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Original Article

A Tool for Economic Assessment of Ill Seafarers Repatriations

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Abstract

Background: Seafarers, in case of illness, should be repatriated at the expenses of the ship owner, but very little is known about the cost of the repatriations. The main purpose of this study was to develop a model to assess the economic burden of seafarers' repatriations due to illness and/or accidents.

Method: The model used the micro costing "the local approach." The tool was tested with one case study. The team collected and analyse data from the Danish Maritime Authority (DMA) about the case study seafarer profile, diagnosis, country or place of medical treatment and cost of procedures.

Results: The total average cost for the case study seafarer amounted to around 180.000 \$. If we take into consideration that about 10.000 seafarers are evacuated every year the losses inflate to about an estimated total of 2 billion \$ for the shipping industry per year.

Discussion: The local approach method can be applied in the shipping industry. It revealed a substantial burden due to illness for the industry. As the employers and in this case the shipping industry strives to achieve cost reduction and maximum efficiency in all times, it is crucial to know how much the economic cost of evacuating and repatriating seafarers is. This shows the importance of the good quality health services. Therefore it is very crucial to strengthen prevention and organisation of integrated care for seafarers.

Keywords: micro-costing approach, local approach, seafarers, method, direct, indirect costs

Introduction

Maritime transportation is an essential and cost-effective way to move goods around the globe since more than 90% of all goods are moved by ship. A recent report by Oxford Economics showed that shipping is very important for the global economy. In European Union alone the direct added value of shipping industry to the economy amounted to 57 billion € in 2016. The shipping industry directly employed 640.00 people. With an average productivity of 89.000 € per worker, the shipping industry was above other sectors of the economy such as health care and manufacturing. If we take into consideration that there are about 1.5 million seafarers globally we get an idea of how important their contribution is (Oxford Economics 2017).

Behind this success story there are people who work day and night to make this happen. International Organizations including WHO (2006) and the International Maritime Organization (IMO 2010) point out that people are the most valuable input within an organisation because through working efforts they create wealth and help in the development of this organization.

To work and create wealth the workforce should be healthy. But what happens in case of illness? According to the International Labour Organisation, the Maritime Labour Convention 2006 states that in case of illness seafarers should enjoy the same quality of care as the citizens on shore and further must be repatriated at the costs the employer.

Immediate response to seafarers' health problems is crucial and has been saving lives. To ensure their good health the respective services are organised in four main pillars (Jensen 2010).

- a) Pre-service fit-for work certificate
- b) Trained caretakers on board
- c) Tele-medical services in cooperation with the respective national emergency services
- d) Early diagnosis and prevention of chronic diseases (hypertension, diabetes, obesity)

More specifically, all seafarers undergo health examinations every other year as a prerequisite for employment on board. In case of illness on board the seafarer shall first contact the designated caretakers on board, who attended mandatory training courses and are able to provide medical first aid functions. They can ask the telemedical services (TMAS), which operate in several states across the globe, for medical assistance (Stoloff et al. 1998). In case of emergency the TMAS may advise hospital admission via ship deviation to the nearest port or evacuation by boat or helicopter.

After the hospitalisation and treatment a health evaluation takes place. This may show not-fit-for work then the seafarer has the right to be repatriated at the expenses of the ship-owner. (Carter et al. 2104). In addition the sick seafarer is entitled to compensation according to the flag state rules and regulations (IMO 2006)

Repatriation is not uncommon though very low, and according to Abaya et al. 2015, 1.7% of deployments end with repatriation. Similar results were found by Lefkowitz et al in 2015. Abaya et al. using data from the Philippines pointed out that cardiovascular system problems, dermatological issues and infections are all causes for repatriation and account for respectively 8.1%, 5.6% and 3.6% of all repatriations. The two major causes of repatriation are injury/accident and musculoskeletal disorders representing 21.4% and 19.1 % of all medical repatriations. Injuries, accidents and musculoskeletal disorders formulate a broad category of incidences and as they encompass a lot of parameters are out of the scope of this study.

As the employers and in this case the shipping industry strives to achieve cost reduction and maximum efficiency in all

times, it would be relevant to see how much the economic cost of evacuating and repatriating seafarers is (Delcin Faurby 2017).

Even though methods to estimate the cost of illness are widely used in health services, so far none of them has been used in the maritime field. In general, such calculations are mainly based on direct and indirect costs. In the case of shipping, estimations should take into consideration health care costs including, helicopter transfer and hospitalisation expenses as well as indirect costs including replacement, compensation and lost productivity (Andrioti et al. 2017).

Designing of a model approach will help us understand which variables should be included to achieve better responsiveness (Gavious et al. 2009). This study aims at a) developing a methodology to assess the economic burden of seafarers' repatriations due to illness and/or accidents and b) implementing it using summary data

Methods

Costs, represent the value of the resources used (Drummond 2007). Several methods exist in the literature to assess the burden of a disease, which fall into the two most used methods:

The macro or "top-down" approach uses aggregate data and statistics to show how a disease burdens the whole society and the micro- or "bottom-up" approach based on surveys in organizations to obtain an estimate of average cost by industry sector. However, none of these have been used in the maritime environment.

Additionally, the shipping sector is more complicated if we take into consideration the different size and type of ships, the different routes and costs they face and the different number of their employees with various backgrounds.

Therefore the team used a type of micro-costing approach the so-called "local" approach for implementation in the various shipping environments. It is based on local (in company) data collection to obtain direct and indirect costs that are company specific (Jallon et al. 2011).

Estimations are more accurate when using direct and indirect costs. In health economics, direct costs are all resources that are consumed in the provision of a health intervention including hospitalization, pharmaceuticals and salaries of the health professionals. In general there are routine available data for these parameters.

Direct costs may be incurred by the health services, the community or the clients (Drummond 2007). This study examines the ship owner point of view.

Indirect costs are all the other costs, which cannot be accurately attributed to specific cost objects. These types of cost include diminishing production, overtime and increased employee turnover, losses and time spent managing the case. They are commonly called "indirect costs."

Most of the times they are not routine data available either because there are difficulties in calculation or because they are not considered as costs by the managers. These costs, being "hidden," are difficult to evaluate, isolate, identify, and quantify (Jallon et al. 2011).

One should also mention that there are some other costs that are called intangible costs and have to do with lower corporate image, reduced employee engagement, motivation and morale. These are even

more difficult to quantify and are out of the scope of this study (de Greef et al. 2015).

Designing of a model approach will help us understand which variables should be included. Furthermore, the formula should be comprehensive so as to capture all the relevant cost parameters and at the same time flexible, reliable, easy to implement and low time consuming for the shipping company.

More specifically in the maritime sector the direct costs of occupational injuries and illnesses include evacuation costs, medical and hospitalization expenses for the affected employees. The indirect costs include replacement, compulsory insurance pay, rerouting fuel, and charter loss penalties.

The team collected the above mentioned data on cost parameters from the Danish Maritime Authority (DMA). Where this was not possible (i.e. replacement and productivity costs), the relevant data were collected via a scoping review (Henny et al. 2013). In addition, estimations were made with regards to travel expenses and daily allowance (Table 1).

The method was implemented in a case study (Pilipino seafarer serving as second engineer on a Danish ship diagnosed with acute ischemic heart disease) to gain insight with regards to its responsiveness (Annex).

Table 1. Cost component for the shipping industry, based on the Danish context

Cost category	Data source
Transportation costs	DMA
Health and rehabilitation costs	DMA
Compensation costs	DMA
Replacement costs	Henny et al. 2013
Productivity costs	Henny et al. 2013
Employers liability compulsory insurance	Henny et al. 2013
Rerouting	Henny et al. 2013

Case study formula implementation:

Taking the above analysis into consideration from the employer point of view the total average costs for the case study are defined in US dollars (Table 2):

$$\text{Total average cost} = C_{\text{direct}} + C_{\text{indirect}}$$

$$\text{Case study total average cost} = 152,000 + 32,094 = \$184,094 \text{ (€168,433)}$$

More specifically: **Direct costs include:**

$$C_{direct} = C_{evacuation\ cost} + C_{hospital\ cost} + C_{hrh\ salaries} + C_{medications} + C_{transfer\ home} + C_{compensation}$$

Where:

$C_{evacuation\ cost}$ = the helicopter cost (transfer from the ship to the hospital)

$C_{hospital\ cost}$ = the hospitalisation cost for 10 days

$C_{hrh\ salaries}$ = the health professionals salaries

$C_{medications}$ = the cost of pharmaceuticals

$C_{transfer\ home}$ = the cost of repatriation and the accompany doctor

$C_{compensation}$ = the compensation expenses to the seafarer according to the Danish standards

Indirect costs: $C_{indirect} = C_{recruitment} + C_{productivity\ loss} + C_{insurance\ premiums}$

Where:

$C_{recruitment}$ = the cost of recruiting a new employee via a manning agency and training

$C_{productivity\ loss}$ = the cost for any productivity losses, damage of goods, overtime

$C_{insurance\ premiums}$ = the cost of insurance

The analysis showed that for just one case (one sick employee) the shipping company had average losses of about 184,172 \$. If we take into consideration that about 10.000 seafarers are evacuated and repatriated every year the losses go up to an estimated total of \$ 2 billion per year.

Discussion

Seafarers are a hard to reach population group and they face some challenges with regards to their health in comparison with other groups of employees. Seafarers often live on the ship on which they are employed for several months and this poses some challenges in regards to occupational medicine since they are not only employed at the ship, but they also live on the ship. They are often cut off from the regular world being isolated from regular health care. This makes their health and wellbeing a concern and priority in a public health point of view (Carter et al. 2014). Often health care services can only be assessed through telecommunication which offers limited options in terms of treating illnesses. However they enjoy full health rights as the employees on shore at the expenses of the employer (IMO 2006).

The development of a simple and easy to implement in the maritime sector method would help in getting an idea of which parameters should be included, which data the company needs to collect on a routine base so that they are able to proceed with costs calculations (Gavious et al. 2009), and highlight the importance of

investing in seafarers good occupational health (Jensen et al. 2010). Some of the costs could be prevented with better “fit for work” examinations (competencies of medical doctors) and/or by targeted training of the caretaker team on board (Zevallos et al 2014). Responsible authorities should consider harmonising pre-employment examinations as well as maritime doctors competencies and skills (Carter et al 2014, Andrioti et al 2017). In addition the industry may join forces with the relevant authorities with regards to these (IMO 2006). Furthermore strengthening the organisation of integrated care has been proven effective and efficient way for service provision. Integrated care with follow up of the patients at risk can help decreasing the prevalence of diseases and injuries. Encouraging the development of integrated care and follow up practices by marine doctors for early diagnosis and treatment of chronic diseases parties will achieve better services to seafarers. Moreover, the empowerment of seafarers for self-disease management will help them stay fit and healthy. Therefore it is very crucial to strengthen prevention and organisation of integrated care for seafarers (EU 2011).

In concluding, the local approach method can be applied in the shipping industry. It showed that for just one case-one sick employee the shipping company had losses of about 180.000 \$. If we take into consideration that about 10.000 seafarers are evacuated every year the losses go up to an estimated total of \$ 2 billion per year,

while most of the cases would be prevented with good quality pre-employment health services (Carter et al. 2014). We expect that this study will pave the way to more prevention initiatives on board so that a decrease on diseases and injuries and thus lower need for evacuations would be achieved. It may compliment the implementation of prevention programmes on board. For the industry the benefit would be lower evacuation costs, compensation claims, and thus better employment reputation with an obvious financial benefit.

Limitations of the study

The realisation of this study requested a number of assumptions due to limited data availability i.e hire a new employee from the same country as the sick seafarer who flew the same route back to embark on the ship and the respective cost of flights. In addition assumptions were made in regards to the productivity and the administration costs, however these are supported by the scientific literature. Furthermore, the collection of data via different sources may have compromise the quality. In any case the intention here is to gain insight of the different parameters that formulate the average cost of repatriation. These estimations can only be perceived as an indication of the cost components. In this implementation example the estimated average direct cost accounts for 82.6% and the indirect for 17.4% of the total. It does not include rerouting and deviation of the ship, which is highly expensive due to the cost of bunker fuel consumption. Data availability would facilitate accurate economic calculations. To this direction a harmonised list of essential cost data would be very helpful and the stakeholders should examine such collection on a regular basis

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ANNEX

Table 2: Direct and indirect cost components of the case study: Pilipino 2nd engineer seafarer on board of a Danish freight ship, sailing the East Asia Route (Taiwan – Norfolk, USA)

2 ICD-10: (IX Diseases of the circulatory system) I21 Acute myocardial infarction	Units	\$/unit	Total USD
Evacuation from the ship to the hospital via helicopter	1	25000	25000
48 year old Filippine, 2nd engineer, acute heart pain, hospitalised 10 days	10	6000	60000
Treatment 3 x cardiac stents	3	15000	45000
Seafarer salary 30 days according to Unions	1	6000	6000
Home flight Miami to Manila 1 st class ticket	1	5000	5000
Medical doctor accompanying and return	1	5000	5000
1 overnight for medical doctor in Manila	1	200	200
Per diem for medical Doctor	1	100	100
Seafarers Rehabilitation at home	1	500	500
Seafarer compensation <18 weeks according to danish legislation	10	500	5000
Overtime for fellow seafarers (8hoursX10 days=80 hours)	80	22	1760
Replacement for the seafarer 2 months = 6000 x 2	2	6000	12000
Flight replacement seafarer Manila to Miami (economy class = 1500 \$)	1	1500	1500
Per diem for replacement seafarer	1	100	100
Employers liability compulsory Insurance	1	16108	16108
Rerouting 0,3 tons fuelX560X1,5 days	1,5	252	378
Administration cost captain 4 hours X 100\$(3 contacts with TMAS+1 contact with company)	4	100	400
Administration cost company 6 hours X20,2\$)	6	21	126
Total		87403	184172