

Evaluation of the Compliance of Orthodontists to Infection Control Procedures in South India: A Questionnaire Based Study

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Abstract

Original Research Article

COVID-19 emerged as a global pandemic in early 2020, affecting more than 200 countries and territories. The infection is highly contagious, with disease transmission reported from asymptomatic carriers, including children. So in today's orthodontic practice, disease control must undergo major reevaluation and restructuring and must be given prime importance. The aim of this study was to evaluate by means of questionnaire, sterilization and disinfection methods employed in the practice of orthodontics in South India and the compliance of orthodontists to these methods. The questionnaire study was conducted using an online survey from July 2020 to December 2020.

Keywords: Infection control, COVID19, Orthodontic clinic.

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INTRODUCTION

Infection control is crucial for orthodontists and for patient health. The concept of sterilization and disinfection was introduced into the dental practice with the recognition of hepatitis B as an occupational disease in 1975, and considerable steps have been taken in infection control procedures with increasing prevalence of human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) in the mid-1980s [1].

COVID-19 emerged as a global pandemic in early 2020, affecting more than 200 countries and territories. The infection is highly contagious, with disease transmission reported from asymptomatic carriers, including children. It spreads through person-to-person contact via aerosol and droplets. The practice of social distancing—maintaining a distance of 1-2 m or 6 ft—between people has been recommended widely to slow or halt the spread. In orthodontics, this distance is difficult to maintain, which places orthodontists at a high risk of acquiring and transmitting the infection [2].

Orthodontists usually do not perform comprehensive surgical procedures, but they are obliged to use appropriate sterilization techniques to prevent cross-infection in daily practice. This is also important from an ethical and legal point of view [3, 4]. However, the studies have found that orthodontists have

lower compliance to the infection control procedures than dentists. The main reason for this is that they work on pediatric cases, they do not perform procedures in deep tissues, sterilization procedures result in the loss of time and money, and sterilization procedures cause corrosion in orthodontic pliers [5, 6].

In the present study, we aimed to evaluate by means of questionnaire, sterilization and disinfection methods employed in the practice of orthodontics in South India and the compliance of orthodontists to these methods.

MATERIALS AND METHODS

The present study was a cross-sectional questionnaire-based survey conducted among the orthodontists in South India between July 2020 and December 2020. A 23-item questionnaire were included in the study to evaluate the compliance of orthodontists to infection control procedures. The questionnaire was in English language and open ended and self-administered. The Ethical approval was obtained from the Ethics committee KVG dental college Sullia, Dakshina Kannada. Soft copy of questionnaire was delivered through whatsapp and whatsapp groups to maximum possible number of orthodontists in South India including PG residents. A total of 205 responses were included in the study.

Questionnaire

1. How long have you been working as a dental practitioner/orthodontist?
 - a. 0-5
 - b. 6-10
 - c. 11-15
 - d. 16-20
 - e. More than 20 years
2. Place of work?
 - a. Private Clinic
 - b. Government Hospital
 - c. Public Health Care Center
3. Daily patient volume?
 - a. 0-5
 - b. 6-10
 - c. 11-15
 - d. 16-20
 - e. 20
4. Number of dental assistant?
 - a. 0
 - b. 1
 - c. 2
 - d. 3
 - e. 4
 - f. 5
 - g. 5
5. Is there a written infection control program at your clinic?
 - a. Yes
 - b. No
6. Is there a separate sterilization room?
 - a. Yes
 - b. No
7. How do you sterilize dental handpieces?
 - a. Dry-heat sterilizer
 - b. Autoclave
 - c. Cassette autoclave
 - d. Cold sterilization
8. How do you sterilize hand instruments/orthodontic pliers?
 - a. Autoclave
 - b. In a dedicated device (dental handpiece autoclave)
 - c. Cold sterilization
9. How do you sterilize your cheek retractor?
 - a. Autoclave
 - b. Cold sterilization
10. Do you sterilize molar bands after purchase?
 - a. Yes
 - b. No
11. How do you sterilize molar bands after trial in the patient?
 - a. Dry-heat sterilizer
 - b. Autoclave
 - c. Cold sterilization
12. Do you sterilize mini implants after purchase?
 - a. Yes
 - b. No
13. Do you use recycled brackets/orthodontic materials?
 - a. Yes
 - b. No
14. Do you disinfect impressions or appliances to be delivered to an outer laboratory?
 - a. Yes
 - b. No
15. How do you disinfect the impression?
 - a. Using a disinfectant solution
 - b. UV irradiation
16. Which type of gloves do you use during cleaning of instruments and environmental cleaning?
 - a. Examination gloves
 - b. Kitchen-type gloves
 - c. I do not wear
17. How do you perform surface cleaning?
 - a. Disinfect with alcohol
 - b. Disinfect with hypochlorite solution
 - c. Other disinfectants
 - d. Don't do at all
18. How do you disinfect your dental chair?
 - a. Cover the handles with a disposable foil
 - b. Using a disinfectant solution
19. Do you use a separate protective mask for each patient?
 - a. Yes
 - b. No
20. Have you had hepatitis B vaccine?
 - a. Yes
 - b. No
21. Do you advise the patient to use an antimicrobial mouthwash before procedure?
 - a. Yes
 - b. No
22. What are the necessary precautions you are taking during Covid 19 pandemic?
 - a. Surgical mask
 - b. Respirators(N 95)
 - c. Using PPE
 - d. All the above

23. How do you purify the air inside the clinic?
 a. Exhaust fan and ventilation
 b. Hepa purifiers
 c. Fumigation
 d. UV irradiation

RESULTS

The responses of a total of 205 orthodontists were included in the study. Of the total respondents, 99.5% have an experience less than 20 years. 85.3% work in private offices and 12.7% work in Government hospitals. In terms of daily patient capacity, 74.5% of the respondents have over 6 patients. The results of the study are presented with the help of pie charts below.

N-Number of Response

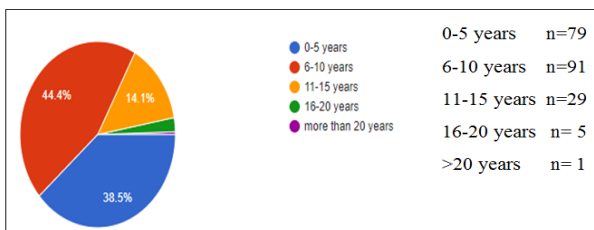


Fig-1: Experience in practice

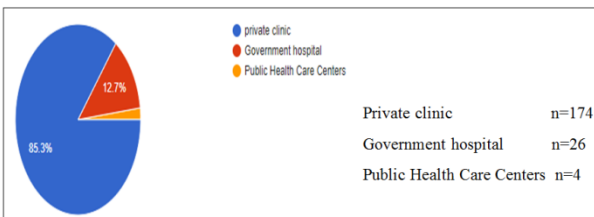


Fig-2: Place of work

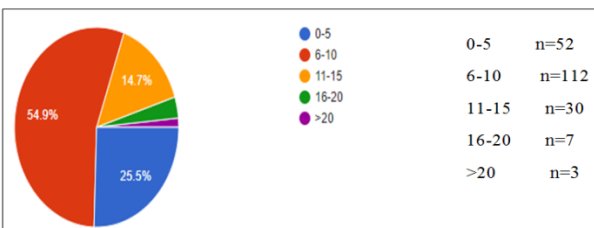


Fig-3: Daily patient capacity

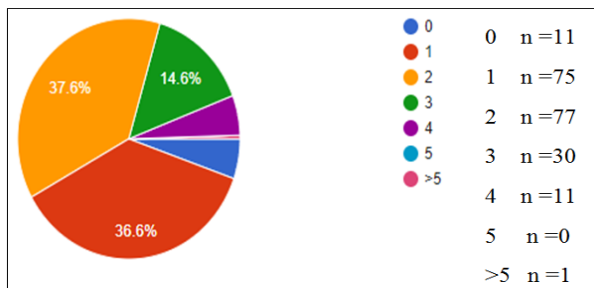


Fig-4: Number of dental assistant

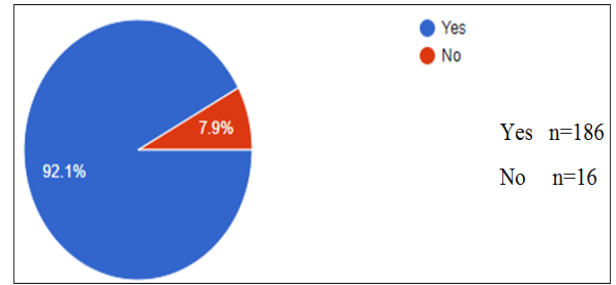


Fig-5: Written infection control program at clinic

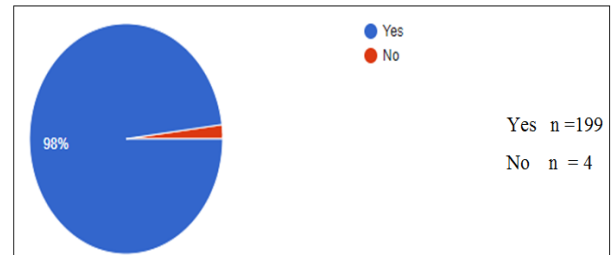


Fig-6: Separate sterilization room

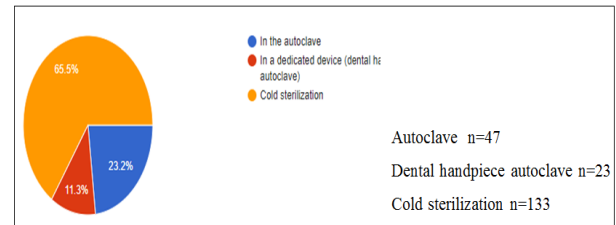


Fig-7: Sterilization of dental handpieces

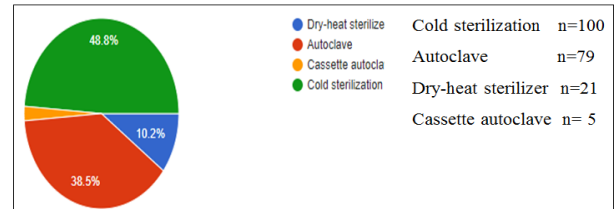


Fig-8: Sterilization of hand instruments/orthodontic pliers



Fig-9: Sterilization of cheek retractor

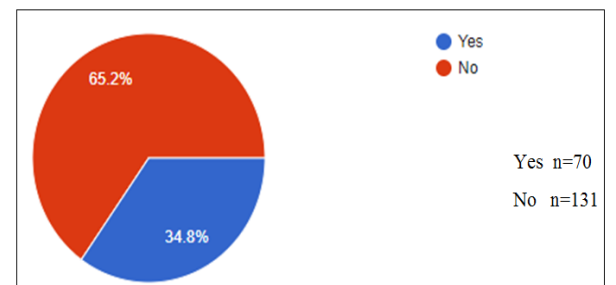


Fig-10: Sterilization of molar bands after purchase

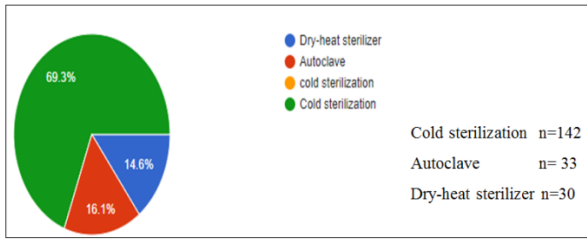


Fig-11: Sterilization of molar bands after trial in the patient

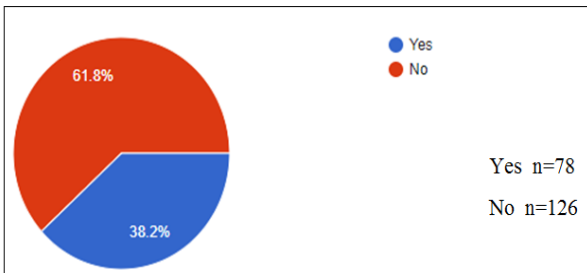


Fig-12: Sterilization of mini implants after purchase

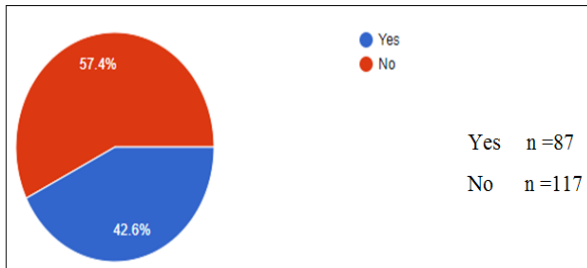


Fig-13: Recycling of orthodontic materials/brackets

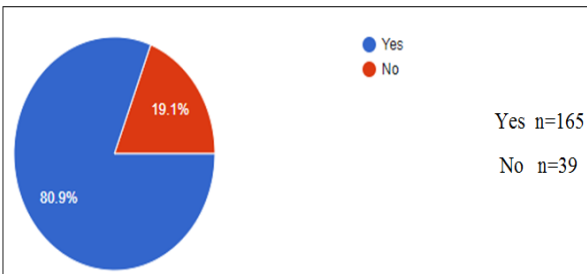


Fig-14: Disinfection of impressions or appliances to be delivered to an outer laboratory

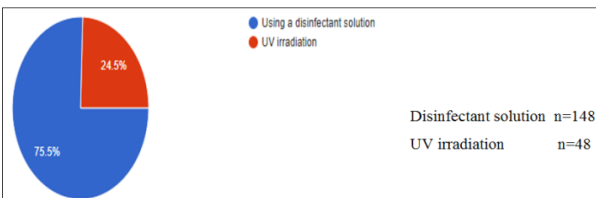


Fig-15: Methods of disinfection of the impression

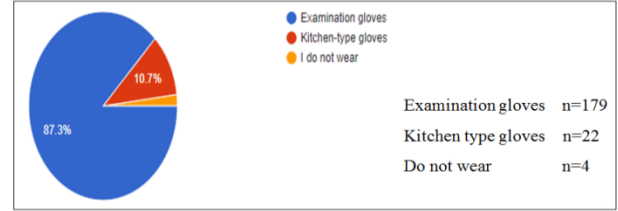


Fig-16: Gloves used during cleaning of instruments and environmental cleaning

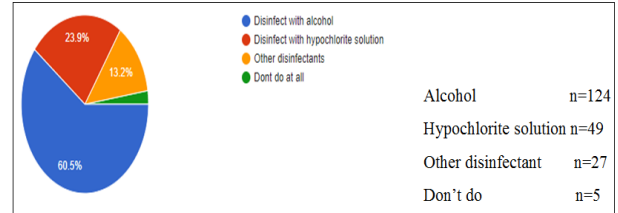


Fig-17: Surface cleaning



Fig-18: Disinfection of dental chair

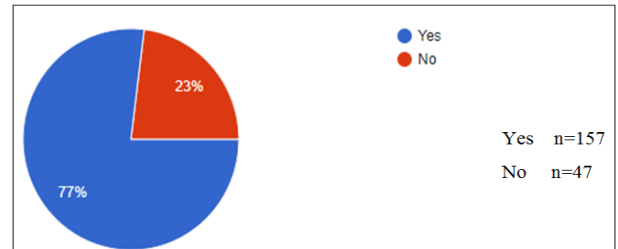


Fig-19: Separate protective mask for each patient

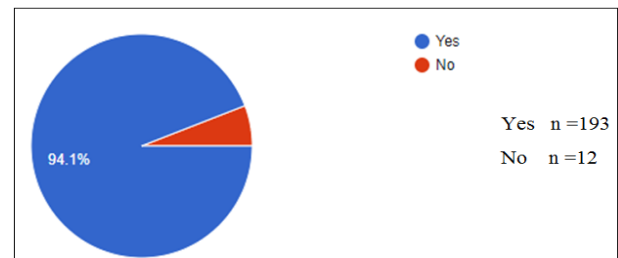


Fig-20: Hepatitis B vaccination

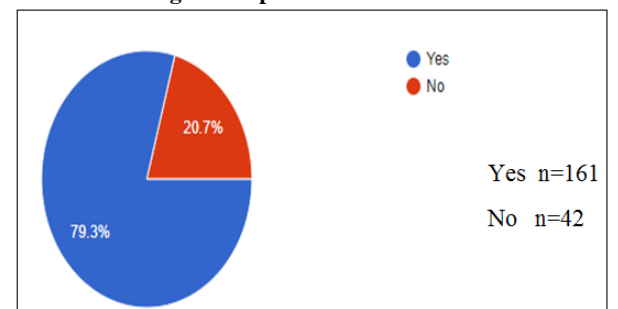


Fig-21: Advising patients to use antimicrobial mouthwash before procedure

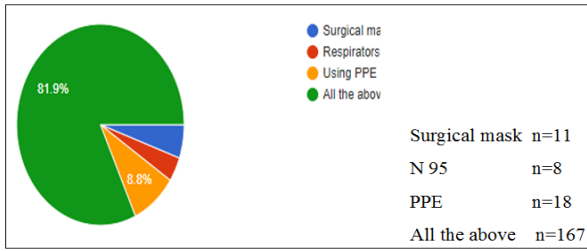


Fig-22: Necessary precautions taking during Covid 19 pandemic

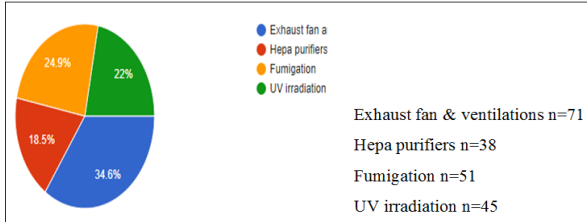


Fig-23: Air disinfection in dental clinic

98% of respondents had separate sterilization room and 92.1% had written infection control program at their clinic. Rate of using cold sterilization for orthodontic pliers and hand instruments was 48.8%, the rate of using autoclave was 38.5%, and the rate of using dry-heat sterilizer was 10.2%. For dental hand piece 65.5% were using cold sterilization. Majority were not following presterilization of mini implants (61.8%) and bands (65.2%). Whereas the rate of sitting molar bands in disinfectant solution after trial in the patient was 69.3%, the rate of autoclave sterilization was 16.1%. The rate of using examination gloves was 87.3% kitchen-type gloves during cleaning of instruments and environmental cleaning was 10.7%.

Hepatitis B immunization rate was 94.1%. Majority were advising antimicrobial mouthwash before procedure (79.3%) and were following all the necessary precautions during COVID 19 including PPE and N 95 masks (81.9%).

DISCUSSION

Eventhough Orthodontist does not perform oral surgery, effective infection control must be a routine component of professional activity. The results of this study showed that majority of respondents had separate sterilization room (98%) and written infection control program (92.1%) at their clinic which is inevitable for very clinic. Work load increases with daily patient volume, and accordingly, number of dental assistant increases. In the practice of experienced orthodontists, number of dental assistant was found to be higher with increasing daily patient volume.

The rate of wiping off the outer surface of dental handpieces (cold sterilization) was 66.8%, and the rate of using autoclave sterilization was 23.2%, whereas the rate of using dental handpiece autoclave was 11.3%. Although wiping dental handpieces with disinfectant solutions without performing sterilization is an inappropriate and an inefficient means of

sterilization, the rate of this method was considerably high. According to the study by Vendrell et al., [7] published in 2002, disinfection with ethanol, propanol (Incidur®) spray, and isopropanol (Iso-Septol) spray was not satisfactory in reducing the number of microorganisms. Dental handpieces must be therefore sterilized using the autoclave, and wiping the outer surface with a disinfectant solution must be abandoned [7].

If cross-infection prevention is to be taken seriously in orthodontics, then probably all instruments should be routinely sterilized using an autoclave. Some studies have showed that routine autoclaving of orthodontic pliers using a centralized system does not causes any more damage than chair side cold disinfection [8]. As an ideal sterilization method, the rate of using autoclave does not exceed 50%. This finding suggests an inadequacy in sterilization of orthodontic pliers and hand instruments.

Although auto-claving is the safest way to remove infectious micro-organisms from contaminated instruments including cheek retractor, not all available cheek retractors are autoclavable one. Authors recommended cheek retractors be cleaned using a high-level cold disinfectant. Both alcohol- and chlorine-based disinfectants come in many different forms, and they must be used according to the manufacturers' instructions [9]. The rate of cold disinfection for cheek retractor was 71.4%.

The rate of sterilization for the purchased molar bands before trial in the patient was 34.8%, the rate of sitting in a disinfectant solution after trial was 69.3%, and the rate of autoclave sterilization was 16.1%. Although the rate of sterilization for the purchased molar bands was low, the rate of sterilization after trial in the patient was found to be higher and majority followed cold sterilization. The rate of sterilization of mini implants before usage and after purchase was only 38.2%.

The rate of using recycled brackets/orthodontic materials was found to be 42.6%. In a study published by Oshagh et al., in 2012, softening of archwires was reported after sterilization in the autoclave; however, this change was reported to be at low levels and does not pose a problem in clinical practice [10].

Dental impression materials can act as vectors transmitting a significant amount of microorganisms. Sodium hypochlorite disinfection is an efficient disinfection method for alginate impressions. Tap water rinsing reduces microbial load but does not eliminate the cross-infection potential of alginate [28]. The British Dental Association in the Health Technical Memorandum 01-05 recommends disinfection and decontamination of dental impressions before dispatching them to the dental laboratories, and states

that the responsibility for ensuring dental impressions are both disinfected and labelled as such before being sent to dental laboratory lies solely with the dentist who should inform the dental lab technicians about the status of impression disinfection [11, 12]. The rate of the disinfection of impression before delivering to laboratory was 80.9% and of that 75.5% followed disinfection using a disinfectant solution and 24.5% followed UV irradiation.

The rate of using examination gloves instead of thick kitchen-type gloves during cleaning of instruments and environmental cleaning was 87.3%.

Surfaces that cannot be sterilized must be disinfected effectively. These surfaces include the air-water sprayers, aspirator heads, reflector arms, cuspidors, drawers, head rest and arms.

Suitable clinic and instrument setting will reduce the surfaces to be disinfected. If the chair's positions can be controlled using a pedal and cuspidors controlled by buttons at the level of the elbow or the knee, hand contact is therefore minimized [13]. Sodium hypochlorite 1% or solutions including 70% alcohol are used for surface disinfection in orthodontic clinics. Iodine solutions used for disinfection are cheap, easily stored and highly effective. The only disadvantage is the staining characteristic of iodine. There are types that can be diluted in water or in 70% isopropyl alcohol [13]. The rate of disinfection with alcohol was 60.5%, with hypochlorite was 23.9% and 13.2% was using other disinfectants. For disinfection of dental chair, 56.4% of respondents used the method of covering handles with disposable foils and 43.6% used the method of wiping with disinfectant solution.

77% were using separate mask for each patient and 94.1% had hepatitis B immunization. 79.3% were advising patient to take a antimicrobial mouth wash before procedure.

Orthodontist should wear a lab coat, face mask and hand gloves as a general precautionary measure. Disposable gowns, surgical masks, protective eyeglasses and plastic face masks should be worn during procedures that are likely to splash blood, saliva and oral fluids [5]. As a result of the pandemic, the routine use of complete personal protective equipment may be advisable. Eventhough this equipment, that's usefulness is unquestionable, is very uncomfortable in the day-to-day clinical activity and also hinders psychological interaction with the patient [2]. The rate of using PPE kit and N95 mask during procedure during the time of study was 81.9%.

Various devices/ methods, including ventilation system, ultraviolet lamps, high-volume evacuator, automated room disinfection systems with hydrogen peroxide vapor (fumigation) are used for room surfaces and air disinfection [14-16]. The rate of

using exhaust fans and ventilation for air disinfection was 34.6%. 18.5% used HEPA purifiers, 24.9% used fumigation method and 22% used UV irradiation.

CONCLUSION

1. The rate of using autoclave for sterilizing hand piece was 11.3% and for orthodontic pliers and hand instrumnts ,it did not exceed 50%. This finding suggests an inadequacy in sterilization.
2. Although the rate of sterilization for the purchased molar bands was low, the rate of sterilization after trial in the patient was found to be higher and majority followed cold sterilization.
3. The rate of sterilization of mini implants before usage and after purchase was only 38.2%.
4. The rate of using examination gloves instead of thick kitchen-type gloves during cleaning of instruments and environmental cleaning was 87.3%.
5. Covid 19 disease has altered the entire dental community and in todays orthodontic practice, disease control must undergo major reevaluation and restructuring.The result of the study showed that the compliance of orthodontist to infection control procedure has improved in South India during Covid time, yet need to be still improved.

Effective infection control must be a routine component of professional activity. Thorough understanding of the application of sterilization will help ensure safety from the invisible but deadly world of microbial pathogens. Always "Prevention is better than cure".

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