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ORIGINAL ARTICLE

Application of joint analysis to ongoing training of pharmacy personnel

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KEYWORDS
Joint analysis;
Ongoing training;
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Preferences

Abstract
Introduction: Ongoing training by means of clinical sessions constitutes an essential activity for a pharmacy department, being joint analysis useful to adapt the clinical sessions' characteristics to the preferences of the professionals involved. By means of this study we hope to optimize clinical sessions for their better use and efficiency.
Methods: A least squares model was used to assess the usefulness of different clinical session profiles. Data was collected from 14 individual interviews (7 specialists and 7 residents); these interviews consisted in ordering the clinical session profiles by order of preference.
Results: The most valued attributes were duration of sessions (29.9%) and the structure of teaching content (27.8%) in both groups studied; although the duration of the sessions was assigned greater value by the group of residents (31.1% vs. 27.2%). The availability of bibliographical references was the third attribute most valued (17.9%), and the two last attributes by order of importance were availability of a copy in files for storage (13.8%) and multimedia content (10.5%).
Discussion: The adaptation of clinical sessions as an integral part of ongoing training leads us to see that we can modify the duration, content structure and availability of bibliographical references so as to adapt them to the preferences of the professionals involved. However, according to the population surveyed, other attributes are of little importance

PALABRAS CLAVE
Análisis conjunto;
Formación continua;
Sesiones clínicas;
Preferencias

Aplicación del análisis conjunto en la formación continua de un servicio de farmacia

Resumen
Introducción: La formación continua a través de las sesiones clínicas constituye una actividad esencial en un servicio de farmacia, mediante el análisis conjunto podemos adecuar las características de las sesiones clínicas a las preferencias de los profesionales. Mediante este estudio

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se pretende optimizar las sesiones clínicas para un mayor aprovechamiento y eficiencia de sesiones clínicas.
Métodos: Se utilizó un modelo de mínimos cuadrados para evaluar la utilidad de los diferentes perfiles de sesiones clínicas. Los datos se recogieron de 14 entrevistas individuales (7 facultativos especialistas y 7 residentes), que consistían en ordenar los perfiles de sesiones clínicas por orden de preferencia.
Resultados: Los atributos más valorados fueron la duración de las sesiones (29,9%) y la estructura de contenidos docentes (27,8%) en ambos segmentos estudiados, si bien la duración de las sesiones fue el más valorado en los segmentos de los residentes (31,1% vs. 27,2%). La disponibilidad de referencias bibliográficas fue el tercer atributo más valorado (17,9%), y los 2 últimos por orden de importancia fueron la disponibilidad de una copia en archivos de almacenamiento (13,8%) y contenidos multimedia (10,5%).
Discusión: La adecuación de las sesiones clínicas como parte integral de la formación continua nos lleva a que podemos modificar la duración, estructura de contenidos y disponibilidad de referencias bibliográficas de ellas para adaptarlas a las preferencias de los facultativos. Sin embargo, otros atributos apenas tienen importancia para los encuestados.

New technologies are continually introduced to healthcare processes, which means that ongoing training[1,2] represents a fundamental aspect of any healthcare organisation, especially a Pharmacy Department. As with any type of teaching method used in any type of environment, it is important to know the users' preferences so that objectives can be fulfilled. As such, joint analysis[3-6] (JA) has great potential for being a decision-making tool in medicine[7-10] and training.[11,12]

JA is a multivariant technique which is used to study consumer preferences for goods or services with certain attributes.[13-16] The method is based on consumers (or users[17-18]) evaluating a product's total utility considering partial values which its *attributes* respectively provide.

To apply this method, a set of products must be designed by combining *levels* (values that each attribute can adopt) chosen from each of the product's or service's characteristics that are to be valued. The characteristics used are chosen mainly due to the fact that they can be modified or controlled once the results have been collected. In order to evaluate them, a group of potential customers (or users) are asked to express their individual preferences for each of the combinations presented *(stimuli).* Each respondent only gives the value or preference for the product that it is presented with. In this way, we are able to establish that each item or service can be described by its characteristics (or *attributes*) and that an individual can assess it depending on these characteristics. This method aims to obtain an indirect utility function in which the utility that the consumption of a product or service that an individual gives it is expressed in accordance with the level that its defining characteristics reach.[19,20]

This data collecting and analysis method (known as joint analysis) is gaining ground in healthcare[21,22] and training and has been successfully applied to issues such as surgery waiting lists,[23,24] choosing optimum treatment,[25-27] assessing healthcare technologies,[28,29] and establishing the best type of medical visit depending on the doctor-patient relationship.[30] It is especially useful when trying to establish an optimal service using limited resources given that it can determine the relative importance of each *attribute* and its utility.

This study was conducted in agreement with the preferences of medical staff from a Pharmacy Department regarding a set of alternatives indicated by different levels of chosen attributes. It aims to define the most suitable characteristics for the clinical sessions given in the Pharmacy Department and therefore to ensure that the most is made from training. The sample comes from a survey that was conducted in May 2009, involving specialists and resident junior doctors from the Pharmacy Department at the Hospital Universitario Reina Sofía (Cordoba, Spain).

Method

The JA is a modular structure, given that it requires several stages which depend on the research project's initial objectives. These phases are[4,5]:

Identifying attributes and establishing levels

In accordance with this methodology, attributes (characteristics which define the department) and levels (values that each attribute can adopt) were defined (Table 1). The number of *attributes* needed in the study was reduced to five so that a conclusion could be obtained from the respondent more easily. *Attributes* were chosen due to their determining and controllable factor, i.e. those which were modifiable and could improve session quality. So that clearer results could be obtained and in order to facilitate data collecting, the number of levels for each *attribute* was kept to a minimum.

Choosing a preference model

It was assumed that the preferences follow the *additive aggregation rule*, and as such, each of the respondents had to value each attribute for each combination.

Table 1 Clinical sessions attributes and levels

Clinical sessions
Duration
Less than 20 min
Between 20-30 min
More than 30 min
Availability of bibliographical references used
No
Yes
Files available in data storage devices
Yes
No
Structure of educational content
Introduction and core material for the session
Case reports and core material for the session
Case reports, an introduction, and core material for the session
Only core material for the session
Multimedia contents
High contents
Average contents
Low contents

Choosing combinations to study

Given the large number of combinations to choose from among the different attributes and levels (144), an orthogonal, fractional factorial design was carried out using the statistical software SPSS 15© to reduce this number. Using this process, 16 cards were obtained that combined the different attributes with their different levels (Table 2).

Data collecting

The "full profile" method was used to collect data, which consisted in showing all the attributes simultaneously to the respondents. This is the closest option to a real-life decision-making situation despite the disadvantage that there is a large number of possible combinations to evaluate.

The different types of cards were given to the respondents and the different attributes and their levels were explained before they were asked to value them. The respondents had to value each attribute from 1 to 16 (1 was the most liked and 16 the least liked). Fourteen respondents completed the survey, 7 resident junior doctors and 7 assistant specialists, all of which usually participate in clinical sessions as students or speakers. The survey was conducted individually by the respondents and data collected during May 2009 by means of individual questionnaires. All of the respondents had spent at least one year attending and participating in clinical sessions.

Reliability and validity of results

Data analysis and reliability of the estimates were carried out using a SPSS Conjoint procedure (it uses a least squares model to establish utility and importance). The result that the Conjoint procedure gives for each factor level is in the

Table 2 Profiles of the 16 cards presented to the respondents

ID	Availability of bibliographical references used	Multimedia contents	Structure of educational contents	Session duration, min	Availability of files on data storage devices
1	Yes	Average contents	Case reports+core material	>30	Yes
2	No	High contents	Introduction+core material	>30	No
3	Yes	High contents	Only core material	20-30	No
4	Yes	High contents	Introduction+examples+core material	<20	No
5	Yes	Average contents	Introduction+core material	<20	No
6	No	Average contents	Only core material	<20	No
7	No	High contents	Introduction+core material	<20	Yes
8	Yes	Low contents	Introduction+core material	<20	Yes
9	No	Low contents	Introduction+examples+core material	>30	No
10	Yes	High contents	Only core material	>30	Yes
11	No	High contents	Case reports+core material	<20	No
12	No	High contents	Introduction+core material	20-30	Yes
13	Yes	Low contents	Case reports+core material	20-30	No
14	Yes	High contents	Introduction+examples+core material	<20	Yes
15	No	Low contents	Only core material	<20	Yes
16	No	Average contents	Introduction+examples+core material	20-30	Yes

form of utility points, known as partial contributions or part-worths. This utility point system is similar to regression coefficients in that they quantitatively measure the preference for each factor level. Partial contributions are expressed as a common unit, so that the total utility or overall preference can be obtained from any combination of factor levels.

The Conjoint procedure used in this study has been carried out using a least square methodology. In this sense, the estimate model is based on the fact that an individual's preference regarding a combination of levels is an additive function of the utilities of each of the levels of attributes that form this combination. And as such, the low values of one attribute can be compensated with the high values from another.

Mathematically, the utility would be expressed as:

Where: y_t: is the evaluation of preference on the stimulus t, *a* is a constant term, β_{ij} is the utility or *part-worth* associated with j-*th* level of the i-*th* attribute, 1=*ijx* if the j-*th* attribute level *i* is present in the *t* stimulus, 0=*ijx* if the j-*th* attribute level *i* is not present in the *t* stimulus, *et* is a residual term.

The importance of attribute A_i is defined in terms of the range of partial values in all levels of this attribute:

for each i

If we were to compare the relative importance of the attribute, we would use the following formula:

Results

Data was analysed on a total level (total number of respondents) and by separating the different degrees of professionalism (specialists and resident junior doctors). The results are presented in Table 3. The table shows that the total utility is 14.934, which would be the sum of the constant and the utility of the different levels for each attribute having used the additive preference model.

We were able to find out the individual weighting for each of the attribute levels analysed, and more importantly were able to check the relative weighting for each attribute in the conjoint of the study by dividing the range by each one of the levels for a given attribute and then adding all of the ranges (Table 4), which is presented in the form of a graph in Figure.

We have seen that the duration of the sessions is the most important *attribute* (29.9%), but that it is more important for the resident junior doctors (31.1%) than the specialists (27.2%). Slightly below duration was the attribute related to educational content of the sessions (27.5%).

The educational content of the sessions is the second most important *attribute* for the respondents (27.8%).

Table 3 Utility results from SPSS 15© (least squares model)

	Utility	Typical error
Session duration		
Less than 20 min	−2.234	0.479
Between 20-30 min	−4.468	0.957
More than 30 min	−6.701	1.436
Availability of bibliographical references used		
Yes	−2.679	0.794
No	−5.357	1.587
Files available on data storage devices		
Yes	−2.071	0.794
No	−4.143	1.587
Structure of educational content		
Introduction+example+core material	−1.382	0.355
Introduction+core material	−2.764	0.710
Case reports+core material	−4.146	1.065
Only core material	−5.529	1.420
Multimedia contents		
High contents	−0.786	0.479
Average contents	−1.571	0.957
Low contents	−2.357	1.436
(constant)	24.364	2.276

Table 4 Importance of attributes

	Utility	*Importance*
Session duration		
Less than 20 min	−2.234	29.9%
Between 20-30 min	−4.468	
More than 30 min	−6.701	
Availability of bibliographical references used		
Yes	−2.679	17.9%
No	−5.357	
Files available on data storage devices		
Yes	−2.071	13.9%
No	−4.143	
Structure of educational content		
Introduction+example+ core material	−1.382	27.8%
Introduction+core material	−2.764	
Case reports+core material	−4.146	
Only core material	−5.529	
Multimedia content		
High content	−0.786	10.5%
Average content	−1.571	
Low content	−2.357	

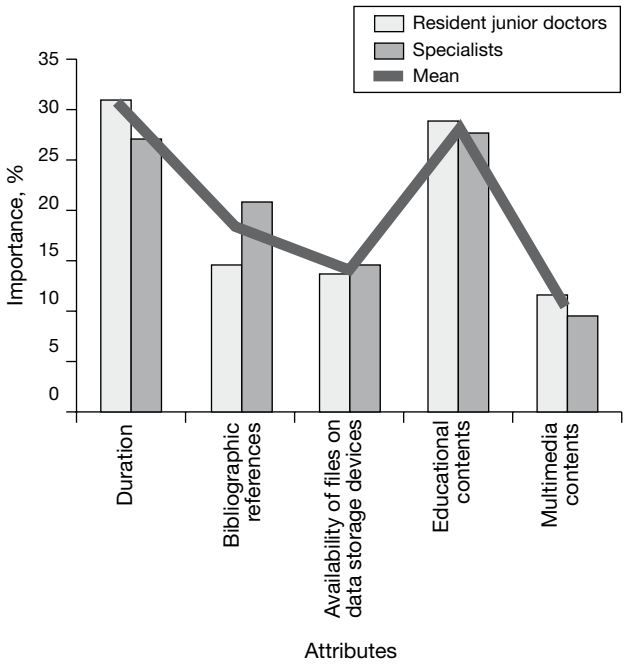

Figure Total importance of the attributes, separated by segments.

Table 5 Ideal profile of a clinical session according to results

Clinical sessions
Duration
Less than 20 min
Availability of bibliographical references used
Yes
Files available on data storage devices
Yes
Structure of educational content
Case reports, introduction, and core material for the session
Multimedia contents
High contents

However, as we have already mentioned there are differences between the two groups: resident junior doctors (28.3%) and specialists (27.5%). As is observed, specialists find educational material slightly more important than session duration (27.2%).

The third most important *attribute* is the availability of bibliographical references included in clinical sessions (17.9%). However, for this *attribute* there is a greater difference between the respondent populations: the resident junior doctors found this attribute to be less important (14.6%) than the specialists (20.9%).

The forth *attribute* is the availability of the session files on data storage devices or sent by group email (13.9%) and is almost the same between the two respondent groups, with only a difference of one percentage point: resident junior doctors (13.6%) and specialists (14.9%). For resident junior doctors there is only 1% difference between this *attribute* and availability of bibliographical references, where for specialists the difference is 6%.

Lastly, multimedia content represents the least important *attribute* (10.5%), which is less than 10% for specialists. However, this attribute is more important for resident junior doctors (11.7%).

Duration, educational content and availability of bibliographical references together have an overall importance of around 75%. This overall importance is the same for both specialists and resident junior doctors, with the remaining *attributes* being less important. The relative weighting of the *attributes* can be found in accordance with these results, by finding the difference between the utility values of the levels of each of the attributes and comparing it with the total. Logically, relative weighting confirms that the most valued *attributes* are the structure of educational content (27.8%), duration (29.9%), and availability of bibliographical references (17.9%). The remaining 2, multimedia content and availability of session files (13.9% and 10.5%, respectively) are less valued, so that their total does not even reach 25%. Using the results shown above, an ideal session profile can be created, and is presented in Table 5.

Although importance has been broken down by professional category of the respondents and overall importance, we have not been able to estimate the statistical differences for utility of the two population segments. This is because it would only really be possible to find differences between the two populations if a much larger sample were to be used.

Discussion

JA is a very valid tool to evaluate a population segment's preferences. This tool is mainly used in marketing, but has been extended to healthcare for evaluating decision-making tools[29] or assessing preferences with regards doctor-patient relations.[30] As such, this study has tried to find out healthcare professionals' preferences with regards clinical sessions, so as to make their format more attractive and so better use can be made of them.

Although more time and effort is spent providing healthcare, ongoing training by means of clinical sessions enables staff to become familiar with and evaluate new healthcare technologies and processes which are carried out in a Pharmacy Department and which is essential to their line of work.

The JA results have shown that the clinical sessions' format should fundamentally be in line with the time available and the educational content. In this study, both segment populations, resident junior doctors and

specialists, consider these attributes to be the most important. Availability of bibliographical references used in these sessions is considered as the third most important attribute. These three attributes are the most important with regards clinical session characteristics, representing three quarters of the results. As such, the least important attributes for the respondents are access to files of the sessions or use of multimedia content in the sessions. It seems logical that the pressure on the healthcare service may have some type of influence on the results from this study, considering that if the session were to last longer, a significant loss would be produced on the utility. It is almost certain that if we could have analysed these preferences with a larger sample, clearer results would have been produced regarding the preferences of the professionals that attend clinical session.

As well as the least square method used in this study, a different methodology could have been used by means of three estimate procedures ordinal Logit, ordinal Probit and doubly-censored Tobit. However, the methodology used is considered to obtain the greatest precision and most detailed analysis for any JA application.[31]

The possibility of finding out users' or department's opinions or "satisfaction" does not only relate to JA or other decomposition methods, but it represents a viable and relatively simple option to find out the overall "value" of a department. Furthermore, it can reduce subjectivity to a minimum that would be produced, for example, in other methods such as satisfaction questionnaires. It is important to mention how this last method, widely used in healthcare, is different to the method that we used. Its main disadvantages are that questionnaires obtain disparate results, satisfaction is subjective, individuals are less likely to participate with this type of survey, and it is considered a "passive" approach, i.e. the end user values a product that is already complete. However, this methodology can be complementary to this type of survey, allowing a product or service to be modified or adapted in accordance with the users' needs and the limited availability of resources to create a product or service.

Conclusions

This study shows that not only can clinical sessions used in ongoing training be adapted to its users' preferences so that they make better use of knowledge and ideas, but that it can be extended to any activity or area of our unit.

Conflict of interest

The authors affirm that they have no conflicts of interest.

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