A complexity scale for clinical trials from the perspective of a pharmacy service

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ABSTRACT

Objective To establish a method for evaluating the complexity of clinical trials (CTs) from the perspective of a pharmacy service (PS) and to analyse the complexity of CTs carried out in a tertiary level hospital.

Methods An observational, prevalence and retrospective study was carried out in a Spanish tertiary level hospital during the period 2008–2013. A scale of complexity was developed, whose internal consistency was determined by Cronbach's alpha. The study involved five steps: an analysis of the activities involved, score allocation to the activities, identification of CTs started in the study period, data collection and assessment of the complexity. Three complexity levels were determined: low, medium and high. The variables calculated were mean overall complexity, mean complexity per medical specialty, per pathology, per phase of CT, per initiation year and percentage of CTs by complexity level.

Results Cronbach's alpha of the scale of complexity was 0.738. The two most influential items were dose preparation and number of professionals involved. 55.0% of CTs were in the medium level of complexity and 12.1% of CTs were in the high level. The mean complexity of CTs studied was 13.3 ± 4.7 (median 12, range 6–32). Statistically significant differences were found in the complexity values between CTs of different medical specialties, pathologies, phase and dose preparation in the PS ($p < 0.001$).

Conclusions The scale designed to evaluate the complexity of CTs had internal consistency. More than half of the CTs are in the medium level of complexity. The largest number of CTs with a high level of complexity were in rheumatology and oncology.

INTRODUCTION

The Guideline for Good Clinical Practice (GCP)¹ states that 'responsibility for investigational product(s) accountability at the trial site(s) rests with the investigator/institution'. In Spain, according to Law 29/2006 on guarantees and the rational use of drugs and healthcare products,² the custody, maintenance and prescription of drugs is the exclusive responsibility of the pharmacy services (PS) of hospitals or primary healthcare centres from the National Health System, for dispensing in these institutions. The investigator/institution and/or a pharmacist or other suitable individual, who has been designated by the investigator/institution, must keep a record of investigational drug (ID) shipments received at the trial centre, the inventory, use of drugs by subject, return to the sponsor and destruction of unused drugs.

Apart from the legal obligation of the PS in clinical trials (CTs), pharmacists must ensure compliance with the GCP and provide added value in terms of the quality and safety of the trial procedure.³

Various papers have discussed the activities carried out by pharmacists in CTs.^{3–18} These activities include verifying the reception of IDs, their storage in correct conditions with evidence of temperature conditions, calibrating temperature monitoring equipment used, dispensing IDs to patients or investigators, dose preparation in sterile conditions and ensuring blinding (if required), keeping a record of drugs returned by patients, returns to the sponsor and checking expiry dates.

These activities are monitored¹⁹ by clinical research organisations or by sponsors mainly focusing on the following aspects: reception, storage, dispensing, dose preparation, return of ID and documentation.

With regard to storage, according to Aldea *et al.*,²⁰ findings in CT audits carried out by Spanish health authorities show that storage of IDs is positioned in last place in terms of deviations detected (2 non-conformities in 23 inspections carried out in 14 hospital PS).

It is essential that all of the activities of the PS are correctly documented. According to the GCP,¹ records for the prescription of ID processes and records kept by the PS are considered as 'source documents' and must be available for monitoring visits, audits of the sponsor or inspections carried out by the health authorities.

IDs are increasingly sophisticated and their requirements for storage, preparation and monitoring are getting increasingly stricter¹⁵ which, together with the large number of ongoing CTs, has a direct effect on the workload of the PS although the dedication required differs from trial to trial. No studies have been found in the literature that evaluates the complexity of CTs from the perspective of the PS, nor any that describe a validated method of doing this, although some publications refer to the increase in the number of CTs in hospitals and their growing complexity.¹⁴

Our aim was to define a method for evaluating the complexity of CTs with drugs from the perspective of the PS and to analyse the complexity of the CTs carried out at a tertiary level hospital.

METHODS

A retrospective observational study was carried out at a Spanish tertiary university hospital during

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Table 1 Scores for activities involved in clinical trials in the pharmacy service

Items (activities and aspects considered)	Score assigned (0–3)
Blinding	
Open, with drugs provided by the sponsor ready to dispense	1
Open, with commercial drugs provided by the pharmacy service	2
Double-blind, provided by the sponsor and ready to dispense	2
Double-blind, maintaining the blinding in the pharmacy service	3
Number of drugs or presentations involved in the trial:	
1	1
2	2
≥3	3
Dispensing method:	
All drugs given to investigator	1
Dispensed individually to the investigator for each patient at each visit	2
Dispensed individually to the patient at each visit	3
Members of pharmacy service involved:	
1 pharmacist	1
1 pharmacist + 1 nurse/technician	3
Use of interactive systems (IVRS/IWRS) (if several options are used, add up points):	
Fax/email to confirm reception of investigational drugs	1
IVRS/IWRS to confirm reception of investigational drugs	2
IVRS/IWRS to randomise patients	2
IVRS/IWRS to assign treatments at each visit	3
Dose preparation in pharmacy service (if several options are used, add up points):	
No dose preparation	0
Extemporaneous preparation in pharmacy service	1
Preparation of placebo in pharmacy service	2
Preparation in sterile conditions	3
Storage conditions (if several options are used, add up points):	
Room temperature	1
Refrigerator	3
Freezer	3
Need for special conditioning material (special syringes, in-line filter, infusion equipment, light resistant bags)	
No	0
Yes	1

IVRS/IWRS, interactive voice response system/interactive web response system.

the period 2008–2013. All CTs started in the study period were included. There were no exclusion criteria.

In order to evaluate the complexity of the trials, the following steps were carried out:

1. A review of all of the activities involved in the CT in the PS, based on the standard operating procedure at the PS.

2. Score allocation ranging from 0 to 3 points for all of the activities involved, as shown in table 1. Resources consumed (professionals involved and time required) and risk level of the activity (critical activity for the patient and/or for the correct development of the trial) were taken into account. The activities and scores were agreed between four pharmacists involved in the CT.

3. Identification of the CT started in the study period and data collection.

4. Obtaining the score for each CT. The overall score for each CT was obtained by adding the scores obtained from the different items according to the scale shown in table 1.

5. Evaluation of complexity. Three levels of complexity were defined: low, medium and high. In order to define the cut-off points, the three most influential activities were considered (based on their median score). The following variables were calculated for the study period (2008–2013): mean overall complexity, mean complexity and percentage of CTs by medical specialty, pathology, phase and initiation year.

During the period 2008–2013, 340 CTs were started. This sample size allows estimation of their mean complexity based on the scale designed, with a precision of ± 0.53 points. The quantitative variables studied were expressed as mean $\pm$ SD, median and range.

To compare two means the Student t-test or the Mann–Whitney test was used. To compare more than two means the ANOVA test or Kruskal–Wallis test was used. The normality of the variables was compared using the Kolmogorov–Smirnov test. The association of qualitative variables was carried out using the χ^2 test or Fisher exact test.

All tests were carried out from a bilateral approach, considering values of $p < 0.05$ as statistically significant.

The internal consistency of the complexity scale was determined using Cronbach's alpha. We also determined the correlation between the final score and each item of the scale.

The statistical analysis was carried out using the programme SPSS 19.0 for Windows.

The project was authorised by the Regional Ethical Review Board.

RESULTS

The measurement of the complexity of CTs from the perspective of the PS is based on allocation of scores to different activities involved in the trial procedure, defining the complexity of a CT as its overall score.

To calculate the reliability of the scale, Cronbach's alpha was used to measure its internal consistency as well as for each item.

Table 2 Analysis of the internal consistency of the complexity scale

	Mean of the scale if the element is eliminated	Variance of the scale if the element is eliminated	Corrected element: total correlation	Cronbach's alpha if the element is eliminated
Blinding	11.62	19.670	0.304	0.733
No of drugs	11.25	19.496	0.225	0.746
No of professionals involved	11.64	15.442	0.753	0.648
Dispensing method	10.76	19.448	0.472	0.718
Dose preparation in pharmacy service	12.27	12.241	0.712	0.641
Storage conditions	10.96	15.677	0.459	0.710
Use of interactive systems	11.38	16.549	0.387	0.726
Need for special conditioning material	13.19	20.600	0.423	0.733

Table 3 General characteristics of clinical trials

n=340	n (%)	95% CI
Phase		
I	8 (2.3)	0.6 to 4.1
I–II	6 (1.8)	0.2 to 3.3
II	87 (25.6)	20.8 to 30.4
II–III	4 (1.2)	0.3 to 3.0
III	197 (57.9)	52.5 to 63.3
III–IV	4 (1.2)	0.3 to 3.0
IV	34 (10.0)	7.9 to 15.0
Blinding		
Open	161 (47.4)	41.9 to 52.8
Double-blind	178 (52.3)	46.9 to 57.8
Single-blind	1 (0.3)	0.1 to 1.6
Randomisation		
Yes	262 (77.1)	72.4 to 81.7
No	78 (22.9)	18.3 to 27.6
Setting		
International multicentre	272 (80.0)	75.6 to 84.4
National multicentre	67 (19.7)	15.3 to 24.1
Single centre	1 (0.3)	0.1 to 1.6
Sponsor		
Pharmaceutical companies	286 (84.1)	80.1 to 88.1
Scientific group	48 (14.1)	10.3 to 18.0
Investigator	6 (1.8)	0.2 to 3.3
Medical specialty		
Oncology	103 (30.29)	25.3 to 35.3
Rheumatology	88 (25.88)	21.1 to 30.7
Haematology	27 (7.94)	4.9 to 11.0
Endocrinology	21 (6.18)	3.5 to 8.9
Internal medicine	21 (6.18)	3.5 to 8.9
Urology	14 (4.12)	1.9 to 6.4
Pneumology	14 (4.12)	1.9 to 6.4
Cardiology	11 (3.23)	1.2 to 5.3
Others (<10CTs/specialty)	41 (12.06)	8.5 to 15.7
Pathology		
Rheumatoid arthritis	53 (15.59)	11.6 to 19.6
Breast cancer	27 (7.94)	4.9 to 11.0
Non-small cell lung cancer	22 (6.47)	3.7 to 9.2
Type 2 diabetes mellitus	20 (5.88)	3.2 to 8.5
Colorectal cancer	19 (5.59)	3.0 to 8.2
Prostate cancer	15 (4.41)	2.1 to 6.7
Chronic hepatitis C	12 (3.53)	1.4 to 5.6
Spondyloarthropathies	11 (3.24)	1.2 to 5.2
Others (<10CTs/pathology)	161 (47.35)	41.9 to 52.8

Cronbach's alpha for our complexity scale was 0.738. Table 2 shows the values obtained for each item.

The correlations of seven of the eight items with the total score were higher than 0.30. The correlation of the number of drugs or presentations involved in a trial was 0.225, which means this item could be discarded and, if it is eliminated, Cronbach's alpha for our

complexity scale rises from 0.738 to 0.746. The three items that correlate best with the complexity are the number of professionals involved, dosage in the PS and how the drug was dispensed.

Based on this scale, the complexity of a CT can vary between 6 and 33 points. In order to identify the cut-off points and define the three levels of complexity, the three items best correlated with the complexity (according to the internal consistency analysis) were considered—namely, (1) professionals involved in the CT; (2) dose preparation of the ID in the PS; and (3) how the drug was dispensed.

The median score of CTs started between 2008 and 2010 and the greater or lesser complexity based on the above three items was considered in order to define the cut-off points. Thus, high complexity trials for the PS were considered as those that involve the pharmacist and nursing staff, require dosage by the PS and individual dispensation for each patient. This group of trials obtained a median score of 19 points. Low complexity trials were considered as those that only involved the pharmacist and do not require dosage or individualised dispensation to the patient. These trials had a median score of 10 points. As a result, the levels of complexity were defined as follows:

- Level 1, low complexity: total score 6–10 points
- Level 2, medium complexity: 11–19 points
- Level 3, high complexity: 20–33 points

Table 3 shows the general characteristics of the CTs included in the study and the distribution per medical specialty and pathology.

The mean overall complexity of CTs started between 2008 and 2013 was medium, with a mean score of 13.3 ± 4.7 (median 12, range 6–32). Table 4 shows the values obtained for each level of complexity.

Forty-one trials with a high complexity were in the following medical specialties: rheumatology, 58.5% (n=24); oncology, 29.3% (n=12); and others, 12.2% (n=5).

Table 5 shows the complexity per medical specialty, pathology, phase and distribution of CT in each level. Statistically significant differences were found in the complexity score between CTs of different medical specialities, pathologies and also by phase ($p < 0.001$). The complexity decreased as the phase progressed.

Table 6 shows the results of the analysis carried out according to the blinding and dose preparation in the PS. There are statistically significant differences in the complexity score depending on this activity ($p < 0.001$).

DISCUSSION

According to the scale used to determine the complexity of the CTs carried out, and taking into account critical activities for the patient and the correct development of the trial, eight aspects associated with the dedication required were considered (see table 1).

Cronbach's alpha is a measure of internal consistency of a determinate scale—that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. Cronbach's alpha must be higher than 0.70^{21 22} for scales with internal consistency and the correlation between

Table 4 Distribution of clinical trials (CTs) in each level of complexity

Level of complexity	No (%) of CTs	95% CI	Mean±SD score	Median	Range
Low	112 (32.9)	27.8 to 38.1	8.9±0.9	9	6–10
Medium	187 (55.0)	49.6 to 60.4	13.9±2.7	13	11–19
High	41 (12.1)	8.4 to 15.7	22.5±2.8	21	20–32

Table 5 Values of complexity of clinical trials (CTs) per medical specialty, per pathology, per phase and distribution in each level of complexity

	n	Values of complexity (p<0.001)			Distribution of CTs by level of complexity		
		Mean±SD	Median	Range	Low n (%)	Medium n (%)	High n (%)
Medical specialty							
Oncology	103	14.6±4.3	15	7–25	24 (23.3)	67 (65.0)	12 (11.7)
Rheumatology	88	14.7±5.6	12	8–29	17 (19.3)	47 (53.4)	24 (27.3)
Haematology	27	12.4±10.0	11	6–21	12 (44.4)	14 (51.9)	1 (3.7)
Endocrinology	21	11.4±1.8	12	8–14	7 (33.3)	14 (66.7)	0 (0.0)
Internal medicine	21	11.9±2.2	12	8–15	5 (23.8)	16 (76.2)	0 (0.0)
Urology	14	10.8±6.2	9	7–32	12 (85.7)	1 (7.1)	1 (7.1)
Pneumology	14	11.2±1.8	11	9–14	4 (28.6)	10 (71.4)	0 (0.0)
Cardiology	11	10.6±3.6	9	8–21	7 (63.6)	3 (27.3)	1 (9.1)
Others (<10 CT/specialty)	41	11.4±4.0	10	7–24	24 (58.5)	15 (36.6)	2 (4.9)
Total	340	13.3±4.7	12	6–32	112 (32.9)	187 (55.0)	41 (12.1)
Pathology							
Rheumatoid arthritis	53	15.4±5.6	13	8–29	7 (13.2)	30 (56.6)	16 (30.2)
Breast cancer	27	15.5±4.0	16	8–21	3 (11.1)	19 (70.4)	5 (18.5)
Non-small cell lung cancer	22	14.9±4.3	14.5	8–25	3 (13.6)	16 (72.7)	3 (13.6)
Type 2 diabetes mellitus	20	11.6±1.6	12	9–14	6 (30.0)	14 (70.0)	0 (0.0)
Colorectal cancer	19	16.6±3.5	18	8–21	2 (10.5)	15 (78.9)	2 (10.5)
Prostate cancer	15	11.1±6.1	9	7–32	11 (73.3)	3 (20.0)	1 (6.7)
Chronic hepatitis C	12	12.5±2.3	13	8–15	2 (16.7)	10 (83.3)	0 (0.0)
Spondyloarthropathies	11	14.9±5.8	12	9–24	2 (18.2)	6 (54.5)	3 (27.3)
Others (<10 CT/pathology)	161	12.0±4.1	11	6–27	76 (47.2)	74 (46.0)	11 (6.8)
Total	340	13.3±4.7	12	6–32	112 (32.9)	187 (55.0)	41 (12.1)
Phase*							
I	14	17.1±5.3	17	9–26	1 (7.1)	8 (57.1)	5 (35.7)
II	91	14.6±5.0	14	8–27	25 (27.5)	50 (54.9)	16 (17.6)
III	201	12.7±4.4	11	6–32	69 (34.3)	114 (56.7)	18 (9.0)
IV	34	11.8±3.9	10.5	7–25	17 (50.0)	15 (44.1)	2 (5.9)
Total	340	13.3±4.7	12	6–32	112 (32.9)	187 (55.0)	41 (12.1)

*Trials have been grouped as phase I and phase I–II, phase II and II–III and phase III and III–IV.

the final score and each of the items must be 0.30 or higher.²¹ Cronbach's alpha for our scale was 0.738, and the three items that correlated best with complexity were the number of professionals involved, dosage in the PS and how the drug is dispensed.

With regard to the different items considered, blinding influences presentation and labelling of IDs. According to the GCP,¹ labelling of IDs must comply with current regulations. In Europe, Annex 13 of Good Manufacturing Practices²³ defines the information that must appear on the primary packaging and on the secondary packaging. Labelling of IDs must be checked by the pharmacist when drugs are received because current regulations are not always followed.²⁴

Open CTs received a lower score as they are less complex, although if they are open but the drug is not provided by the

sponsor and has to be provided by the investigation centre, these open trials receive an additional point. This was done because, in this case, to ensure traceability of the ID, it is advisable to separate a single batch for use in the trial and store it in the CT area, outside of the usual prescription circuits in the hospital.

In double-blind CTs, the packaging is usually identified with a code. This implies that IDs must be stored in rigorous order and that great care must be taken when dispensing the treatment assigned to each patient, especially when different presentations have been assigned. The process of assigning treatment is usually carried out using an interactive voice/web response system (IVRS/IWRS) so that the investigator and pharmacist responsible for the study receive by email or fax the numbers of the kits they have to dispense.

Table 6 Values of complexity of clinical trials (CTs) according to blinding and dose preparation in the pharmacy service and distribution in each level of complexity

	No of CTs	Mean±SD	Median	Range	p Value	Low (% CT)	Medium (% CT)	High (% CT)	p Value
Blinding									
Open*	161	12.8±4.0	12	6–21	0.130	38.5	57.1	4.3	<0.001
Double-blind*	178	13.8±4.0	12	8–32		28.1	52.8	19.1	
Dose preparation in PS									
Yes	112		18.5	13–32	<0.001	0.0	63.4	36.6	<0.001
No	228		11	6–16		49.1	50.9	0.0	

*One single-blind trial excluded.

In the case of double-blind CTs when ensuring blinding in the PS is required, an additional point is given because this adds more complexity to the dispensing process and supposes a greater risk for the correct trial development. It is necessary to define the mechanisms to avoid affecting the blinding process.

The number of IDs or presentations involved has been evaluated because their storage is more complex, there are several batches and expiry dates, they need to be stored in a strict order, and there may be a greater probability of confusion in the dispensing process. This item could have been eliminated because it had the lowest correlation in the internal consistency analysis, but it was kept because its removal did not lead to any significant variation in Cronbach's alpha.

The higher score in dispensation of IDs to the patient in each scheduled visit is explained by the fact that the pharmacist must give the patient some information relating to storage, administration and return of kits dispensed. We did not consider patient returns because, in general, the count is done by the investigator, checked by the monitor and stored in the PS until they are returned to the sponsor or destroyed.

The number of professionals involved includes pharmacist and technical/nursing staff. In our PS, nursing staff are responsible for dose preparation in CTs (if required). Coordination between professionals involved in the CT made standardised operating procedures necessary for each trial. Also, dose preparation logs to ensure traceability and specific labels are designed for each CT. Dosage under sterile conditions in the PS is a critical activity for the patient and the correct development of the trial, so it has a higher score. Blinding maintenance in the PS adds complexity. Blinding is a key factor for the robustness of many CTs.²⁵ As described in the ICH E9 guidelines, blinding and randomisation are the most important design techniques to prevent bias in CTs.²⁶

A higher number of CTs required the use of IVRS/IWRS systems with a personal access code for pharmacists. It is usually necessary to do training courses that are used to confirm ID reception and sometimes to randomise the subjects and assign them the treatment at each visit.

The use of special conditioning material such as in-line filters, special infusion equipment, low absorption equipment, light-resistant bags and opaque bags for blinding has also been considered.

Complexity of CTs during the period 2008–2013

A total of 340 CTs started between 2008 and 2013 were included in the study. Most of the CTs were phase II and III (85.9%), double-blind (52.3%), international (80%) and commercial (84.1%); 56.17% of the trials were in oncology and rheumatology. The most studied pathologies were rheumatoid arthritis, breast cancer, non-small cell lung cancer, type 2 diabetes mellitus, colorectal cancer, prostate cancer, chronic hepatitis C and spondyloarthropathies, with >10 CTs per pathology during the study period.

Complexity was medium in the 6 years studied (mean 13.3 ± 4.7 , median 12, range 6–32). Of the trials studied, 55% were of medium complexity, 32.9% were of low complexity and 12.1% had a high level of complexity.

The 112 CTs with a low level of complexity were in oncology (21.4%, $n=24$), rheumatology (15.2%, $n=17$), haematology (10.7%, $n=12$) and urology (10.7%, $n=12$), and the 41 trials with a high level of complexity were in rheumatology (58.5%, $n=24$), oncology (29.3%, $n=12$) and other specialties, each

with one trial (12.2%, $n=5$). The medical specialties with the highest median score were oncology (15), rheumatology (12), endocrinology (12) and internal medicine (12). If we consider the mean complexity, the values for rheumatology and oncology were 14.7 ± 5.6 and 14.6 ± 4.3 , respectively, with statistically significant differences in the score obtained for the different specialties ($p < 0.001$).

Rheumatology CTs ($n=88$) obtained a higher score due to the following factors:

- ▶ 63/88 of the CTs involved thermolabile drugs
- ▶ 31/88 CTs required dose preparation under sterile conditions in the PS; 23/31 CTs needed masking in the PS
- ▶ 31/88 CTs used three or more presentations of ID (ie, different drugs or different presentations of the same drug)
- ▶ 78/88 of the CTs required the use of IVRS/IWRS systems; 62/78 were only to confirm reception of the ID and 16/78 to randomise and/or assign treatments in each scheduled visit
- ▶ 14/88 of the CTs required special conditioning material

With regard to the complexity per pathology investigated, all CTs were located in the medium level, and the five pathologies with the highest score (mean $\pm$ SD) were: colorectal cancer (16.6 ± 3.5), breast cancer (15.5 ± 4.0), rheumatoid arthritis (15.4 ± 5.6), non-small cell lung cancer (14.9 ± 4.3) and spondyloarthropathies (14.9 ± 5.8). Statistically significant differences were found in the mean score according to the pathologies involved ($p < 0.001$).

With regard to the distribution of CTs by pathology, pathologies with the largest number of trials with a high level of complexity were rheumatoid arthritis (30.2%), spondyloarthropathies (27.3%), breast cancer (18.5%), non-small cell lung cancer (13.6%) and colorectal cancer (10.5%).

With regard to the CT phase, all trials had a medium level of complexity with statistically significant differences in the mean score for each phase ($p < 0.001$). It was found that the median score decreased as the phase of the CT increased. With regard to the distribution of CTs by phase in each level of complexity, phase I had the highest percentage of CTs with a high level of complexity (35.7%) and the smallest percentage of CTs with a low level of complexity (7.1%).

It was found that double-blind CTs had a mean complexity one point higher than open trials, with no statistically significant difference ($p=0.130$). Trials that required dose preparation in the PS had a median complexity 7.5 points higher than those that did not ($p < 0.001$).

Masking to maintain blinding and dose preparation increase the complexity of the CT to a higher level. In our study, 37 trials in which these activities were carried out had a mean complexity of 21.95 ± 3.87 .

We did not find any reference in the literature to studies evaluating the complexity of CTs, so it has not been possible to compare the results obtained. The results obtained with 340 trials have made it possible to verify this as a valid approach for the evaluation of complexity. Complexity scores, especially for CTs with the highest level of complexity, agree with the individual perceptions of pharmacists involved in CTs in our service.

Published studies reflect the workload associated with CTs according to different indicators of activity, which vary between hospitals. Gómez Pérez *et al*²⁷ refers to the activity indicators in the period 2004–2007 of five tertiary hospitals in Spain that are comparable to our centre. This study showed the different criteria used by different hospitals to calculate the same indicator and the workload that CTs represent in each centre.

What this paper adds

What is already known on this subject?

- The role of pharmacy service in development of clinical trials.

What this study adds?

- Our paper describes a method to evaluate the complexity of clinical trials. Based on the experience carried out in a 1500-bed tertiary level hospital, we propose a model to understand the workload of the pharmacy services of research centres.
- Our study defines a scale with internal consistency to evaluate the complexity of clinical trials.

The complexity of CTs from the perspective of the PS is associated with the resources consumed in terms of staff and time. Resources consumed should be considered to define the payment that the PS receives for its participation in CTs. Revenue generated by CTs should be in proportion to the impact they have on PS workload. A system based on payment of fees depending on the complexity of the CT should be considered instead of a fixed percentage for all CTs, which is currently the most widespread system used in Spanish hospitals.

CONCLUSION

The scale designed to evaluate the complexity of CTs from the perspective of the PS had internal consistency. The most influential items were dose preparation in the PS and the number of professionals involved. Decreasing complexity was observed as the phase of the CT progressed.

Approximately half of the CTs carried out in our hospital had a medium level of complexity. Trials with a high complexity were concentrated in rheumatology and oncology. The pathology with the highest complexity CTs during the study period was colorectal cancer.

Competing interests None declared.

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