	6.5%
J00 -J99	Diseases of the respiratory system:	18	4.7%
G00-G99	Diseases of the nervous system	14	3.6%
H00-H59	Diseases of the eye and its annexes:	13	3.4%
A and B	Infectious and parasitic diseases	12	3.1%
H60-H95	Diseases of the ear and mastoid process:	11	2.9%
U072	COVID-19 Virus not identified	10	2.6%
N00 -N99	Diseases of the genitourinary system:	9	2.3%
L00-L99	Diseases of the skin and subcutaneous tissue	8	2.1%
F01-F99	Mental and behavioral disorders:	7	1.8%
V01-Y98	External causes of morbidity and mortality	6	1.6%
I00-I99	Diseases of the circulatory system	4	1.0%
U12	COVID-19 vaccines causing adverse effects	1	0.3%
	Total	**384**	**100.0%**

Sub-Analysis of the results of the drug/alcohol test

In all, n=673 seafarers were tested for drug/alcohol. Number of seafarers found positive for alcohol was n=2 (0.3%) and n=31(4.6%) of those tested for drugs were found positive. We do not have the details of which type of drugs were used, but we do know that in Costa Rica the main drug use prevalence is marijuana, cocaine, and crack-cocaine.

Discussion

We report the clinical data from a medical clinic located inside a large maritime container terminal in Costa Rica, which is known to be the first report of its type. Among key findings, 62% of patients were 30-49 years old, 97.7% were from Costa Rica, and the most frequent reason for visits was alcohol and drug screening (64%), while all other reasons were within a wide range of conditions in ICD-10 reported previously [8] We do not have the details of which drugs were positive, but we do know that in Costa Rica the main drug use prevalence is marijuana, cocaine, and crack-cocaine.[10]

Direct relationship between the profession as a dock worker and low back pain

Musculoskeletal disorders occur frequently among dock workers. According to the National Insurance Institute of Costa Rica, from 2007 to 2008, lower back pain was the most frequent cause of disability among port workers over 45 years of age [9]. For workers, the use of NSAIDs (e.g., diclofenac) to treat such pain reduces the number of days they are unable to work. In one study, workers without work-related musculoskeletal disorders had significantly higher scores for quality of life than for functional ability, physical and social aspects, pain and vitality [9].

On this topic, obtaining an appropriate pre-employment evaluation is critical to prevention in the workplace. Another preventive strategy is to perform routine risk assessments of the workplace and replace non-ergonomic machines, including the seats on the terminal tractors. Osteoarthritis and other causes of musculoskeletal pain can be superimposed on occupational diseases, thereby making it difficult to diagnose an occupational disease or injury secondary to an occupational accident. In Costa Rica, vocational assessments are usually short and lack scientific rigor. Doctors should be trained in occupational medicine, have knowledge of risks in the workplace and report any occupational disease to the insurance company [12].

Observation of suspected toxic effects of drug ingestion (i.e. doping)

Doping, or ICD-10 code Z036 (ie observation of a suspected toxic effect from an ingested substance), was by far the most common condition in the sample (n = 834/1301) patients, 64.1%). A sub-analysis of the most frequent job categories, selected for testing - that is, terminal tractor drivers (n = 117), crane operators (n =178) and stevedores (n = 166) - showed that respectively 54.2%, 79.5% and 84.3% of their visits to the clinic were for drug and alcohol screening. In a similar study of 232 dock workers in Rio Grande do Sul, Brazil, 29 reported using illicit drugs [11]. These results are relevant because this group of employees handles powerful machines with a high risk of causing injury to people and other machines that are close to them. Another study with random testing of workers for doping has been shown to significantly reduce the risk of occupational accidents [11].

Sea transport with containers represents another serious problem surrounding the transport of illegal narcotics from South America. Various publicly available sources suggest that the estimated number of narcotics shipments initiated per month varies from 4 to 72, and at any given time two to four ships of all types are transporting illegal narcotics on the high seas. In response, the United States continues to invest significant efforts in detecting and preventing drug-trafficking vessels in the Caribbean and Eastern Pacific [12]. Regarding drug screening, the average value of each test and what it represents in terms of financial and time burden to the clinic they represent should be investigated to support the use of such tests or guide how they should be used. In the sub-analysis of the results: This is an important subject for further investigation in the future.

Limitations and directions for future research

Our analyzes included all patients who visited the clinic during the 8-month observation period. Only one visit from each patient is included, which gives an estimate of the differences between the different reasons for the visit, drug and alcohol tests compared to visits due to illness in the job groups. As we do not know the number of people in the various job groups, we cannot estimate the relative risk of being referred for alcohol and drug testing. by, for example, driving dangerous machines under the influence of drugs and alcohol [13].

Another limitation was that the accuracy of the entered data was not confirmed, which poses a risk because human errors can occur when filling in the rubrics in patient records. The inaccuracy is a big issue when we analyze the results. A digital solution can help to get better results, for instance, an electronic health record.

We know that the implementation of new electronic health services is often not sufficiently financially incentivized, that has to be taken into consideration since it helps to make better decisions out of the data and

eventually adds more security for the storage of information [16].

A further uncertainty arises from the fact that most of the diagnoses are based on clinical assessments without laboratory or clinical tests to support the diagnosis made.

Cost-benefit calculations

Large workplaces, schools, military, and prisons, for example, often have health clinics inside the institutions to help injured and sick people without leaving the workplace.

In the transport chain of goods from ship to port to road transport, the medical emergency in the port plays a key role, saving time in shipping, but also to provide good and free treatment to the workers. Having a medical clinic in the workplace means that employees do not have to spend time leaving the workplace and, in most cases, can come back to the workplace and continue working. Fast loading and unloading of the containers without stopping the work process is important for the shipping companies to remain competitive on the transport market.

Future studies should include knowledge of the number of workers at the specific work tasks to assess the relative risks in the job groups, e.g., drug testing. In addition, preventive intervention studies should be carried out, which make it possible to assess the pattern of the most common complaints and the most frequent pathologies, as well as how implemented changes to the flexibility of drug testing can affect the statistics.

Conclusions

This study contributes to the current understanding of the need for clinical screening for drugs and alcohol among dock workers in large maritime container terminals. Two-thirds of the visits to the clinic by dock workers were for alcohol and drug screening, which means that attention to the use of illegal drugs among dock workers needs to be intensified. Our findings provide evidence for the need for further research on the topic and to guide the treatment of individuals to improve occupational safety, productivity, and the overall health of the workforce. Calculation of the relative risks for the use of drugs and alcohol proved to be impossible due to a lack of knowledge about the size of the risk groups in the job categories but should be included and used in future studies. We also observed a lack of systematicity in the coding system, which complicates the analysis with the risk of miscalculations. To prevent errors, it is recommended to have drop down menus in the digitized registration system. In addition, there is a lack of good data to carry out a cost-benefit analysis, which can be recommended.

Highlights

What Is Already Known?

As far as we know, no other port has ever investigated the type of alcohol and drug problems presented at the workplace clinics.

What Does This Study Add?

We are investigating the port workers' use of the medical clinic at a container terminal with a view to drug and alcohol problems as a means of improving the quality and safety of the port's functioning. We observed a lack of systematicity in the coding system, which complicates the analysis with the risk of miscalculations. To prevent errors, it is recommended to have drop down menus in the digitized registration system. In addition, there is a lack of good data to carry out a cost-benefit analysis, which can be recommended.

Authors' Contributions

Both authors contributed to the conceptualization and design of the study and performed quantitative data analysis. Both authors have read and accepted the published version of this manuscript.

Statement from institutional audit committees

Not relevant.

Declaration of informed consent

Not applicable.

Statement on data availability

Data is available in MCT's medical clinic. Specific requests can be sent to the corresponding author.

Conflicts of interest

The authors declare no conflicts of interest.

Ethics approval

N.a

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Consent For Publication

The Publisher has the permission from the Authors to publish the Work.

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None

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