

Pre-hospital Blood Gas Analysis A necessity or a whim?



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INTRODUCTION

Our ambulance service Croce Verde Lugano (CVL) is located in Switzerland, in the Canton of Ticino. Currently, the intervention territory covers an area of 320 km², which includes 49 municipalities with a total of 150,000 inhabitants (approximately 40% of the total cantonal population). The CVL is a member of the "Federazione Cantonale Ticinese Servizi Autoambulanze" (FCTSA), a group that since 1977, represents all the ambulance services at cantonal level, including the REGA, and manages the health alarm and coordination centre "Ticino Soccorso 144". CVL carries out around 10,000 interventions for year. A literature search in 2018 revealed a lack of literature on the effectiveness of blood gas analysis in pre-hospital settings. In order to better understand the usefulness, particularly given the increase in use of Non-Invasive Ventilation (NIV), we decided to introduce the practice to our service, for one year, to assess the true benefits.

METHODS

The equipment utilized was the i-STAT System from Abbott. This device is certified for use in Switzerland and offers reliable results on common laboratory tests. Consideration was given to cost and expiry date, and an appropriate cartridge was selected that provides the following tests; Na, K, Ca, Hgb, Hct, Ph, PCO₂, Po₂, TCO₂.

Computer data collection allowed monitoring of all uses between September 2018 and October 2019, and in that time, 92 venous blood samples were processed.. By avoiding arterial sampling, which carries risk in pre-hospital settings, ethical approval was not necessary. Venous parameters are acceptable except for PO₂. No absolute indication was given, for the use of the blood gas analyzer, however it was recommended in cases of acute respiratory failure, suspected electrolyte imbalance and non-traumatic bleeding.



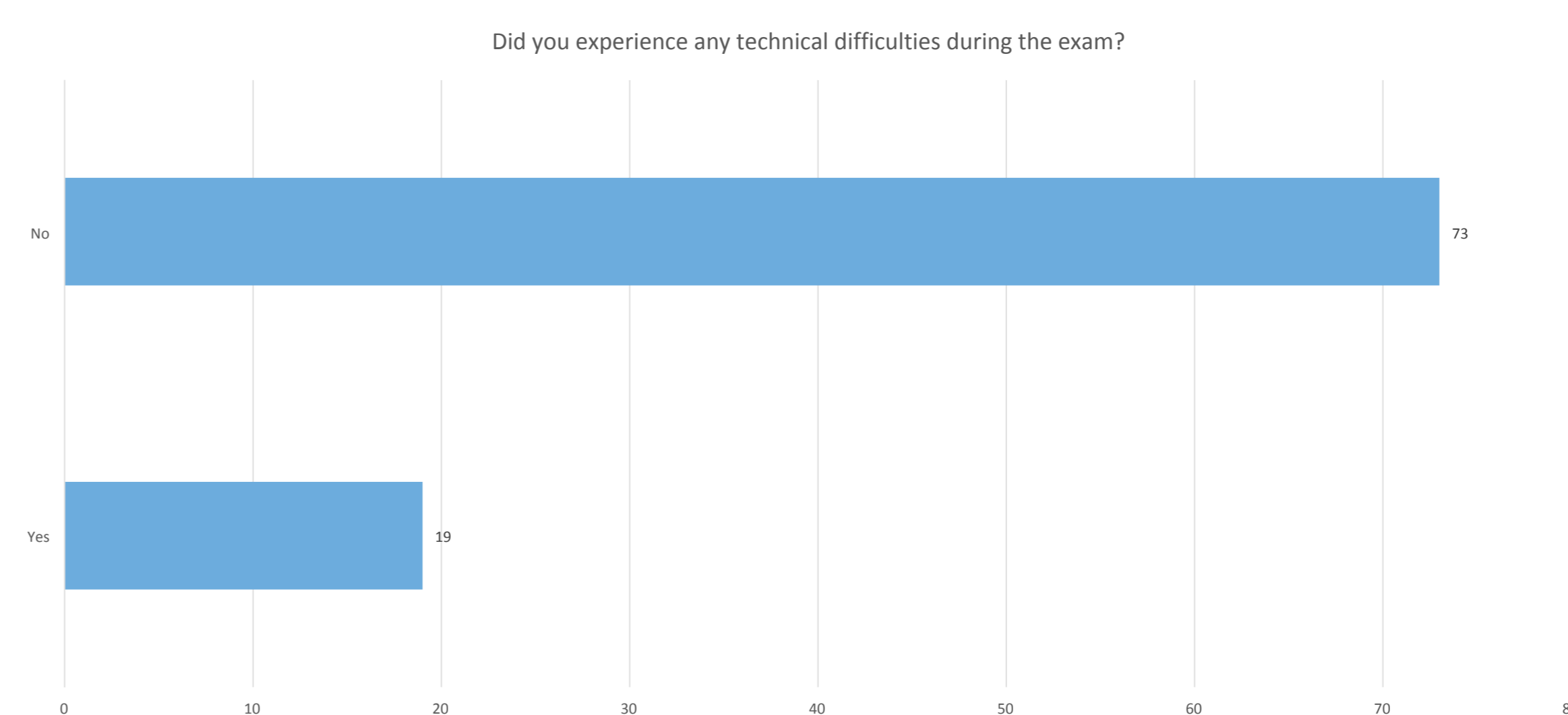
ABBOTT, i-STAT System

Above is an image of the questionnaire utilized.

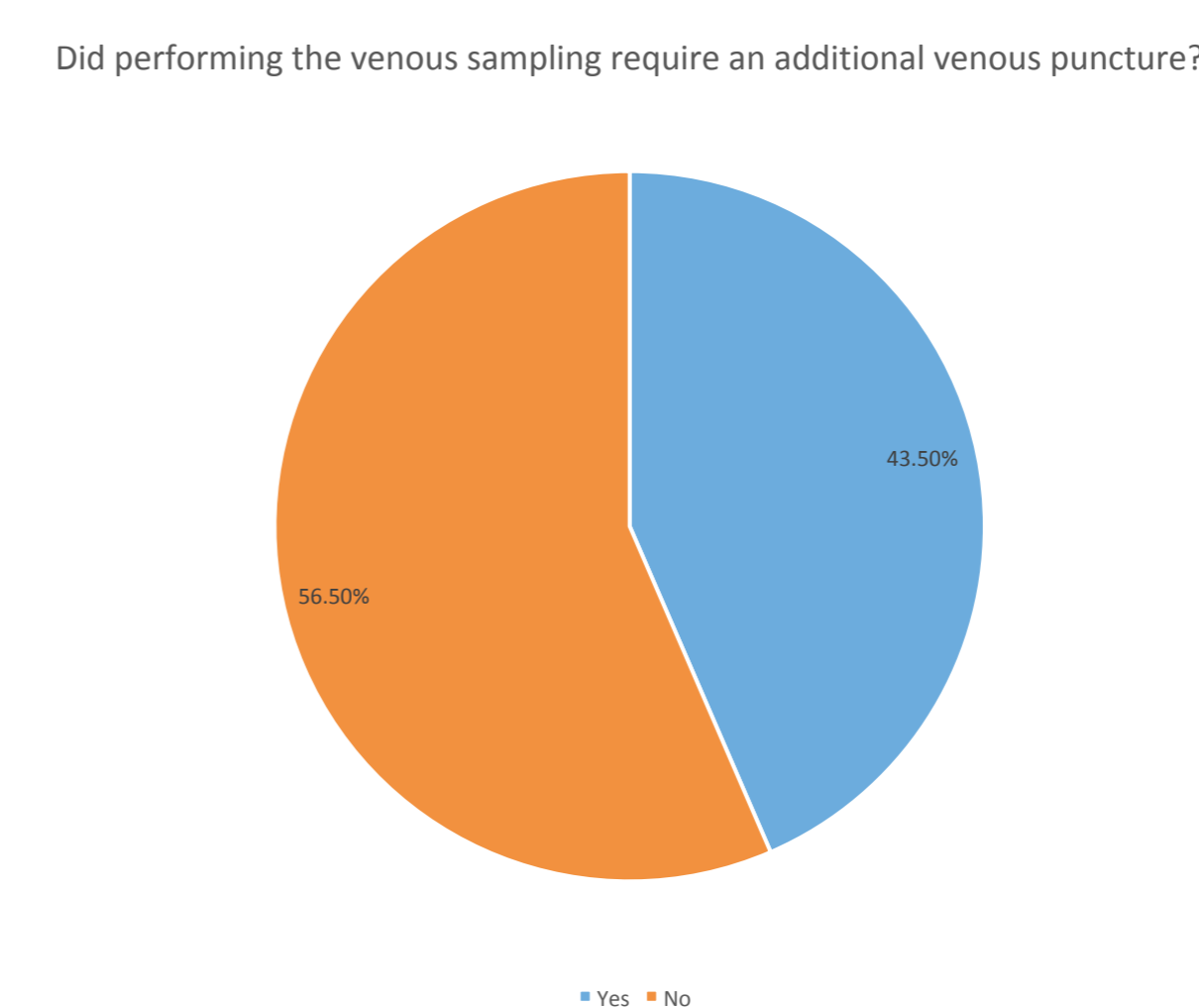
- The aspects investigated are:
- Did you experience any technical difficulties during the procedure?
 - If "Yes" what kind?
 - Was an additional venous puncture necessary during the sampling procedure?
 - Did the diagnostic result change your treatment?
 - If "Yes" in what way?
 - Do you feel it was helpful?
 - Why?
 - Are there any other things you would like to report?

RESULTS AND DISCUSSION

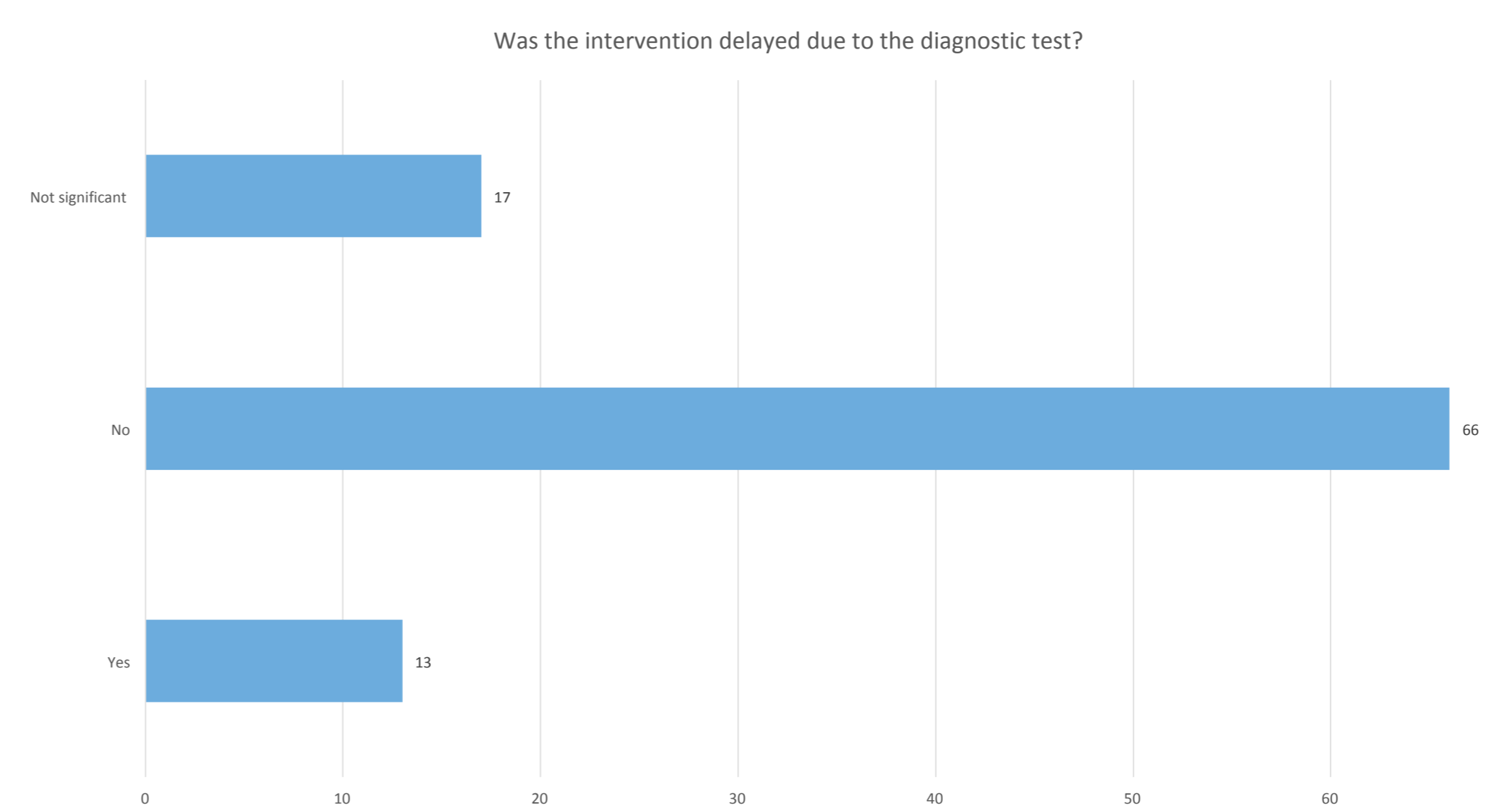
In 79 % of cases there were no technical problems. In the remaining cases the problems were attributable to the use, filling and recognition of cartridge codes.



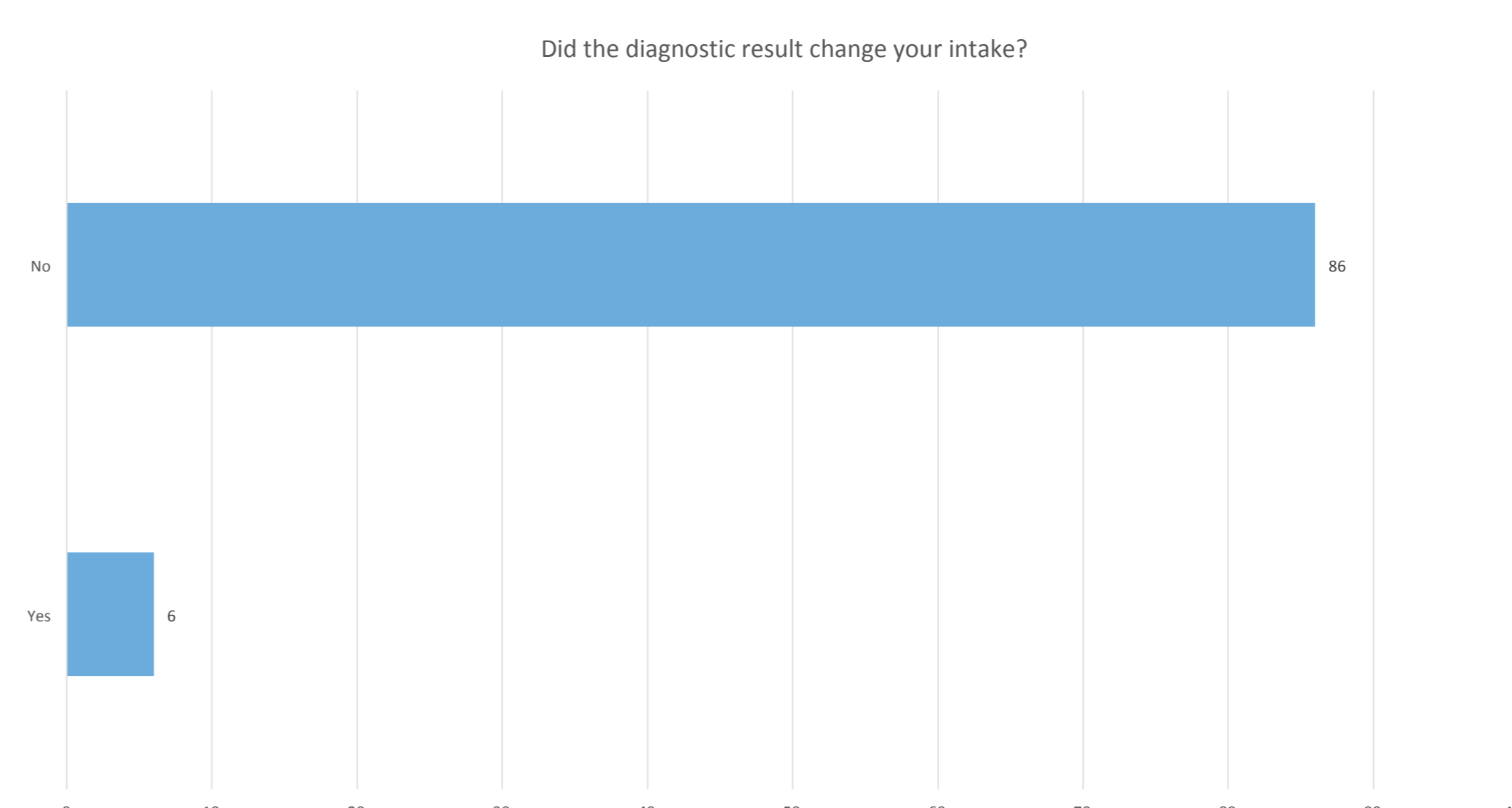
In 43% of the cases the execution of the sampling procedure required an additional puncture to that performed.



In 72% of cases, the procedure was not delayed by the diagnostic examination. In the remaining cases, however, the delay was limited to a few minutes.



Only in 6 out of 92 cases did blood gas analysis prove useful and change the outcome. In 3 cases the NIV setting was modified. In another 3 cases NaBic was administered.



CONCLUSION

In our urban context, which is characterised by short transport times, the use of blood gas analysis did not substantially modify clinical care, even in patients with NIV. We conclude that the practice of pre-hospital blood gas analysis, lacks financial justification in the long term, as the cost outweighs the limited benefits observed.