Chapter 5
Incorporation of EU Harmonized Classifications to Enhance Traditional Methods of Risk Analysis

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Abstract This paper describes a risk assessment (RA) study focusing on the circumstances of occupational accidents in a Portuguese company of the "hotel, restaurant and catering" sector (HORECA). The aim was to modernize current practice by incorporating new features into traditional RA techniques; this new development gave particular attention to the integration of harmonized variables established by the Eurostat within the European Statistics on Accidents at Work (ESAW) classification system. The study consisted of two parts and it used a number of harmonized variables: (1) the characterization of the company's "typical accident", defined here as the most frequent type of accident (2011–2012 period), and (2) the analysis (and assessment) of occupational risks using the new procedure, i.e., the "enhanced methodology". In the latter case, the idea was to run a trial test of the procedure's application and usefulness, especially in terms of its ability to provide a clearer identification of "accident scenarios". The results allowed mapping the relevant risk situations, in which "falls on the floor" are the prevalent type of accident (contact); this accident mode is associated with two categories of physical activity: carrying by hand/transporting a load, or ordinary movements (e.g.: walking, running, going up, going down, etc.). The most frequent injuries are dislocations, sprains and strains, or wounds and superficial injuries. The conclusions highlight the advantages of using European harmonized classifications with any kind of risk assessment methodology. This improved procedure is likely to produce comparable information (outputs), which can embrace both accidents at work and/or occupational diseases.

Keywords ESAW · Hazard · Risk · Occupational accident · Occupational disease

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5.1 Introduction

Employers have the legal duty to guarantee low-risk workplaces and to prevent the occurrence of occupational accidents and diseases. This also means that the discussion on workplace risk assessment is far from being "old news". On the contrary, companies are compelled by many (e.g.: Unions, Governmental Agencies and the Society in general), to go further in their efforts to advance good practice in this domain. The present work describes one of such attempts to update and improve procedures for dealing with both accident analysis and risk assessment.

This Risk Assessment (RA) study has taken place at *Instituto Técnico de Alimentação Humana* (ITAU), in English "Technical Institute of Food". The core business of ITAU is focused on high quality food services, including both production of meals and catering, distributed by schools, hospitals, and other companies. It was established in 1963 and belongs to the Portuguese "hotel, restaurant and catering" sector (HORECA).

The objective of this work was to improve and update the RA methodology currently used by ITAU; the underlying idea was to create a harmonized database and be able to compare the results with European statistics. This new development, therefore, includes European harmonised classification schemes established by the Eurostat for both accidents at work and occupational diseases [5, 8]. The updated and improved approach was subjected to a "pilot test" application, in a hospital kitchen run by ITAU.

This enhanced RA methodology has a more structured basis and it facilitates not only the use of a "common language" for risk communication, but also the creation of a specific "occupational hazards map", structured by occupation. The ultimate goal is to improve current practice and to reinforce the implementation of ITAU's Occupational Safety and Health (OSH) management system.

5.2 Background

Terms like hazard and risk have been used since ever, but they can have different meanings depending on the situation and context. These two terms must be well defined when used in OSH studies, so within this work, the authors have adopted the OHSAS 18001:2007 definitions. A hazard is defined as *source, situation, or act with a potential for harm in terms of human injury or ill health, or a combination of these*; on the other hand a risk is defined in this standard as *combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s)* (in OHSAS 18001:2007).

Two other important terms in OSH nomenclature are incident and accident. Over the years several authors have been proposing their own definition for accident. According to Hollnagel [11] an accident can be defined *as a short, sudden, and unexpected event or occurrence that results in an unwanted and undesirable outcome* [11].

Furthermore, Harms-Ringdahl [10] defines accident as *an event that causes damage or injury, but which was not intended to have a negative outcome* [10]. However, the OHSAS 18001 standard definition of an accident is a sub-category of incident, as follows: *an incident which has given rise to injury, ill health or fatality*.

To answer the need for assessment and correction of systems weaknesses a set of tools have been developed over the years by experts. Overall, risk assessment methodologies include three main phases, one phase of hazard identification, other of risk evaluation, and finally a phase to establish risk control measures, which are subjected to hierarchy. One possible definition cited by Marhavilas et al. [15] states that risk assessment is an essential and systematic process for assessing the impact, occurrence and the consequences of human activities on systems with hazardous characteristics [15]. Risk assessment should be revised whenever needed to improve good practice and assist OSH management in companies.

Among the newest developments related to risk assessment in industry, one can find studies focusing on the assessment of risk factors concerning "new product development" (NPD); examples are, for instance, recent work by Choi and Choi [4] and Choi et al. [3]. However, it should be stressed that, not only such new approaches follow the same RA general principles, but also, and perhaps most importantly, new products and new technologies can also bring new (emergent) occupational hazards.

Within the OSH context, risk assessment should embrace both accidents at work and occupational diseases. The European Regulation (EC) No 1338/2008 defines occupational disease as *a case recognized by the national authorities responsible for recognition of occupational diseases. The data shall be collected for incident occupational diseases and deaths due to occupation*; it should not be mistaken for work-related health problems and illnesses. According to the same European source, work-related health problems and illnesses *are those health problems and illnesses which can be caused, worsened or jointly caused by working conditions. This includes physical and psychosocial health problems. A case of work-related health problem and illness does not necessarily refer to recognition by an authority and the related data shall be collected from existing population surveys such as the European Health Interview Survey (EHIS) or other surveys* (EU Regulation 1338/2008).

Sometimes, historic accident data tend to be used by companies as a way of "measuring" risk with "blind" numbers or statistics. According to Aven [1], however, these numbers do not express risk, but rather provide a basis for doing it. Additionally, this historic data can help understanding the accident phenomena and provide very useful inputs for risk assessment.

There are many RA methodologies; they can be classified, broadly, as qualitative, quantitative (usually probabilistic) and semi-quantitative techniques. However Harms-Ringdahl introduces a different approach categorising RA methods according to its principal aim.

The OSH matters are among the most important areas where the European Union (EU) social policies are centered. A good example to attest the importance of OSH issues at EU level is the work developed by Eurostat [8] concerning the European Statistics on Accidents at Work (ESAW) classification system. This project had three developing phases: Phases I and II covered a set of 14 "classical" variables, which

included variables that already existed in most EU countries' data bases. On the other hand, phase III has introduced 8 new variables and, since 2001, it marked the beginning of a new statistical series [8, 13] across the EU. In Portugal, 6 of the new variables are implemented in the Portuguese official system [14].

5.3 Methodology

This work's intention is to modernize current practices by incorporating new features into traditional RA techniques. It is important to emphasize that this work is not about the risk assessment methodology itself, but, as afore mentioned it gives particular attention to the integration of harmonized variables established by ESAW system and to understand how they can contribute to RA. The study is structured into five methodological steps: (1) re-classification of previous accidents' data, (2) characterization of the "typical accident" of ITAU, (3) modernization of ITAU's risk assessment tool, (4) running a RA pilot study at ITAU's unity and (5) drawing conclusions.

This work began with the re-classification of accidents' data collected in the years 2011 and 2012, within the hospital segment of ITAU business. The ESAW variables used in this study were: sex and age, nationality, specific physical activity, deviation, contact, material agent associated to contact, type of injury and body part injured. The name of some of these variables is self explanatory, i.e., it is possible to understand what they mean just by its name (e.g.: age or sex). However, a few others need to be defined to warrant a better understanding of its application, as follows [8]:

- Specific Physical Activity—this is the activity being performed by the victim just before the accident, i.e. precisely what the victim was doing at the exact time,
- Deviation—this is the last event deviating from normality and leading to the accident, i.e. the Deviation is the event that triggers the accident,
- Contact Mode of Injury—it is the contact that injured the victim, i.e. it describes how the person was hurt (physical or mental trauma),
- Material Agent of Contact—it is the main Material Agent associated with, or linked to the injuring contact.

During the study period (2011–2012) there were 50 accident records in the hospital segment of this company. Their re-classification with the new variables (Step 1) was important for the characterization of the "typical accident", which resulted from descriptive statistics; such statistics allowed comparison with HORECA's European and Portuguese data. In this work, the "typical accident" is defined as the markedly most frequent modality of accident and its causation mechanism.

The enhanced RA approach proposed here was built by integrating several methodologies, such as the traditional Job Safety Analysis (JSA), the BS 8800:2004 Risk Matrix, some ESAW variables, and the classification of European Occupational Disease Statistics (EODS).

The JSA methodology constituted the main pillar, and the adequacy of its application to a kitchen had already been demonstrated by Harms-Ringdahl in 2013 [10]. Moreover, this method was chosen for being useful in work situations involving manual tasks. This is a method of direct analysis of hazards through the scrutiny of tasks and procedures performed by a person or group of people, focused directly on the injury or damage that may occur. JSA involves four main phases: (1) structuring and planning, (2) identifying hazards, (3) evaluating risks, and (4) proposing risk control measures [10].

The JSA method does not provide any specific tool for assessing risk level. So, this approach has incorporated the risk matrix proposed by the British Standard BS-8800:2004. This evaluation tool was chosen to match the spirit of pushing the ITAU's current practice towards standardisation. The matrix has 5 risk levels, based on a (3×4) combination: 3 severity levels and 4 likelihood levels. The three intermediated risk levels (Low risk, Medium and High risk) constitute the so-called ALARP zone, in which risks should be lowered to a level "As Low As Reasonably Practicable".

To establish risk control measures (or improvements), the guidelines of BS8800: 2004 were followed. Such guidance establishes a hierarchy of controls, which should be applied in the following order: engineering measures, organizational measures, protective measures (collective or individual) and emergency/contingency arrangements [2].

The ESAW methodology was incorporated in this new RA procedure to describe accident scenarios associated with hazardous situations. At this point the variables used were: contact, type of injury, and part of body injured; together, these three variables portray the accident scenario.

At last, the identification/classification of occupational diseases was made through the EU methodology known as EODS [5]. Its aim is to obtain gradually harmonised, comparable and reliable data and indicators on occupational diseases in Europe [5]. This method not only describes occupational diseases, but also, just like the ESAW system, it includes a structured coding for each "type of disease".

5.4 Results and Discussion of Application

1. Case study

The piloting test of this integrated methodology ran in a hospital kitchen that belongs to ITAU's hospital segment; this particular segment or business area, as a whole, covers around 20 units, i.e., hospital canteens and/or kitchens.

Due to implementation of "food safety" regulations, namely the Hazard Analysis and Critical Control Points (HACCP), the facilities of the specific unit studied (code 1616779) underwent renovations in 1988, when the whole floor was replaced and specific processes were physically separated by areas to avoid cross-contamination. This kitchen is divided into the following main areas, corresponding to specific processes:

- One large reception and storage area (including different types of storage facilities),
- Four preparation areas (for fruit, vegetables, meat and fish; preparation activities include the use of many hand-tools, some of which are motorised),
- Three kitchens (for milk products, diets and general meals; activities in these kitchens include all sorts of cooking tasks and use of many apparatus),
- One area for desserts (includes preparation and cooking),
- One area for placing meals in trolleys for distribution to hospital patients,
- Two washing and desinfection areas (for thick crockery and fine China).

When the study took place there were 46 workers on this ITAU's unit, all women. The workers were distributed by professions as follows: the commissioner, the sub-commissioner, three pantry women, four cooks, eight kitchen assistants and seven canteen workers, four tapsters (bar tenders) and 18 workers for customized deliveries. Although these workers perform tasks essentially related to the profession, sometimes they have to either help or replace others and, therefore, can also be exposed to other risks, uncommon to their specific profession.

The present study covered both safety risks (accidents) and health risks (diseases) for all tasks and professions, from the reception of raw materials to the washing up areas, as well as the delivery of finished meals to the hospital wards. In total more than 100 hazards were assessed in this hospital kitchen.

Tasks that involve cleaning the facilities (i.e., general washing and disinfections) can interfere with other tasks, since they can be carried out simultaneously. The same might happen with certain maintenance activities. As a principle, the two mentioned processes (general cleaning and maintenance) should be scheduled for different periods; however the workers tend to perform such tasks whenever it seems more suitable to them, which means that sometimes these may occur simultaneously with the "normal" production activities.

2. Characterization of the "typical accident"

The opportunity to characterise the "typical accident" arose from the observation that ITAU does not follow a standard classification of accidents. Until now, any report or study prepared with the aim of analysing accidents served only as a basis for internal comparisons over the years (i.e., to identify trends) and it could not be used to compare data with competitors or with national/ European accident statistics.

With the re-classification of accidents through the 2011–2012 biennium, using the ESAW classification, these newly coded data provided a starting point for identifying specific hazards and the "typical accident" of ITAU hospital segment (all units of this segment).

The adoption of the variables used by ESAW is a potentially important contribution to the effort of prevention, as far as they allow to characterize and give a better understanding of the modality of accident (characterised by the variable Contact), the Material Agent involved on it and its immediate cause (characterised by the variable Deviation).

The data used in this study covers 50 accidents ($n = 20$ in 2011 and $n = 30$ in 2012). In the period under consideration (2011–2012), 646 and 696 persons were working in the whole hospital segment, respectively. From Table 5.1, one can observe

Table 5.1 Indicators of relevance (all units of the hospital segment)

	2011	2012	Annual average
N^o fatal accidents	0	0	0
N^o non-fatal accidents	20	30	25
Days lost	230	612	421
$Average\ severity$ (average days/accident)	11.5	20.4	15.95
$Incidence\ per$ 100,000 $workers$	3,095.9	4,310.3	3,703.12

that there were no fatal accidents, which is not surprising in ITAU. However, in the case of non-fatal occurrences, all indicators show a significantly worse scenario from 2011 to 2012. Not only has the number of accidents increased, but also their severity, i.e., more days lost per accident, on average. Based solely on the data from this biennium, there is no logical explanation for such increase. On the other hand, OSH data of 2010 and before was out of reach for the present study, since it was already stored in the company's historical archives. In any case, this simple fact suggests the need for more in-depth analysis, as well as more detailed risk analysis.

The incidence rates in the years 2011 and 2012 were, respectively, 3,095.9 and 4,310.3 accidents per 100,000 workers. Comparing the incidence rate of 1 year alone has little meaning; therefore, the average was calculated, and the table shows that the resulting annual value (∼3,700) is slightly above the EU average of HORECA's sector (∼3,041) [7]. Once again, this result shows that there is room for improvement and also that more specific analysis are recommended in this company. With respect to the "typical accident", its characterisation was based on the same re-coded data and using the 9 variables referred in Sect. 5.3 (methodology). Table 5.2 gives the most frequent category (or modality) for each variable used in this study. Since the typical accident is defined through the markedly most frequent modality of these key variables, the results provided in Table 5.2 allow describing the "typical accident" at ITAU's hospital segment.

Thus, in the study period the "typical accident" in this segment can be roughly described as the occurrence that happened to a woman—cod. 1 (89 %), with Portuguese nationality—cod. 1 (77 %) in the age group of 45–54 years (31%) or 25–34 years (29 %). The accident happened when the worker was carrying something by hand—cód.50 (37 %) or was moving herself to somewhere—cod. 60 (33 %). This resulted in the fall of the worker—cod. 030 (39 %) against the floor—cod. 01.00 (36 %), likely caused by slipping/stumbling—cod. 50 (37 %). This occurrence may cause dislocations, sprains or strains—cod. 030 (43 %), or wounds and superficial injuries—cod. 010 (39 %), in which the upper extremities—cod. 50 (54 %) were the most frequently affected.

However, there are two other deviations that also called for attention in this study, they are: body movement without any physical stress—cod. 60 (22 %) and loss of control of handling equipment—cod. 40 (18 %). So, a partial conclusion related to the deviation variable, i.e., direct cause, is the fact that the most frequent "top-3" (i.e., codes 50, 60, 40) are all of human nature (i.e., each embodies erroneous

Table 5.2 Variables relevant for characterising the "typical accident"—hospital segment (2011–2012)

	Description	2011 (%)	2012 (%)	Average (%)
Sex	Woman (cod. 1)	85	93	89
Nationality	Portuguese (cod. 1)	70	83	77
Age	25–34 years	25	33	39
	45–54 years	15	47	31
Specific physical activity	Carrying by hand (cod. 50)	40	33	37
	Movement (walking, running) (cod. 60)	30	37	33
Deviation	Slipping—stumbling and falling-fall of persons (cod.50.)	30	43	37
Contact-mode of injury	Horizontal or vertical impact with or against a stationary object (the victim is in motion)-result from a fall (cod. 30)	35	43	39
Material agent of contact	Buildings—at ground level (floor) (cod. 01.00)	25	47	37
Type of injury	Dislocations, sprains and strains (cod. 030)	35	50	43
	Wounds and superficial injuries (cod. 010)	35	43	39
Part of the body injured	Upper extremities (cod. 50)	48	60	54

human actions). Although the timeframe (2 years) in this study is short, this indicates a need for improving safe behaviour and working procedures.

The workers in this segment are more likely to be injured by accidents caused by slips, trips and falls, especially in kitchen areas. According to EU-OSHAS [6], the majority of "slip" injuries happen on wet floors, while most "trips" are due to poor cleaning, which were also observed as problems in this case, corroborating previous knowledge [7].

Additionally, this study results were also compared with the national Portuguese statistical scenario, using the official report on "accidents at work" (with 2010 accident data), produced by the Office of Strategy and Planning of Portuguese Government [9]. This official report uses ESAW harmonised variables; using the same approach as above, from the frequency distribution of these variables, one can also pick the typical accident within the HORECA Portuguese sector in 2010 as follows: What happened to a man, aged between 25–34 years, who was in movement (physical activity cod. 60). This occurred when he lost control (total or partial) of machine, means of transport or handling equipment, hand-held tool, object, or animal (deviation cod. 40). Such deviation could cause horizontal or vertical impact with or against a stationary object (the victim is in motion) (contact cod. 30) or contact with sharp, pointed, rough, coarse agent (contact cod. 50). The injuries would be wounds and superficial injuries (cod. 10) or dislocations, sprains and strains (cod. 30). There were two parts of the body most likely injured: lower extremities (cod. 60), and upper extremities (cod. 50) [9].

The above characterisation shows certain similarities with the findings in ITAU's hospital segment, such as, age range, physical activity, one of the relevant deviations, contact, types of injury (both of them), and one category of part of the body. However, there are also a few relevant differences, namely the sex of the victim and the existence of a second category of contact (in this case the contact with sharp, pointed objects). Despite a considerable overlapping in the most frequent type of accident, one needs to be careful in drawing conclusions, considering that the HORECA sector is very broad and it also includes other business (e.g.: restaurants and hotels).

3. Risk Assessment—Pilot Application

As mentioned, the application of the improved RA procedure was carried out in one single kitchen. After a few observation visits and a detailed analysis of the working processes in this unit, it was possible to (re)design a risk assessment procedure, taking into account the JSA general methodology, together with the BS 8800 Risk Matrix, as well as the ESAW [8] and EDOS [5] classification systems.

Once the hazards had been identified for each task, the occupational risks were characterised through the ESAW and EODS classifications. This allowed the harmonised coding of relevant accident scenarios (safety risks), as well as the diseases likely to develop within the medium/long term (health risks). Whenever several risks were identified simultaneously, the risk level was scored considering the worst scenario (either the most probable or the most severe).

Although the tasks within the unit are diverse, many risks are common to several activities, despite the risk level being different from one task to another. Figure 5.1 is a small extract from the whole analysis, only to illustrate this procedure. Tasks involving "handling/transportation", for example, are those which have a higher level of risk, as illustrated in Fig. 5.1. By contrast, tasks involving contact with cold environments have a very low level of risk, which is due to the fact that the contact time is usually short and that it is almost always done with proper equipment (gloves and insulated clothing).

From the whole analysis it stands out that the four most frequent (and also higher risk) accident scenarios were: (1) physical stress on the musculo-skeletal system; (2)

Risk Assessment: Unit 1616779 ITAU (hospital kitchen)											
Risk Analyses					Risk Assessment						Recommendations
Activity	**Task/ Process**	**Hazard/ Hazardous situation (deviation)**	**Risk of accident (ESAW): Contact; Type of injury; Part f the body injured**	**Risk of disease/ EODS classification**	**Possibility**	**Severity**	**Risk level**	**Acceptable**	**ALARP**	**Unacceptable**	**Proposed Control Actions**
Preparation	Preparation of vegetables and fruits	Incorrect handling of cutting tools (eg: knives, manual grater)	• Contact with sharp Material Agent (cod. 51); Open wounds (cod. 12); Upper Extremities (cod. 50) • Struck - by falling object (cod. 42); Superficial injuries (cod. 11); Lower Extremities (cod. 60), Upper Extremities (cod. 50)	• Carpal tunnel syndrome (cod. G560); arthrosis on the wrists (cod.931) and other diseases related with the use of hand tools	2	2	**Medium**		yes		✓ Ensure the existence of a local storage area for tools ✓ Use only appropriate cutting tools (eg: knives, grater) ✓ Rotation of workers ✓ Make frequent breaks between the various tasks ✓ Training of workers: attitudes / work instructions (safe work) ✓ Use proper protection: footwear and gloves (PPE)
Cooking	Cooking meals	Transporting food, kitchenware, and heavy loads	• Physical stress - on the musculo-skeletal system (cód.71); Dislocations, sprains and strains (cod. 30); Back, including spine and vertebra in the back (cod. 30), Upper Extremities (cod. 50) • Vertical motion, crash on or against (resulting from a fall) (cod. 31); Dislocations, sprains and strains (cod. 30), Bone Fractures (cod. 20), Wounds and superficial injuries (cod. 10); Lower Extremities (cod. 60), Upper Extremities (cod. 50)	• Musculo-skeletal diseases - with permanent disabling effects (e.g.: low back pain)	3	2	**High**		yes		✓ Maintenance of the floor (anti-slippery surface treatment) ✓ Ensure that transportation is made, whenever possible, in transport cars ✓ Rotation of workers ✓ Training of workers: attitudes / work instructions (safe work) ✓ Use proper protection: footwear and gloves (PPE)
		Direct contact with hot surfaces, hot containers, or contact with stoves	• Contact with naked flame or a hot or burning object or environment (cód.13); Burns, scalds (thermal) (cod. 61); Upper Extremities (cod. 50)	*Not applicable*	3	2	**High**		yes		✓ Proper maintenance of stoves, ovens and all kitchen equipment ✓ Reduce time of exposure to risk ✓ Training of workers: attitudes / work instructions (safe work) ✓ Use proper protection: footwear and gloves (PPE)
General		Physical or psychological aggression from clients (especially in Canteens)	• Bite, kick, etc. (animal or human) (cod. 80); Superficial injuries (cod. 11); Shocks after aggression and threats (cod. 111)	• Fatigue • Psychological stress • Depression	3	1	**Low**		yes		✓ Perform advance planning of the tasks ✓ Training of workers
		Poor lighting for tasks performed	*Not applicable*	• Loss of visual accuracy	1	2	**Very low**	yes			✓ Planning maintenance of lighting and ensure compliance with the plan ✓ Make frequent breaks between the various tasks

Fig. 5.1 Illustration of a part of the risk assessment (exert of the whole analysis document)

vertical motion, crash on, or against (resulting from a fall); (3) struck by object in motion or collision with; (4) contact with naked flame or a hot or burning object. Of these, three categories are visible in Fig. 5.1.

It appears that the first two scenarios above mentioned are associated with body movement and/or manual transport of loads; consequently, in these cases there is also a higher likelihood that workers will suffer from occupational diseases related to musculo-skeletal disorders (MSD), such as, for instance, low back pain or tendonitis. The most common types of injuries are: (1) wounds and superficial injuries, and (2) dislocations, sprains and strains; bone fractures are also considered quite possible outcomes. Body parts most affected are the upper and lower extremities.

These RA findings are in agreement with the "typical accident" occurred in 2011–2012, i.e., "crash against the floor, which is probably caused by slips/falls, while the worker is carrying by hand or moving". Naturally, this RA reveals several other accident risks to which workers are exposed to, despite these others not being part of the specific "typical accident".

One of such cases is the high risk of contact with naked flame or a hot or burning object [c.f. scenario (4)]. The hazardous situation related to this modality of accident is in fact very common in any kitchen. The control actions proposed in this case (see Fig. 5.1) are to ensure transportation, whenever possible, on transport cars, rotation of workers, reinforcement of training concerning attitudes, safe work instructions and the use of proper protection gloves. In a kitchen, the incorrect handling of cutting tools is a common hazard leading to contact with sharp, pointed, coarse materials or tools (contact cod. 50). This modality of accident was highlighted in the Portuguese HORECA sector, but in this particular kitchen it was classified as medium risk.

In what concerns occupational health in this workplace, musculo-skeletal disorders (MSD) appear to be the most common risks; however problems related to hearing loss are also an issue, especially in the washing areas for thick crockery and fine China. Skin diseases, such as leptospirosis, caused by infection with *Leptospira bacteria*, or dermatophytes caused by fungus, can become a problem too; however, they will not be severe cases but can cause discomfort.

Finally, when comparing these new results with those of previous assessments, it became obvious that there were significant improvements: not only the standard terminology allowed comparisons, but also the final output was more detailed in terms of risk characterisation and coverage.

5.5 Conclusions

The improved risk assessment procedure applied in this hospital kitchen revealed four kinds of hazardous situations that need careful consideration from the OSH management of ITAU. These are the movement of people (e.g.: walking on slippery floors), the transport by hand, the incorrect handling of cutting tools and contact with flame/hot or burning object or environment.

This study fulfilled the objective of modernising and updating the risk assessment tool used previously by the company.

However the implementation of this enhanced procedure may face some obstacles, since it implies that all safety professionals of ITAU receive some training on the use of these harmonised classifications; in addition, the analysis requires more time than before. However, such effort is seen as good investment, since it brings tangible benefits.

This work demonstrates that the integration of harmonised classifications allows comparisons of data and statistics, at national and European level, which were impossible before. In addition, it represents a step ahead in terms of good practice. Furthermore, the adoption of these harmonised classifications allow to improve risk communication and the whole cycle of information in general, because the common language builds a bridge between risk assessment and accident analysis, thus, facilitating the management process.

At last, it must be highlighted that the above mentioned benefits are not restricted to the EU countries, since most of these harmonised variables and their respective terminology are also a recommendation of the International Labour Organisation (ILO) since 1998 [12], thus, any steps in this direction could have international application.

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