



**PREANALYTICAL ERRORS: PRELIMINARY APPROACH TO THE POINT OF VIEW OF PRIMARY HEALTH CARE GIVERS**

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Manuscripts

We think that “ancillary” and “auxiliary” are synonyms in this context. However, we corrected the text.

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2 ABSTRACT  
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5 The incidence and types of errors in the pre-analytical phase is a widely studied topic. However,  
6 information regarding the perspective of the involved professionals is rather scant.  
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8 Two focal groups of professionals from Primary Care involved in the pre-analytical period (general  
9 practitioners [GP], community nurses [CN], and other auxiliary health workers, including  
10 administrative personnel [AHW]) were convened. A qualitative analysis with a phenomenological  
11 approach was performed, by using the structure of SWOT (Strength, Weakness, Opportunities and  
12 Threats) analysis as a guide, and results categorised by grouping the resultant dimensions according  
13 to this structure.  
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15 Overall, 12 professionals (3 GP, 6 CN and 3 AHW) were distributed in two groups. Age and gender  
16 distribution were similar between groups. The most commented Strengths were organisational  
17 capability and team-work. Main Weakness was the workload increase (compared to the short time  
18 spent in sample procurement). Opportunities were related to workload optimisation through on-line  
19 analytical request. Threats were related to the long time elapsed between sample drawing at Primary  
20 Care delivery at the Central Laboratory.  
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22 **The phenomenological approach allows knowing those aspects that cannot be entirely  
23 elucidated by objective data measurement. Participants sought personnel's professionalism  
24 and commitment as a basic tool to overcome reduce pre-analytical errors. Attitudes  
25 considered as positive can be exploited by the institution, whereas those considered as  
26 negative alert on possible future problems.**  
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28 **Primary Care professionals offered a different point of view than laboratories staff, but both  
29 recognized high workload as the main threat and on-line analytical request as the best  
30 opportunity.**  
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32 These perspectives may help at improving the detection and decreasing the number of pre-analytical  
33 mistakes in the near future.  
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47 (266 words)  
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50 KEY WORDS

51 PREANALYTICAL MISTAKES, PRIMARY CARE, QUALITATIVE APPROACH  
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55 The Authors wish to thank its collaboration in translation and revision to Prof. M Muñoz, School of  
56 Medicine, University of Málaga, Spain.  
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2 INTRODUCTION  
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5 The presence of errors in the **pre-analytical** phase is a widely studied topic. From the early studies  
6 by Plebani et al (1), several researchers have investigated on the high rates of mistakes in this phase  
7 of the laboratory process, although using different approaches and suggesting different solutions to  
8 avoid this problem (2-4).  
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12 Thus, some researchers focused on the sample quality, specifically the presence of haemolysis,  
13 stressing the importance of its absence and analysing their most likely causes (i.e. blood sampling  
14 method or use of pneumatic devices for samples transportation) (5-7). Other focused on the  
15 relationship between the presence of pre-analytical errors and the commitment to patient's safety,  
16 stressing the possible misinterpretation of the results (8-10). This argument became particularly  
17 important after the publication of the report "To err is human: Building a safer health system" (11);  
18 a document that contributed strongly to a paradigm shift on how to deal with the problems arising  
19 **related to patient's safety.**  
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22 Another line of research has focused on the reporting of malpractices in blood sampling, developing  
23 specific questionnaires for the professionals involved on critical steps (**e.g.**, sample labeling),  
24 offering a holistic approach to the problem, and adding the information from previous studies at  
25 hospital wards and extractions rooms (12-17).  
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28 Great attention has been paid to the detection and description of these errors (1, 3-4), followed by  
29 the development of actions for preventing them (18), especially after realizing that this problem far  
30 from solved, persisted despite the technological changes that had occurred during the last ten years  
31 (3). Finally, an observational study sought to identify the sources of errors that may occur from  
32 sample drawing at the health care point to the sample delivery at the central laboratory (19).  
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36 However, information regarding the perspective of the professionals involved in the pre-analytical  
37 phase is rather **scant**. **In recently report on the perspective of laboratory on this topic, we**  
38 **noted that both negative (weaknesses and threats) and positive aspects (strengths and**  
39 **opportunities) arose from organizational aspects, though positive ones were also influenced by**  
40 **staff professionalism and commitment.** (20).  
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48 To the best of our knowledge, no study has dealt with the perspective of primary health care  
49 professionals on pre-analytical errors. The present study was aimed to explore the perspective of  
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primary care professionals, applying the same methodology previously used for laboratory personnel.

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2 METHODS

3 Design

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5 **After approval by our institutional Research Ethics Committee, we convened two face-to-face**  
6 **group interviews** of professionals from Primary Care Centres (PCC) involved in the pre-analytical  
7 period (general practitioners [GP], community nurses [CN], and other **auxiliary** personnel,  
8 including administrative personnel). **Participants were selected among professionals from the**  
9 **PCC “Las Delicias” (Málaga city district), PCC “Coín” and PCC “Alhaurín el Grande”**  
10 **(Guadalhorce rural district) on the basis of fulfilling two inclusion criteria: capability for**  
11 **transmitting information regarding the investigated issue, and “social-significance” annexed**  
12 **to different roles within the pre-analytical processes.**

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20 **A member of the research team chaired both sessions, following a common guideline and**  
21 **formulating simple questions, directly referring to strengths, weaknesses, opportunities and**  
22 **threats (SWOT) perceived in the pre-analytical phase. Each participant was asked to explain**  
23 **all the SWOTs detected in the different steps of the pre-analytical phase, according to his own**  
24 **experience. This referred to the whole pre-analytical phase, and not only to the steps for which**  
25 **he was responsible. Participants were not compelled to respond to every item during the**  
26 **personal interview, so they could express their opinion at any moment during the meeting.**  
27 **The sessions were audio-recorded, and hand annotations were taken by the chair-person.**  
28 **Information saturation was achieved in 37 and 42 minutes respectively.**

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37 Analysis

38 **Usually, the SWOT-analysis is seen as the final step of the strategic analysis (21) . However, we**  
39 **use the SWOT structure as a guide: we performed a qualitative analysis with a**  
40 **phenomenological approach, offering a different way about how to obtain the information**  
41 **provided by the research participants, based in the qualitative paradigm.**

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48 We categorised the results by grouping the resultant dimensions according to SWOT structure for  
49 obtaining dimensions which give explanation to the phenomenon. **The number of citations are**  
50 **recorded the number of citations are counted to establish the importance of discourses based**  
51 **on the number of times discussed.**  
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## RESULTS

Overall, 16 professionals met the inclusion criteria, but only 12 attended the sessions (3 GP, 6 CN and 3 auxiliary personnel) who were distributed in two groups (6 and 6). Age, occupation (professional appointment) and gender were similarly distributed between groups. The number of commentaries for each item is given within squared brackets.

The most commented Strengths were the organisational framework and teamwork [4], with problem solving capability [4], and utilization of an intranet-based test request [3].

Main Weakness was the increase in workload (related with little time available for blood sampling; i.e., if they have one hour for blood sampling and the same number of patients, a lower number of nurses results in shortest time for each blood sampling) [4]. The participants also reported the absence of detailed analytical test profile for specific request (e.g., basic haemostasis) [3], delays in samples transportation [2], long distance between PCC and central laboratories [2], some characteristics of patients (e.g., elderly people, usually with poor venous access requires more time for sampling) [2], and lack of (low) flexibility in some analytical requests (e.g., electronic form are used only for analytical profiles, but not for single parameter requests) [2].

The Opportunities were related to the optimisation of the workload through on-line electronic form for analytical request [5], and the adoption of some protocol modifications for improving the whole process (e.g., centrifugation of samples at PCC, refrigerated transport) [2].

The Threats were related to the long time elapsed from blood sampling at PCC to sample delivery at the Central Laboratory, problems with cold storage (e.g., damaged refrigerators), the persistence of high workloads over the time, and problems with the use of paper forms when the requested tests were not included in the electronic form [3]. (See in detail at Table 1).

We can find other results in some items the number of participants, with no limit to explain their opinions; only the information overload is required to stop collecting data.

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2 DISCUSSION

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4 Though the presence of errors in the **pre-analytical** phase is an uncontroverted fact, and most of  
5 their causes have been identified, its correction is not so straightforward. Different approaches to  
6 the problem have contributed mightily to explain **its complexity**, but an approximation to the  
7 opinion of professionals involved in this process is lacking. Several researchers have performed  
8 qualitative approaches to this problem among nurses from **PCC**, using a questionnaire that mostly  
9 dealt with technical issues, but not specifically with personal perspectives (12,16).  
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15 In this regard, when inquiring a group of laboratory professionals about their views on this problem,  
16 a previous study revealed their involvement in this phase, and also their views on what kind of  
17 problems exert a major influence on the development of their professional activity (20). With this  
18 exception, an approach to the problem from the phenomenological point of view has not been  
19 accomplished. This approach allows not only to validate models or hypotheses, but to develop new  
20 concepts and ideas on the basis of collected data. **It also allows the researcher to have a full**  
21 **vision of the field of interest, since individual's perceptions are not just reduced to variables,**  
22 **but considered as a whole (22).**  
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30 To this end, the search for information was structured using the technique of focal groups (21), with  
31 the SWOT analysis as a guide for structuring the perspectives offered by participants.  
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33 It must be borne in mind that the SWOT is actually a methodology which is oriented mainly to help  
34 in making decisions on any aspect that needs to be resolved or improved. It has a strategic focus, as  
35 it lets one realizes that threats come from the future and the weakness from the present, but chronic  
36 weakness can be also considered as a threat (22). **However, this is a different way of using**  
37 **SWOT, because usually this analysis doesn't include a phenomenological analysis.**  
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43 The phenomenological approach allows knowing those aspects that cannot be elucidated by  
44 objective data measurement. It is difficult to measure the commitment of professionals in the  
45 solution of problems, but it is possible to know how important are these problems considered by the  
46 professionals. According to data depicted in Table 1, participants sought personnel's  
47 professionalism and **commitment** as basic tools to avoid or minimize **pre-analytical** errors. This  
48 way, attitudes considered as positive (strengths and opportunities) can be exploited by the  
49 institution, whereas those considered as negative (weaknesses and threats) **alert of** possible future  
50 problems. In addition, its ductility allows the use of others methodologies that may be an effective  
51 adjunct (e.g., the use of computer tools can lead to error minimization). Joining together these two  
52 ideas seems to be one of the basic strategies to achieve positive results in this area (23).  
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4 **In agreement with** previous views from laboratory professionals (20), for PCC professionals,  
5 problems associated with the current context of economic crisis (such as the decrease in the number  
6 of professionals and the consequent increase in workloads), along with structural deficiencies (such  
7 as the difficulties in ensuring the conservation of samples) are considered as threats (Table 1). **In**  
8 **contrast, PCC personnel did not consider the lack of training programs as a threat, whereas it**  
9 **was an important issue for laboratory staff. This is interpreted/perceived by laboratory staff**  
10 **as a deficient knowledge on laboratory procedures among PCC professionals (unknown**  
11 **known or unknown unknowns)**

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18 **Although we believe that our knowledge on the sources pre-analytical mistakes in PCC**  
19 **samples from primary care, at this moment, we don't detect any improvement, probably**  
20 **because we have not planned any intervention yet. However, we will undertake a failure mode**  
21 **analysis and effects (FMEA) to establish the correct flow of pre-analytical mistakes, together**  
22 **with a specific training activity for primary care professionals (20). New research projects of**  
23 **our team set a sample increase, in order to include health system managers and professionals**  
24 **from different health areas.**

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32 **Finally, we consider** that the obtained information will allow a more comprehensive understanding  
33 of the sources of pre-analytical errors; something that should always be a priority for health  
34 professionals. In addition, the complementary insights from two apparently antagonistic scientific  
35 paradigms should provide new points of view, contributing to a better identification of problems  
36 and, therefore, to a better planning and implementation of valid solutions. All this, together with the  
37 professionals' perception of "being heard", should provide a wider range of intervention  
38 possibilities, many of which would have not been detected otherwise.  
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