Continuous quality improvement in primary health care

A five year project

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Background: The aim of the study was to determine the feasibility of a programme of continuous quality improvement (CQI) in three primary care teams (PCTs) and to test the effectiveness of correspondence analysis (CA) in identifying factors contributing to quality performance. Methods: A CQI task force was responsible for coordinating all aspects of the programme. Six domains of performance were defined, each having one or more indicators. The statistical analysis included comparison of proportions and, in addition, CA was used to further identify which factors were contributing to a performance below the standard. Results: In the domain of infant care, two of the three PCTs reached the 100% goal on immunisation coverage. The third PCT did not attain the standard (85%). However, through CA it was possible to identify the subpopulation at risk. The proportion of pregnant women accessing pre-natal care during the first trimester increased from the initial 20 to 66% (p<0.001). Physicians' compliance with pre-natal care protocol increased from 70 to 93% (p<0.05). Performance related to recording of home health care visits in medical histories did not improve at all, nor did the providers reach the standard for continuing education. The medical records information improved for alcohol and tobacco consumption, allergies (p<0.05), and blood pressure (p<0.05). The patients' satisfaction was greater with doctors than nurses. Conclusions: This experience indicates the feasibility and benefits of a comprehensive CQI programme at the primary care level. CA is considered a useful statistical method for locating factors contributing to quality performance.

Key words: continuous quality improvement, primary care

Primary health care (PHC) is the first level of contact of individuals with the national health system. Care provided at this level depends on allocation of resources and priorities defined by the health care sector and society in general. Continuous quality improvement (CQI) in PHC aims at guaranteeing the delivery of adequate ambulatory care to the target population, while assuring patient satisfaction and proper utilisation of resources. Constant monitoring of specific actions or activities helps to detect quality issues in the delivery of services and allows timely adjustments. This is an important instrument for one of the main focuses of health services research: the appropriateness of care.

Spain has a government-sponsored health care system with universal coverage. Health care institutions and programmes are managed by the government. Health care providers are considered public employees. Primary care services are delivered through health centres located in towns and sectors of large cities. The population is registration based, but usually geographically close to the health centres. All ages and socioeconomic statuses are cared for. The multidisciplinary team approach is used to provide the following services: immunisation, women's health, infant care, home health, diagnostic and treatment and emergency care.

The international teaching programme - Programa Ibero - successfully introduced quality assurance for PHC in Spain during the 1980s. The literature on implementation of quality assessment in Spain and other countries shows designs that demand a high investment of providers' time and effort. In addition, these projects are frequently designed to assess only one criterion in a specific site and for a limited period of time. This paper presents the results of a CQI project (PRO-MOCAL) carried out in three primary health care centres in Tenerife (Canary Islands, Spain) from 1991 to 1995. The main objectives of the project were to ascertain the benefits and feasibility of having a comprehensive CQI programme for an extended period of time in our PHC and to test the effectiveness of multiple correspondence analysis.
analysis (CA)

**METHODOLOGY**

The programme was designed at the Family and Community Medicine Education Unit of the Hospital de la Candelaria (Tenerife), which does not have a hierarchical or contractual relationship with the primary care teams (PCTs). To coordinate the programme we initially organised a CQI task force (TF) of three members. Five PCTs were invited to participate in the development of the programme and three of them agreed to collaborate, i.e. Taco, Tejina-Tegueste and La Salud (Tenerife). Each team consisted of 14 physicians (family physicians and paediatricians) and 14 nurses. Its population size was 1,500–2,000 people per doctor, usually medium–low socioeconomic status people, with almost 100% using the services.

To facilitate communication and sharing of information between the TF and PCT, a CQI subcommittee of three PCT members was appointed at each site. The subcommittee's chairpersons became members of the TF, increasing the membership to six. Each subcommittee had the opportunity of identifying what type of work performance would be monitored and measured at their respective health centres, and to define performance indicators along with the TF.

Most were process indicators because the subcommittees understood that its improvement would depend directly on the practitioner's effort, but some were structure and outcome indicators. At each health centre a consensus on evaluation criteria for the indicators was reached by the whole PCT and the TF before implementation. When a quality issue was identified, immediate corrective action taken was to discuss the issue with the affected PCT members. The data presented in this article are from 1991 to 1995. Six domains of performance were selected, each having one or more indicators (table 1). However, these indicators were not measured simultaneously by the three PCTs. The six domains were as follows:

- **Infant care**
  For indicator 1, the data was provided by the index card system administrated by the health centres' paediatric unit. The review was carried out twice a year. Indicator 2 was measured annually by the paediatric unit.

- **Women care**
  For indicators 3 and 4, the data were collected annually by midwives, through a medical history review. Indicator 5 was considered in compliance if medical histories had the following information: weight, height, personal and family medical history, physical examination details including breast examination and peripheral vascular disease, bimonthly blood pressure, at least two haemograms (e.g. rubella, hepatitis B, VDRL and Rh tests) and ultrasonography. The individual in charge of the pre-natal care programme was responsible for collecting the data. Only medical histories of patients complying with at least 80% of the total number of required medical appointments were used in measuring this indicator. A history review was performed after childbirth.

- **Home health care**
  For indicator 6 all home health care was recorded and reported, including date, purpose, care given and provider's name. Data sources for this indicator were the official home care record book, clinical histories and listings of chronically ill patients in need of home care. Data were collected on an annual basis with each subcommittee selecting the individuals in charge of gathering the information.

- **Continuous medical education**
  For indicators 7 and 8, the chairperson of the health centre's educational committee collected the information.

**Table 1** Selected indicators and standards

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
<th>Standard (%)</th>
</tr>
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<tbody>
<tr>
<td>Indicator 1</td>
<td>Proportion of population up to date on immunisation schedule</td>
<td>85</td>
</tr>
<tr>
<td>Indicator 2</td>
<td>Proportion of pregnant women accessing pre-natal care during first quarter of pregnancy</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 3</td>
<td>Proportion of pregnant women who were between 18 and 40 years of age</td>
<td>85</td>
</tr>
<tr>
<td>Indicator 4</td>
<td>Proportion of medical histories complying with pre-natal care protocol</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 5</td>
<td>Evidence of medical and nursing records showing the type of care provided in home visits</td>
<td>80</td>
</tr>
<tr>
<td>Indicator 6</td>
<td>Continuing education hours provided by each team member at health centre activities</td>
<td>1.5</td>
</tr>
<tr>
<td>Indicator 7</td>
<td>Continuing education hours attended by team members outside the workplace</td>
<td>5</td>
</tr>
<tr>
<td>Indicator 8</td>
<td>Proportion of patients who had medical history available at the time of appointment</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 9</td>
<td>Proportion of medical histories with a complete listing of medical problems</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 10</td>
<td>Proportion of medical histories with information on alcohol consumption habits</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 11</td>
<td>Proportion of medical histories with information on tobacco consumption habits</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 12</td>
<td>Proportion of medical histories with complete information on allergies</td>
<td>70</td>
</tr>
<tr>
<td>Indicator 13</td>
<td>Proportion of medical histories complying with the blood pressure measure protocol</td>
<td>80</td>
</tr>
<tr>
<td>Indicator 14</td>
<td>Emergency kit completely furnished with the required medications and supplies</td>
<td>Event</td>
</tr>
<tr>
<td>Indicator 15</td>
<td>Proportion of patients satisfied with services received at the health centre</td>
<td>90</td>
</tr>
<tr>
<td>Indicator 16</td>
<td>Proportion of patients having confidence in the health practitioners</td>
<td>90</td>
</tr>
</tbody>
</table>

P: process indicator; R: result indicator; S: structure indicator
from the annual committee’s report. All activities organised by the health centre’s educational committee were accepted (e.g. journal reviews, clinical meetings, forums and clinical lectures).

• Care management
For indicators 9–14, each subcommittee selected the individuals in charge of obtaining information, which was collected on an annual basis. For indicator 15, the kit was inspected every 6 months by the centre’s CQI subcommittee to determine compliance or non-compliance (event indicator).

• Patient satisfaction and trust
For indicators 16 and 17, two surveys were carried out (1993 and 1995) to measure patient satisfaction with services, using answer categories of satisfied or not satisfied. The questionnaire also tried to measure the patients’ confidence in the health providers, classifying the answers as high, medium or low. Questions were specifically designed for this project and validated by the TF for content, criterion and construction. In addition, the TF was in charge of training the interviewers and coordinating the survey process. Patients were interviewed after visiting the physician or nurse. Thus, results reflect the opinion of only those individuals who use the PCT services. The response rate was 86%.

Statistical analysis included the comparison of proportions with the normal approximation large-sample test for two independent random samples. In addition, CA was used to identify further which variables and categories were contributing to a performance below the standard, so that actions could be taken on those categories. CA is a multivariate method that summarises a group of multiple categorical variables by using the \( \chi^2 \) distance to create a new set of continuous variables, also called dimensions.

By taking just two of these dimensions, which explained at least 80% of the global variability, we plotted a graph where every category of the initial categorical variables was analysed through its graphical position with respect to the remaining categories. Thus, results are shown in a chart where proximity indicates the association between individual variable categories (figures 1–4). To do this we used SPSS/PC.

Indicators 3–5, 7 and 8 were based on the entire population since we were dealing with small groups. For the remaining indicators, a simple random sample from their respective populations was selected. Sample size was estimated by using the established standard for each indicator as the proportion expected and 10% as the precision of confidence interval. The confidence level for the interval was 95% and the power 90%.

RESULTS
The outcomes for each of the six domains are presented below, taking into consideration that some domains had more than one indicator.

Infant care
Two of the PCTs showed a coverage of 96% in the first evaluation and 100% in the second and third assessments.

<table>
<thead>
<tr>
<th>Global indicator</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Height before</td>
<td>20</td>
<td>23</td>
<td>67</td>
</tr>
<tr>
<td>12 weeks</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>63</td>
<td>60</td>
<td>77</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>67</td>
<td>67</td>
<td>80</td>
</tr>
<tr>
<td>Ultrasoundography</td>
<td>50</td>
<td>60</td>
<td>77</td>
</tr>
<tr>
<td>Analysis</td>
<td>63</td>
<td>60</td>
<td>77</td>
</tr>
<tr>
<td>Physical examination</td>
<td>40</td>
<td>30</td>
<td>73</td>
</tr>
</tbody>
</table>

Figure 1 Correspondence analysis (CA) is helpful in showing the proximity between children and no vaccination (indicator 1)
VAC: correctly vaccinated; NO VAC: without vaccination;
AGE 1: younger than 16 months; AGE 2: between 16 and 24 months; AGE 3: older than 24 months; BOY/GIRL: gender

The third PCT did not reach the standard (85%) during the first evaluation.
Through CA, it was identified that the group of children under the age of 16 months had the lowest compliance with immunisation standards (figure 1). Pertinential histories were found to be complete in 85% of the cases at the three PCTs. Subsequent appraisals showed an increase to 87%.

Women’s care
Even when 100% of women used the services, the first assessment showed that the proportion of pregnant women who began pre-natal care during the first trimester was only 20%. This percentage had increased to 66% by the last review (table 2).

Will reference to the proportion of pregnant women considered at no risk according to age, it was found that the percentage ranged from 85.49 to 87.2.

Table 3 presents the data for the proportion of medical histories showing compliance with pre-natal care protocols.

Table 2 Pregnant women who received check-ups in their first trimester as a percentage of all women included in the programme of gestation management
The proportion in compliance increased from 70% for the first review to 93% for third review.

**Home health care**
Information on home health care was recorded in only 33% of cases. This performance did not improve in the following appraisals. CA was performed taking into consideration the variables of patient’s age and gender, health professionals providing services and date of services. Figure 2 shows that none of the variables selected had a significant impact on the outcome of the results.

**Continuous medical education**
The data indicated that PCTs were not reaching the standards, that is, they were not giving lectures nor attending activities organised by the PCTs’ educational committee.

**Quality Care Management**
Table 4 presents the outcomes of indicators 9-14. Overall, 70% of the patients had their medical histories available at the time of the appointment. During the first assessment it was found that 87% of the medical histories had the required information on medical problems; however, this proportion went down to 58% in the second evaluation and increased to 100% in the third assessment. The same trend was noticed for the information on alcohol, tobacco, allergies and blood pressure measures. For indicator 15, it was found in all three assessments that the emergency kit was not complete and not in compliance with the requirements. However, the number of deficiencies decreased in each appraisal.

**Patient satisfaction and trust**
The first survey indicated a significant difference between the proportion of patients satisfied with physician services (90%) versus nursing services (66%, p<0.001) and administrative services (72%, p<0.001). Trust in physician services and nursing services followed the same trend of satisfaction. In addition, it should be noted that the proportion of questions related to nursing services with No answer (26%) was much higher than the proportion for physicians services (1%). Figure 3A presents CA results using the variables of patient’s age and gender, timetable and patient’s satisfaction with physician services, while figure 3B shows the results of the CA for trust, using the patient’s age and gender, trust in physician services and trust in nursing services as variables.

Results from the second survey were quite similar to the first one. The only differences found were in the category of highly satisfied with nursing services, which increased from 66 to 82% making the previous difference between physician and nursing services not significant. Furthermore, the proportion of questions with No answer decreased from 26 to 14%.

**DISCUSSION**
One of the main objectives of this project was to determine the feasibility of having comprehensive CQI for an extended amount of time in FHC. This is considered to services and nursing services followed the same trend of satisfaction. In addition, it should be noted that the proportion of questions related to nursing services with No answer (26%) was much higher than the proportion for physicians services (1%). Figure 3A presents CA results using the variables of patient’s age and gender, timetable and patient’s satisfaction with physician services, while figure 3B shows the results of the CA for trust, using the patient’s age and gender, trust in physician services and trust in nursing services as variables.

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**Table 4 Evaluation of the medical records (indicators 9-14) shows a fall in the second measurement**
be more difficult than in the in-patient or secondary setting. Results indicate that, with proper planning, organisational structure and leadership, CQI programmes could be successfully implemented in PHC. It was noticed that for the majority of indicators there was a continuous increase in performance, even though some of them never reached the standard. Certainly, it is possible to attribute some results to the well-known Hawthorne effect, but it is difficult to believe, after a five-year period of follow-up, that health workers feel they are being observed.

Continuous improvement concepts suggest that practitioners can be motivated to increase performance. In this study, the coordination and linkage established between the TF and subcommittees provided the direction needed to continue with the project for five years while facing challenges such as staff turnover, lack of support from some managers and additional work responsibilities for the PHC staff, among others things. Participation of PCT members in the decision-making process also contributed to their commitment in carrying out the monitoring system. The main barrier to implementing this programme was the time needed by PCT members to complete the review of the assigned number of medical records.

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It could be stated that the CQI programme created a significant improvement in the provision of pre-natal care, specifically among physicians. They were responsible for physical examinations and immediate referrals of pregnant women to midwives and both actions had the lowest initial performance level (tables 2 and 3). Their commitment contributed to increasing the number of pregnant women accessing pre-natal care during the first trimester and compliance with the existing pre-natal protocol. This is important because, as Kottke stated, we need to develop clinical systems that support the delivery of preventive services.

Recording of home health care visits was identified as a problem during the first evaluation and continued throughout the project period. The variables considered in the CA (figure 2) did not facilitate the identification of factors contributing to low performance. It seems that the difficulty of not having clinical records outside health centres limits the amount of information that is recorded. In contrast, it was found that when medical records were managed within health centres, they contained the information required for the initial appraisal of indicators 9–14 (table 4). The second assessment for the same indicators showed a step down in compliance. This was probably due to a sudden increase in the size of the population assigned to the PCTs, which is a decision
made by the administrative staff of the Spanish health system and not controlled by PCTs. Through CA, it was possible to identify the association between patients' low satisfaction and specific physicians (figure 3A). The situation was corrected after the subcommittee discussed the issue with the physicians involved. The higher confidence shown with physician services in contrast to nursing services could be associated with the well-known classical role of physicians versus the unknown new role assumed by nursing in the last decade. The high rate of No answer on questions related to nursing care was not associated with a negative opinion on nursing services, but instead it appears located between positive opinion about physicians and nurses, particularly among the elderly and male patients (figure 3B). This association was not identified during the second survey, when the No answer rate decreased. The poor outcomes of the continuing education indicators show that, even though the care provided is within the boundaries of the declared standards, the staff need to be motivated to continue learning new strategies and methodologies of delivering quality care as well as sharing their knowledge and experience with peers. In summary, CA was a helpful and simple method for identifying factors contributing to quality care; its outcomes provide suggestions on where adjustments are needed.

The authors would like to thank all primary care team members of Taco, Tejina-Tegueste and La Salud for their extraordinary commitment to the project. Special thanks to Dr Thomas E. Kottke, from Mayo Clinic, for his helpful comments.

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