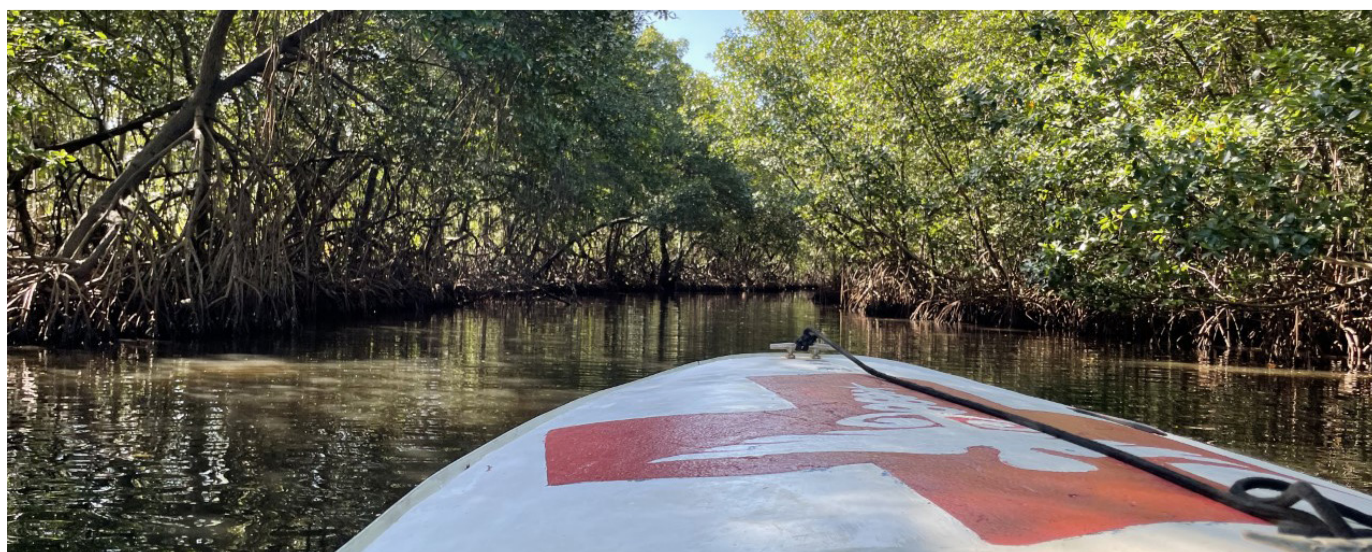


A dental volunteering project in the indigenous communities of Bocas del Toro, Panama: lessons learned.

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Abstract

Background

Panama recognises seven indigenous populations that make up 12% of its population. The Ngäbe population comprises 60% of the indigenous peoples who mainly reside in Bocas Del Toro. Our knowledge of the oral health status of indigenous populations around the globe is lacking. This study aimed to bring awareness of the current oral health status of the Ngäbe population and the wider indigenous populations globally.

Methods

A descriptive cross-sectional study design was used integrating ethnographic research methods. Data for this study were obtained during a three-week volunteering position facilitated by Floating Doctors. Clinical data was extracted from electronic records and observations of dietary habits and oral hygiene (OH) practices took place between 25 July and 12 August 2022. A 'complete observer' method of participant observation was used.

Results

In total, 184 patients were seen between the dates specified. 104 patients presented with pain, 65 presented for a check-up and 15 presented for other reasons. 81.4% of those attending had evidence of caries. At least 50% of patients that presented had unrestorable caries. The teeth most commonly involved were the mandibular first permanent molars. Our observations highlighted a large consumption of high-sugar soft drinks, a lack of effective OH and the absence of fluoride interventions as being the main causative factors in the clinical observations made.

Conclusion

The current oral health status of the Ngäbe population is that of a reflection of the social and geographical barriers faced by these people. The burden of oral disease is attributed to dental caries. More complex issues such as social inequalities and environmental hazards play a significant role in the oral health of these communities. These findings likely reflect that of the wider indigenous population. It is important for us as a global society to reflect on these issues and their causes if we wish to improve the oral health outcomes of those within indigenous populations.

Abbreviations

N - number

OH - oral hygiene

Introduction

Panama recognises seven indigenous populations that make up 12% of its population.¹ The Ngäbe population comprises 60% of the indigenous peoples who mainly reside in western provinces including Bocas Del Toro.² These indigenous populations have faced many challenges in recent decades, notably their struggle to obtain the legal rights to ancestry territories.¹ Additionally, there are high degrees of social segregation, with indigenous populations possessing a low socio-economic status.³ Rudimentary educational infrastructure leading to literacy rates that are substantially lower compared to the national average is also an issue.⁴ These factors undoubtedly create disparities in the quality of health education and healthcare accessibility within these communities, especially

considering their geographical barriers (**Figure 1**). These barriers make access to oral health education and dental care extremely difficult.

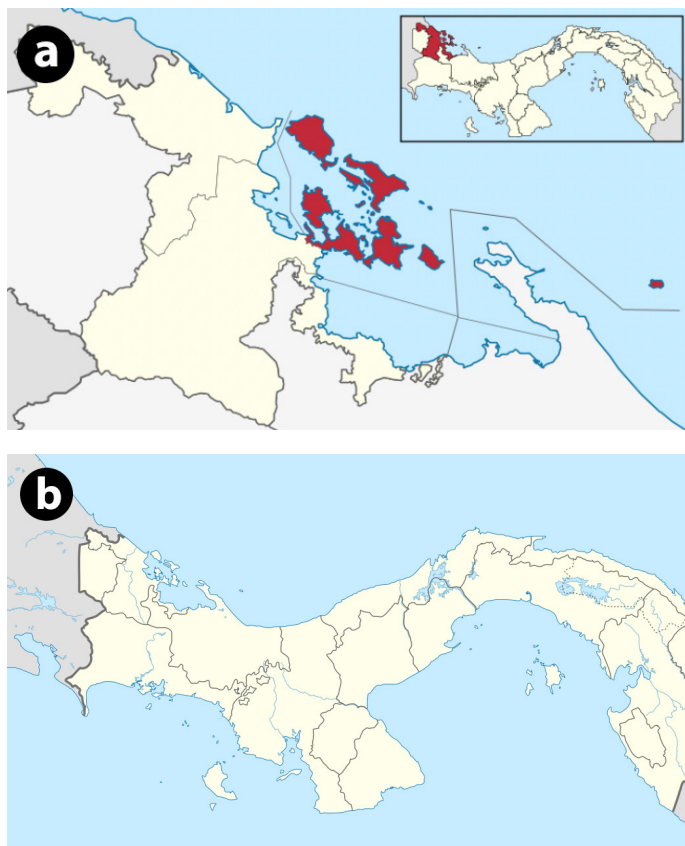


Figure 1. (A) Shows the location of Bocas Del Toro highlighted in red. Multiple islands that form an Archipelago. Image by Alexrk - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=6909551> **(B) Shows the location of Bocas del Toro on the northwest of Panama.**⁵ Image by By Milenioscuro - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=24654195>

Perhaps the most widely known cultural practices relating to the oral health of indigenous people is the art of dental modification. The practice of drilling, chipping and shaping teeth into triangles for aesthetic purposes dates back thousands of years.⁶ However, little is known regarding the burden of oral disease in such communities. National health surveys are routinely used to investigate the oral health of a population. However, owing to the factors already highlighted, it is unlikely these surveys reflect the oral health of indigenous populations. Additionally, having consulted the literature databases, studies investigating the oral health status of indigenous communities globally are scarce and there are no studies pertaining to the Ngäbe population specifically. Accordingly, our knowledge of the oral health status of this community and the wider indigenous population around the globe is lacking. A United Nations report highlighted that poor access to healthcare in indigenous populations is a common theme and so it can be expected that the oral health status of the Ngäbe population may reflect that of indigenous populations globally.⁷ Therefore, this study aimed to bring awareness of the current oral health status of the Ngäbe population residing in Bocas Del Toro, Panama, in addition to investigating the dietary habits and Oral Hygiene (OH) practices within this population. As social, cultural, and behavioural factors are likely to be comparable between indigenous populations across the globe, this study will provide an insight into the oral health landscape of such communities.

Methods

A descriptive cross-sectional study design was used integrating ethnographic research methods to obtain data relating to the cultural

determinants of oral health. The study population was the Ngäbe people who reside in Bocas Del Toro, Panama. Data for this study were obtained during a three-week volunteering position facilitated by the organisation Floating Doctors. This is a non-profit organisation permanently based in Bocas Del Toro that provide medical, dental and veterinary care to the indigenous people residing in this province. This organisation covers a total of 27 communities of which care is provided at three-monthly intervals. Due to the structure of care provision, only six communities were visited by the study author (N=7000). The decision of which communities were visited on a given week was decided by the organisation's timetable at the time of visiting.

Ethnographic research methods

It was decided that a 'complete observer' method of participant observation was to be used owing to ethical considerations and time constraints. This method meant that no effort was made to obtain data on the dietary habits and OH practices above and beyond the natural dental history taken at the point of care. This also meant that the participants of the study did not know they were being observed. Observations of dietary habits and OH practices took place between 25 July and 12 August 2022 and included any observation relating to these determinants of oral health whilst the author was present within the community. A note journal was used to record this data and entries were made as soon as possible following an observation. Where observations were made on clinic, the author recorded this at the next available convenience. This process meant that all data was recorded within four hours following initial observation. Data regarding OH practices were mainly taken from clinical histories owing to the time at which these events would take place.

Clinical data collection

Dental clinics were held remotely within the community and at a base clinic on Isla Cristobal. Electronic record keeping was the responsibility of the dental coordinator who was not involved in care provision. Data was recorded by the dental coordinator upon patient presentation, following initial examination and following treatment completion. This meant all relevant data was recorded on the electronic database contemporaneously. Clinical data input between 25 July – 12 August 2022 was extracted from the electronic records to be used in this study. From these records, data was sought for age, gender, presenting complaint, examination findings and treatment carried out. Microsoft Excel was used to synthesise and tabulate the data.

Ethics

In line with the ethical principles for ethnographic research, efforts were made to ensure that this study protected the autonomy, wellbeing, safety, privacy and dignity of participants. Clinical data was only extracted from those who willingly presented to the clinic and consented to treatment, maintaining the autonomy of patients. The data extracted from the records and used in this study contained no patient identifiable data. Qualitative data pertaining to our outcomes was derived either from that of the natural medical and dental history taken at the point of care or observations made by the researcher within the field. Where patients did not express information about our outcomes, no effort was made to probe for this. Therefore, no information was purposefully extracted from the patient for use within this study. Additionally, a 'chance observation' style was adopted, meaning the observer made no effort to place themselves in locations they were not naturally needing to be in. In this way, the privacy and dignity of participants was maintained.

Results

Dietary observations

Like all indigenous populations, the Ngäbe people rely on food derived from their immediate environment. This largely consists of beans, lentils, plantains, meats and fresh fruit. Therefore, individuals largely consume a balanced diet. Confectionary such as sweets and chocolate were not sighted often in the majority of communities.

The exception to this being a small convenience store within the more developed community Pueblo Nuevo (**Figure 2**). As expected, children in this community were often seen with this confectionary. In contrast, all communities had several stores selling sugary drinks such as Coca Cola. It was noted that in these stores there are no sugar free options and a bottle of Coca Cola costed less than a bottle of water. On multiple occasions, children as young as two were seen drinking juices from a carton for prolonged periods of time. Empty soda and juice bottles were observed frequently within the communities as well as in school classrooms, confirming their high intake of sugary drinks.



Figure 2. Shows an example of a convenience store selling sodas and confectionary.

Oral hygiene observations

Evidence regarding OH practices was limited. It was noted that several patients mentioned they had never brushed their teeth. Evidence of fluoride use was scarce. Empty toothpaste tubes were identified in only two communities (**Figure 3**). It was encouraging to see a mother brushing her daughter's teeth in one community; however, this was the only direct observation of OH practices.



Figure 3. Shows one of the only pieces of evidence of fluoride use within the communities visited (bottom right). The image also shows a large number of empty soda bottles.

Clinical observations

In total, 184 patients were seen between the dates specified. 104 patients presented with pain, 65 presented for a check-up and 15 presented for other reasons including cavities, discoloured teeth, and aesthetic concerns (**Figure 4**). Of those presenting with pain, all were found to have caries. Of the 84 patients presenting for a check-up or reasons unrelated to pain, 49 were found to have dental caries. This meant that 81.4% of those attending had evidence of caries. It was observed that the vast majority of these presentations were extensive and beyond the point of restorability. Indeed, 78 extractions were completed, of which nine were deciduous teeth and 69 were permanent teeth. Only teeth that were deemed to be clinically unrestorable were extracted. This meant that at least 50% of patients that presented had unrestorable caries. The teeth most commonly involved were the mandibular first permanent molars in those in the mixed or permanent dentition. However, for those in

the deciduous dentition the majority of teeth, including the anterior teeth, were affected. Of the 184 patients seen, 124 were adults and 60 were children or adolescents (**Figure 5**). Unfortunately, gender could not be matched with the presenting case and so it was not possible to determine the proportions of males or females attending. However, it was observed that the vast majority of presentations were adult or adolescent females and children. When adult or adolescent males presented, they often had severe caries at multiple sites accompanied by pain or abscesses.

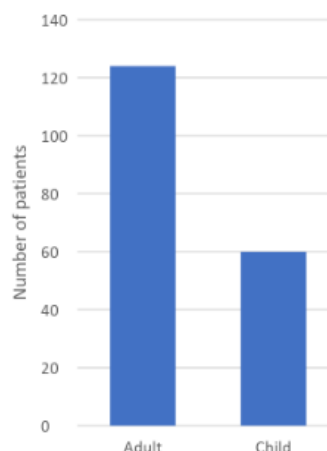


Figure 5: Shows the number of adult and child patients who attended the dental clinic.

Moreover, although not recorded, almost all patients had dental plaque-induced gingivitis. The prevalence of periodontitis was observed to be low. This is shown by the fact that only one patient's presenting complaint was related periodontal issues. Very few patients presented with signs of tooth wear.

Discussion

The aim of this study was to gain an awareness of the current OH practices and dietary habits of the Ngäbe community and whether these factors were reflected within their oral health. Given the similarities of indigenous communities across the world, these results may offer an insight into the oral health of indigenous communities on a wider scale. An ethnographic approach was taken to identify these practices whilst within the communities. Regarding dietary factors, it is clear that the main sugar source is from sodas and fruit juices. This is not an uncommon issue within remote indigenous communities all across the world. A study conducted jointly by the Public Health Advocacy Institute of Western Australia and Diabetes Western Australia highlighted the accessibility and availability of soft drinks within the indigenous communities of Australia.⁸ This accessibility is owed to the sponsorship and community grants given to soda companies to promote their products even in the most remote locations. Recently an advertising campaign by Coca Cola has been heavily criticised promoting the consumption of their product in indigenous communities. This is one example highlighting the negligence and lack of responsibility of large soft drink manufactures.^{8,9} Moreover, they discovered that residents of these communities often feel safer drinking soft drinks compared to water sourced from their environment.⁸ As such, the issue of increasing soda consumption may be a more complex issue than once thought, with people relying on sodas as a source of safe hydration. Additionally, soft drinks were in some areas easier to obtain than fresh water from the local environment. This trend was somewhat reflected in our observations, with bottled water being more expensive and thus deemed more of a commodity than soft drinks. As opposed to the sales and marketing of soft drinks within these communities, education on the general and dental health consequences of high sugar sodas is non-existent. Our observations did not identify one piece of evidence relating to the harm sodas can cause to the dentition or general health, notably in the school environment. In fact, it was observed that the only dental education

that the communities received was from the Floating Doctors Dental Team which reinforced OH and dietary advice at every three-month visit. It is not surprising therefore that in addition to extremely high caries rates, the prevalence of type 2 diabetes is very high. Uniting both oral health and general health in the provision of health education would be key to combat the issue of sugar consumption in indigenous communities. This study confirms the need for increased education and awareness within the remote communities that have such access to soft drinks. Educational projects not only need to target young adults, but also parents who are unaware of the consequences of giving their children large quantities of sugary drinks and sodas. However, the issue of high soda consumption may be more integrated within the culture of remote indigenous populations more than we first thought. Systemic issues such as poor access to fresh water needs to be addressed alongside educational resources in order to see an impact of educational interventions.

Moreover, very little data was observed regarding the OH practices of this population. However, based on several dental histories, the general impression the author got was that OH measures were at best suboptimal and at worst non-existent. Indeed, several patients reported never to have brushed their teeth. This was evidenced by the poor oral hygiene witnessed by volunteers. Despite this, it was pleasing to see the level of engagement by the children of these communities when delivering oral hygiene instruction. It was disappointing to see such a lack of fluoride measures, notably toothpaste, being used within these communities given its ease of implementation. The implementation of fluoride interventions would go a long way in reducing the dental caries burden experienced by this population. However, access to fluoride products such as toothpaste may be the biggest barrier in achieving this given their remote location. Furthermore, OH education was scarce within each community, and so there is a desperate need for the provision of education relating to oral hygiene. Despite the good will of overseas dental volunteering projects, a lack of trust and communication between those delivering oral health education and indigenous people can reduce the effectiveness of such interventions.³ Therefore, providing the knowledge and resources to education providers within the environment, such as schoolteachers, may be a more effective intervention. However, several studies have shown that educational interventions, as well as fluoride interventions, have only had a minimal impact on caries prevalence in indigenous communities.^{10,11,12,13} The main factor in this poor success being the perpetuating social and cultural inequalities experienced by indigenous people.^{10,12,13} As such, addressing these factors on an international level must be a priority if we wish to see substantial improvements in the oral health outcomes of indigenous communities.

The majority of patients presenting to the dental clinic were symptomatic driven. As such, the rates of caries within the treated sample of patients may not reflect the true burden of caries within the Ngābe population. However, that is not to say the data collected does not highlight the severity of the disease experienced by these individuals, as although only 50% of patients had unrestorable caries, many young patients with unrestorable, asymptomatic teeth did not receive an extraction. The vast majority of such patients would fit the diagnosis of rampant caries. Therefore, the severity of caries that presented to us is likely to be greater than that reflected in our clinical data. Interesting, the upper permanent molars were often spared from dental caries. This pattern fits with our dietary observations as fluids are likely to sit at the bottom of the mouth and bath the lower mandibular molars. Moreover, there were very few issues related to periodontal disease. This is surprising considering the observed prevalence of diabetes within this population. Given the link between periodontitis and diabetes,¹⁴ these results were unexpected. An explanation for this could be that few patients were seen over the age of 40 and so the cohort of the population likely to possess this disease did not present to us. Additionally, not one patient reported a history of alcohol or tobacco consumption, which may contribute to the very low rates of periodontal pathology. Despite the observed

intake of sodas, tooth wear rates were very low. However, it is likely that this was overlooked by the author owing to the volume of caries presented. Conclusively, the oral disease burden most likely lies with dental caries within indigenous communities at present.

Only 65 patients presented for a dental check-up, which is a very small proportion of the total population who had access to our clinic. Additionally, it was observed that a large proportion of these patients were children of whom attended with parents with a chief complaint. It was generally observed that patients were accepting, and sometimes eager, to extract the tooth in question. This was the case even if the tooth could be saved at a dental clinic, which is not surprising considering the time and financial implications of this journey. Therefore, it can be inferred that the importance of maintaining oral health may not come high on the priority list for many people within the Ngābe community. Factors influencing the perceived importance of oral health in indigenous communities may include the perceived severity of dental pain, barriers to access such as transport and finances, the social and aesthetic impacts of poor oral health, and the level of oral health education.¹⁵ This study confirms such conclusions with the majority of visits being symptomatically driven and many patients expressing their inability to attend our dental clinic at base owing to transport and financial issues. The social impacts of poor oral health were also observed, with parents often bringing their children to our clinic complaining of the unsightly appearance of their heavily carious teeth. Knowing these factors is important if we aim to increase the perceived importance indigenous populations place on their oral health as it facilitates oral health education that aligns with the beliefs and values of indigenous people.

The clinical data presented largely reflects the paediatric and female individuals within this population. Male patients were rarely treated due to work commitments. It could be assumed that owing to the labour-intensive nature of their occupation, their need for energy and rehydration is greater, and their intake of sodas may reflect this. This would fit the trend seen as the male patients that did present did so with gross caries. This highlights the importance of considering the wider social factors that may influence whether patients are able to attend remote dental clinics offered by dental volunteering projects in order to maximise the number of people that benefit from such projects.

Importance of this study

There are approximately 476 million indigenous people making up 6% of the global population yet represent 19% of those living in poverty.¹⁶ Poor health outcomes are inextricably linked to poverty due to issues such as poor health literacy and limited access to healthcare provision. This study highlights the systemic issues faced by indigenous communities in the context of oral health. It is vitally important that we are aware of the oral health inequalities we still face globally so that we strive to bridge these gaps, especially in an era where the field of dentistry is becoming ever more expensive and unattainable. The lessons learned in this study shows a stark reality of how, despite the best efforts from non-profit organisations, dental volunteering projects are likely going to assume the role of 'damage controller' with respect to oral health. Social inequalities in a wider context and better access to sustained preventative care needs to be addressed at a local, and international level, if we want to see any improvement in the oral health status of our indigenous communities.

Strengths and limitations

A strength of this study was that observations were made contemporaneously by the author, meaning no observations were omitted. Additionally, having a dental coordinator whose role was to collect clinical data meant that this data was accurate and made at the point of care. The nature of the volunteering project meant that

the author was fully immersed within the culture of this community, allowing for rich experiences that has led to a full understanding of this community in the context of oral health.

Limitations of this study include that there was only one observer. This meant that ethnographic data relied on one person being in the correct place and thus led to very fewer observations, particularly for oral hygiene practices. Additionally, without additional observers, the impressions portrayed within this study reflects that of only one individual. As such, bias cannot be excluded. Another limitation was the three-week duration of this study. More time would have allowed greater observations and thus a better insight into the determinants of oral health within the Ngäbe population.

Conclusion

The current oral health status of the Ngäbe population of Bocas del Toro, Panama, is that of a reflection of the social and geographical barriers faced by these people. The burden of oral disease is strikingly high and attributed largely to dental caries. A high intake of high-sugar beverages, the absence of self-sustaining dental education and lack of access to fluoride interventions and dental care are just some of the factors responsible. More complex issues such as social inequalities and environmental hazards also play a significant role. These findings are likely to reflect that of the wider indigenous population globally given they face the same social determinants of health. It is important for us as a global society to reflect on these issues and their causes if we wish to improve the oral health outcomes of those within indigenous populations.

Acknowledgements

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Liam Fletcher

My name is Liam and I am a final year dental student at the University of Bristol. This summer we travelled to Panama, Bocas Del Toro, to volunteer with the organisation Floating Doctors. Not only was this an incredible experience, but we also got to see the full extent to how healthcare project's function and the difficulties faced both at an organisation level and at a patient level. We were very grateful to the wonderfully kind indigenous populations who entrusted us to carry out their dental treatment. I hope this article provides a glimpse of what it's like to volunteer abroad but also the wider issues that we face if we wish to provide effective programmes in the future.

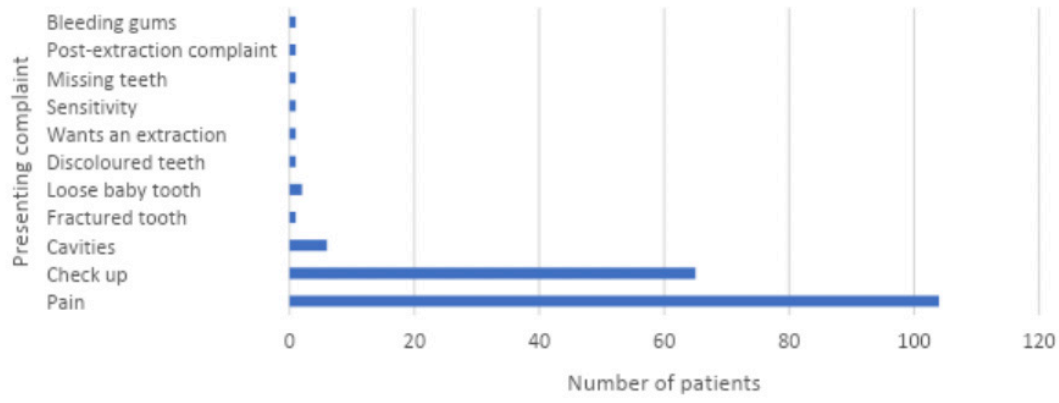


Figure 4: Shows the number of patients presenting with varying chief complaints.