International Journal of Advanced Multidisciplinary Research
ISSN: 2393-8870
www.ijarm.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijamr Volume 10, Issue 11 -2023

Research Article

DOI: http://dx.doi.org/10.22192/ijamr.2023.10.11.001

Efficiency and Effectiveness of Chiropractic Services in the Care Modules of the Universidad Veracruzana, Veracruz Region.

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Introduction

In 2005, the World Health Organization (WHO, 2005) defined chiropractic as a healthcare profession responsible for the diagnosis, treatment, and prevention of diseases primarily affecting the neuromusculoskeletal system and their effects on health. It primarily involves working with spinal manipulations known as adjustments.

Currently, chiropractic is recognized and legalized in more than 40 countries. The practice of this profession encompasses primary care, diagnosis with the assistance of diagnostic imaging studies, without the use of medications or surgeries(FLAQ, 2011). As a degree program, it is only offered at three universities, with the first being the State University of Ecatepec Valley(UNEVE, 2023), the State University of Toluca Valley, (UNEVET, 2023) and finally, in 2013, the University of Veracruz (2023) became the first worldwide to incorporate the program into a medical faculty.

In Mexico, chiropractic care is part of the private healthcare systems, leading to significant variation in service, influenced by geographical location and patients' socioeconomic status. The main barriers to service include cost, limited transportation, lack of awareness of the services offered, and the absence of perceived benefits. (Maiers, et al, 2018). A higher percentage of women between the ages of 25 and 64 tend to seek chiropractic care, primarily for specific musculoskeletal conditions, followed by maintenance of overall health. (Charity, et al, 2016)

One of the fields that currently experiences high levels of activity and expenses for countries striving for development is healthcare services, as substantial resources are allocated to improve their quality and efficiency. (Calvo,2018)

The primary goal of Public Health is to achieve a high level of physical, mental, and social well-being by using available knowledge and

resources. These needs required proper planning, and (Sergio et al, 2017) effective planning must take into account equity, effectiveness, efficiency, and efficacy. These indicators enable access to reliable, safe, timely, and appropriate healthcare services tailored to the population's needs, and they are closely linked to the quality of healthcare services. (Quintero et al, 2021)

Planning within healthcare services is essential because, regardless of the level of social development, resources are always limited, as individual requests and demands grow exponentially. This leads to economic evaluations in the healthcare field for all decisions that impact health and resources and have more than one effective solution. In the healthcare sector, economic evaluation is most useful when preceded by other evaluations, such as efficacy and effectiveness. (Gumersindo, M., Rodríguez, F., Carlos, M., & Rodríguez, V., 2013) A healthcare system is considered efficient when it achieves the best results with the least resource expenditure. (George Q. et al ,2017)

Efficacy is defined as the purpose expected to be achieved under ideal conditions. This is obtained with the formula: Achieved Outcome/Expected Outcome. Efficiency, on the other hand, represents the maximum contribution or degree of contribution that a healthcare system makes with the available resources. The efficiency formula is the ratio of (Achieved Outcome / Achieved Cost * Achieved Time) to (Expected Outcome / Expected Cost * Expected Time). Effectiveness is expressed as a percentage (%), and its formula is the ratio of the sum of the efficacy score and the efficiency score divided by 2, over the maximum score. (Mejía Cañas, C. A.,1998) It is the result of combining efficacy and efficiency. (Rojas, M., Jaimes, L. Y Valencia, M., 2018)

Methodology

This was a descriptive cross-sectional observational study. Data collection began in February and continued until May 2023 using the Google Forms platform. A random cluster probabilistic sampling approach was employed, with an expected minimum participation of 100 users. The study included individuals who had used chiropractic services at one of the care modules provided by the University of Veracruz.

Results and Discussion

Out of the 107 patients, only 101 met the inclusion criteria. The participants consisted of 60% women (61) and 40% men (40).

Table 1. Study Population by Gender

	Frequency	**Percentage**
Men	40	40%
Women	61	60%
Total	101	100%

Source: Own database

The survey contains 4 indicators: attendance time to service care, attendance frequency, total costs, and probability of recommendation. Efficiency and effectiveness are treated as algorithms.

Regarding the time patients have been receiving care, 34% (35) mentioned receiving care for more than 12 weeks, 27% (27) for 1 to 4 weeks, 26% (26) for 5 to 8 weeks, and 13% (13) for 9 to 12 weeks. The fact that 34% of patients have attended for more than 12 weeks suggests that chiropractic modules serve a higher number of patients with chronic or serious musculoskeletal problems, which require more time to achieve expected results. See Table 2.

Table 2. Chiropractic Attendance Time.

Time/Week	Frequency	Porcentage
1 – 4	27	27%
5 – 8	26	26%
9 – 12	13	13%
> 12	35	34%
Total	101	100%

Source: Own database

Regarding the frequency of attending , 33% mentioned that they only go when they have discomfort, 25% attend every 7 days, 23% attend every 15 days, 12% go twice a week, and 7% attend every 30 days. We can understand that the lower attendance frequency corresponds to patients who have been recovering and require less follow-up, such as those who only come in for maintenance every 30 days. Another point to highlight is the 67% of patients who attend the service regularly as part of their appropriate treatment, while the remaining 33% (34 patients) come when they have discomfort. This suggests that they may view chiropractic care as an alternative technique or may have been a communication issue between the patient and the chiropractor in explaining the need for a treatment plan, as in any other health science, to achieve the desired goal. See Table 3.

Table 3. Frequency of Attendance at Chiropractic Service

Frequency	Individuals	Percentage
Twice a week	12	12%
Every 7 days	25	25%
Every 15 days	23	23%
Every 30 days	7	7%
Whenexperiencingdiscomfort	34	33%
Totals	101	100%

Source: Own database

When questioned about their financial investment in receiving chiropractic care, 64% (65) of the patients mentioned that they have spent less than $400 pesos. This suggests that they have not required diagnostic imaging studies for their diagnosis and treatment, meaning they have musculoskeletal issues that can be resolved immediately. Adding the 33% (34) of patients who only attend when they have discomfort, along with the 23% who attend every 15 days and the 7% who attend every 30 days, would cover the initial percentage. The percentage may vary because the age range includes the economically active and student population. This can lead to situations where even if their attendance is regular, patients do not fully comply with all their appointments. See Table 4.

Table 4. Total Investment in Chiropractic Treatment.

Cost (pesos)	Individuals	Percentage
<400	65	64%
400	17	17%
800	12	12%
1200	5	5%
> 1200	2	2%
Total	101	100%

Source: Own database

Regarding the probability of recommending the service, 80% (81) said it's very likely, 12% said it's likely, 7% said it's very unlikely, and 1% was neutral. With 20% of the patients expressing dissatisfaction, there is an opportunity to explore the reasons behind their dissatisfaction with the chiropractic clinic's service. It's worth noting that even though 12% selected "likely," this percentage still has doubts about the service, so it falls within the category of dissatisfaction. The question of how likely the chiropractic service is to be recommended provides insights into the efficiency and effectiveness of the service as it gives an idea of its overall acceptability. See Table 5.

Table 5. Probability of Recommending Chiropractic Service

	Frequency	Percentage
Very Unlikely	7	7%
Unlikely	0	0%
Neutral	1	1%
Likely	12	12%
Very Likely	81	80%
Totals	101	100%

Source: Own database

To calculate Efficiency, respondents were asked to assign a score to the service. They gave 1 point for inefficient, 3 points for moderately efficient, and 5 points for very efficient. The total score obtained was 487 points, with a breakdown of 91% (92 individuals) assigning 5 points and 9% giving 3 points. The formula for calculating the efficiency percentage of the service is: (RA/CA*TA) / (RE/CE*TE). When the formula was applied, the Efficency was determined to be 87.5%, which is considered Moderately Efficient. See Table 6.

Table 6. Service Score Percentage

Points	Frequency	Percentage
1	0	0%
3	9	9%
5	92	91%
Total	101	100%

Source: Own database

Similarly, to calculate Effectiveness, patients assigned a score to the service, but this time the values were on a scale of 0-5. On this scale, 0-3 is considered ineffective, 4 is moderately effective, and 5 is very effective. The total score obtained for effectiveness was 460 points, where 64% (65) rated it with 5 points, 30% with 4 points, 5% with 3 points, and 1% with 0 points. The formula for calculating the service's effectiveness percentage is: (RA*100)/RE. See Table 7.

Table 7. Percentage of Service Effectiveness Score

Points	Frequency	Percentage
0	1	1%
1	0	0%
2	0	0%
3	5	5%
4	30	30%
5	65	64%
Totals	101	100%

Source: Own database

It is possible to analyze the effectiveness of the chiropractic service using both efficiency and effectiveness. The formula in question is: {(Effectiveness Score + Efficiency Score) / 2} / Maximum Score.

Calculations: (460 points + 487 points) / 2) / 505

Effectiveness resulted in a percentage of 93.7%, indicating that the chiropractic service is Moderately Effective.

In this study, the results showed that the efficiency and effectiveness of the chiropractic service provided by the University of Veracruzana were 87.5% for efficiency and 91% for effectiveness. By combining these two, we obtained an effectiveness rating of 93.7%. According to Ramirez et al. (1998), in Mexico, 81.2% of healthcare service users rate them as good, while 18.8% rate them as bad. They used indicators to determine if the service was of quality, such as the treatment received and the health benefits. On the other hand, indicators of poor quality include long waiting times and inefficiency in evaluation and diagnosis. Quality is a term closely associated with the indicators of efficiency, effectiveness, and efficiency.

When characterizing the average patient attending the University of Veracruzana's chiropractic service, we find that 60% (61 respondents) are women, and the predominant age range is 22-25 years. In this service, 66% (67 patients) of those attending are under the age of 30. Women tend to use chiropractic care more than men, and it's important to identify the reasons. It can be inferred that women may experience more musculoskeletal problems compared to men or that, unlike men, women are more concerned about obtaining a prompt solution to these types of health issues. Chiropractic care is considered a primary healthcare service, but most people seek it after receiving a diagnosis from other specialties. Charity M et al. (2016) mention in a study that a higher percentage of women between the ages of 25 to 64 attend chiropractic services, primarily for specific musculoskeletal problems. The second most common reason for their visit is to receive chiropractic care for health maintenance.

In this research, it was found that 33% of patients only attend when they have discomfort, and only 7% go every 30 days, which is when they come for health maintenance. Ideally, for the chiropractor, these percentages should be the

other way around because that would indicate that the patient is receiving proper care. However, the fact that most people only seek chiropractic care when they are in pain or discomfort suggests that they view chiropractic as an alternative health service.

Chiropractors should question whether they adequately explain the treatment plan during the initial consultation and emphasize to the patient that they should not attend only when they are in discomfort. Hennius et al. (2013) found in their observational study that most patients did not fully understand chiropractic treatment, and some had little interest in understanding it, despite the chiropractor's efforts to explain.

Other factors can also limit patient attendance at chiropractic services, as Maiers et al. (2018) mentioned, such as cost, lack of transportation, lack of knowledge, and perceived lack of benefit. In this study, an additional limitation may be the fact that all attendees were adults, indicating that they likely have established work schedules. This complicates their attendance as chiropractic service modules typically operate only from Monday to Friday from 8 AM to 4 PM.

During chiropractic treatment, certain support studies such as X-rays and clinical analyses are sometimes required, incurring additional costs. Although 64% (65) of the patients did not require these studies because their musculoskeletal issues could be resolved immediately, they can be a limiting factor for the remaining patients. Chiropractic services in Mexico are part of the private sector, and government institutions do not cover these expenses, which individuals must pay for out of pocket. For example, within private healthcare costs, an X-ray typically costs around $360, and an MRI is approximately $4,449 (Diego, 2021). This financial burden could be a reason for patients to discontinue their treatment.

Based on the information obtained in this study, we can conclude that, despite achieving percentages of 87.5% for efficiency and 91% for effectiveness, and an overall effectiveness of 93.7%, as healthcare professionals, we must strive to reach 100% in these indicators, which are directly related to the quality of healthcare services.

Conducting such studies is of vital importance for several reasons: assessing the efficient use of resources, improving the quality of care, and reducing costs. By determining which medical services are more efficient and effective, costs can be reduced by eliminating unnecessary or ineffective practices, benefiting both patients and healthcare systems as a whole. Informed decision-making: these efficiency, effectiveness, and effectiveness studies provide solid data to support decision-making in healthcare service management, helping healthcare leaders prioritize investments and policies. They also help evaluate public health programs, essential for assessing the effectiveness of disease prevention and control programs, which can have a significant impact, for example, in chiropractic services, reducing days of disability, decreasing work absences, and improving the neuromusculoskeletal health quality of a population. Additionally, they serve as a tool for transparency and accountability when shared with the public and stakeholders, increasing transparency and accountability in the healthcare system. In summary, these efficiency, effectiveness, and effectiveness studies are key tools to optimize healthcare service delivery, improve the quality of care, and ensure the proper use of limited resources in the field of healthcare.

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Quick Response Code	Subject: Medical Sciences
DOI:10.22192/ijamr.2023.10.11.001	

How to cite this article:
Salas-Ortega María del Refugio, Duarte-Cruz Virginia, Balderas-Domínguez Kate, Rosado-Vera Yatsiri Teotl, López-Hernández Helaman Saeed, Castillo Hernández Jorge Elias. (2023). Efficiency and Effectiveness of Chiropractic Services in the Care Modules of the Universidad Veracruzana, Veracruz Region. Int. J. Adv. Multidiscip. Res. 10(11): 1-8.
DOI: http://dx.doi.org/10.22192/ijamr.2023.10.11.001