

Comparison water/Diphotérine® :

Rinsing of more than 600 chemical splashes during 7 years in the factory ATOCHEM SAINT-AVOLD

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Introduction

The diversity of chemicals commonly used in the industry presents a growing danger¹ for the users, especially in case of a splash with a corrosive product, even if individual protective equipment are worn.

Materials and methods

Thinking that the use of a polyvalent rinsing solution was necessary, the medical department, in accordance with the person responsible for the acrylate department, where the majority of the splashes due to corrosive products happen, decides to install Diphotérine^{®2,3,4,5,6,7} in 1995, as the rinsing with water was used without complete success until this date. This is an observation study comparing the results of worker exposed to chemical splashes, rinsed either with water (before 1995) or with Diphotérine[®], as systematically as possible (68%), according to the protocol recommended by PREVOR laboratory. The rinsing with Diphotérine[®] is generally followed by a secondary rinsing with water. The involved worker must then go to the infirmary, first for the follow up of the use of the rinsing protocol, and also to receive the secondary care if necessary. The gravity criterions taken into account to analyse this observation comparative study between a rinsing with water and a rinsing with Diphotérine[®] are as follows :

- The number of cases noted as « no after-effect », which means a simple registration in the infirmary without any care,
- The number of loss of work.

We realised a secondary analyse, the judgement criterion for skin splashes is the number of cases needing a consultation in the burn centre, and the judgement criterion for the eye splashes is the number of cases needing an ophthalmologic consultation.

In a first approach, the comparative analysis was realised on the 5 chemical products inducing the highest numbers of splashes, that are mainly used. This means concentrated acrylic acid (AA), the acrylate family (ethyl, methyl or butyl), concentrated sulphuric acid (H₂SO₄ 98% or Oleum), caustic soda (NaOH) with a maximum concentration of 22% (5,5 M), dimethylaminoethylacrylate (ADAME). ADAME was differentiated from other acrylates due to the seriousness of the burns it gives, especially on the eyes. The individual protection measures, after the introduction of Diphotérine[®] in 1995, were not different from the one already existing.

The comparisons⁸ between the rinsing with water and the rinsing with Diphotérine[®] are realised according to the χ^2 test or the Fisher test for the losses of work with a precision of 5%.

Results

In total, 652 chemical splashes were reported in the infirmary of ELF ATOCHEM in Saint-Avold between the 1.1.1992 and the 30.04.2000, involving either ELF ATOCHEM workers or subcontractors. After 1995, 68% of the chemical splashes were rinsed with Diphotérine[®]. On 652 chemical splashes, 379 splashes were due to the 5 main products (AA, Acrylates, H₂SO₄, NaOH, ADAME). Four cases of wrong use of the protocol with Diphotérine[®] were excluded. The preliminary analysis of the results was made on these 379 cases of chemical splashes which are divided as follows :

Primary rinsing	water	Diphotérine [®]
Total number of cases	205	170
No after-effect	68	88
With after-effect	137	82

Analysis of the criterion « no after-effect »

The percentage of chemical splashes without any after-effect (52%) is significantly different ($p<0.05$) from the one noted for the washing with water (33%).

Criterion « loss of work »

In this analysis, we can exclude the 4 cases in which the rinsing protocole with Diphotérine[®] has not been respected (not sufficient rinsing) and we note a significant difference according to Fisher test ($p<0,05$) on the losses of work.

Rinsing	water	Diphotérine [®]
With loss of work	7	0
Without loss of work	198	170

Criterion « Consultation in the Burn Centre »

For skin splashes, we observe a tendency ($p<0.1$) in favour of a decrease of the consultation in the Burn Centre after a rinsing with Diphotérine[®] (2%) compared to the rinsing with water (5.9%).

Rinsing	Water	Diphotérine [®]
Without consultation in the Burn Centre	153	145
With consultation in the Burn Centre	9	3

Criterion « Ophthalmologic consultation »

For eye splashes, we do not observe any significant difference, with 15,8% of the cases inducing an ophthalmologic consultation after a rinsing with Diphotérine[®] and 34,3% after a rinsing with water. The lack of statistical power can here be due to the small number of eye splashes that were reported.

Rinsing	Water	Diphotérine [®]
Without ophthalmologic consultation	32	19
With ophthalmologic consultation	11	3

Conclusion

The preliminary analysis of the observations collected during 7 years in the ATOCHEM factory in Saint-Avold (France) allowed to show a significant superiority of the rinsing with Diphotérine[®] compared to the rinsing with water, whatever the chemical product involved is. This study confirms then the polyvalent property of Diphotérine[®]. Its use as a first aid product seems to show a tendency to reduce the gravity of the accidents, even if non significant (less consultations in the Burn Centre). The use of Diphotérine[®], in case of a chemical splash, allows to decrease the losses of work in a significant way.

References

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