

# Dental health of Irish alcohol/drug abuse treatment centre residents

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**Objectives:** This study examines the independent and combined impact of ‘alcohol only’ and ‘alcohol plus drug’ abuse on the dental health of Irish alcohol/drug abuse treatment centre residents, comparing their dental caries experience. **Methods:** Four Irish treatment centres were visited periodically over a year. Data was collected on residents’ alcohol, tobacco and drug habits. Participants underwent comprehensive oral examination. **Results:** Of 210 participants (148 males and 62 females), 53% reported an ‘alcohol plus drug’ abuse; 44% had an ‘alcohol-only’ abuse. ‘Drug-only’ abusers (n=7) were excluded. Ages ranged from 18-73 with 59% aged under 40. ‘Alcohol-only’ abusers were significantly older than “alcohol plus drugs” abusers (p<0.001). Mean DMFT (14.4, sd 7.3) and MT scores (7.3, sd 6.8) were above the national averages. “Alcohol-only” abusers had higher DMFT scores (p<0.001), more missing teeth (p<0.001) and more filled teeth (p<0.01) than “drugs plus alcohol” abusers. DT scores did not vary significantly between study groups. Multivariate analysis confirmed the significance of gender (males OR=2.31, p=0.009) on DT scores and highly significant influence of age (age≤36, OR=0.08, p<0.001) on MT status. However, study group was not a significant influence once age was taken into consideration. **Conclusions:** The study reveals a high level of dental disease among Irish alcohol/drug abusers. While some authors have suggested that ‘alcohol-only’ abusers may experience less decay than ‘alcohol plus drug’ abusers, this study found no significant difference in the caries experience of the two groups once age was taken into consideration.

**Key words:** *drug abuse, alcoholics, dental health survey, dental caries, DMF index, tooth loss, Ireland*

## Introduction

Substance abuse is characterised by numerous physiological and psychological changes which encourage dental disease and reduce the abuser’s engagement with dental services and compliance with dental advice (Dasanayake *et al.*, 2010; Friedlander *et al.*, 2003; Hornecker *et al.*, 2003). While there is a paucity of research on the dental impact of abuse, studies suggest that such individuals experience high rates of dental disease (Araujo *et al.*, 2004; Dasanayake *et al.*, 2010; Niquille *et al.*, 1993). Recent research suggests that those who abuse alcohol but not drugs may experience less dental decay than those who abuse alcohol plus drugs due perhaps to the high fluoride content of certain alcoholic beverages, or the inhibitory effect of alcohol on cariogenic bacteria (Dasanayake *et al.*, 2010; Warnakulasuriya *et al.*, 2002). A literature search of Medline Ovid®, Embase, PsychInfo, and BNIA databases failed to reveal any published work on the dental health of alcohol and drug abusers in Ireland. Search terms for key words included any of alcohol, addict and drug abuse with dental health, caries, decay or tooth loss and Irish or Ireland.

This study examines the dental health of Irish alcohol/drug abuse treatment centre residents, comparing the dental caries experience of “alcohol only” and “alcohol plus drugs” abusers.

## Methods and Materials

Four residential abuse treatment centres in Southern Ireland, with an annual through-put of approximately 280 clients, participated in this study. All centres were visited monthly/bimonthly from October 2006 to September 2007, subject to client availability. This observational, cross-sectional study has been conducted in full accordance with the ethical principles of the World Medical Association Declaration of Helsinki (2008) and ethical approval was obtained from Cork University Hospitals Research Ethical Committee. Procedural details were finalised with Management Boards and medical personnel at each site. All residents, aged 18+ years, were invited to undergo an oral health examination, preceded by a short semi-structured interview, unless the local medical lead considered the individual unfit for interview. Participation was voluntary with no financial inducements offered. Each resident was given an oral explanation and written study details before written consent was sought. Standard demographic data and self-reported tobacco and alcohol/drug intake prior to admission were recorded on a custom-designed questionnaire (see the appendix to the online version of this paper). The author undertook all interviews and examinations to avoid inter-examiner variation.

The comprehensive oral examination followed International Dental Federation (FDI) guidelines using a mobile Daray lamp, dental mirrors and gauze while participants sat in a hospital-grade, high-backed armchair. Probing

**Table 1.** Participant demographics, behavioural characteristics and dental status by study group

Variable	Alcohol Only (n=92)		Alcohol plus drug (n=111)		p
	n (%)	mean (sd)	n (%)	mean (sd)	
Age in years		47.2 (12.8)		30.2 (9.4)	<0.001
Gender: Male	59 (64%)		83 (75%)		0.10
Female	33 (36%)		28 (25%)		
Current smokers	71 (77%)		106 (96%)		<0.001
Years of alcohol drinking		20.5 (14.8)		13.9 (8.7)	<0.001
Alcohol preference: Beer	65 (71%)		96 (87%)		0.006
Spirits	9 (10%)		4 (4%)		0.07
Wine	20 (21%)		15 (14%)		0.12
Regular mouthwash user	33 (36%)		30 (27%)		0.38
Regular dental attendee	33 (36%)		35 (32%)		0.52
Teeth present		21.9 (7.9)		26.9 (4.6)	<0.001
DMFT		17.7 (7.3)		11.7 (6.1)	<0.001
Decayed		1.7 (2.7)		2.4 (3.2)	0.14
Missing		10.1 (7.9)		5.1 (4.6)	<0.001
Filled		5.9 (4.5)		4.2 (3.7)	<0.01

was avoided as full medical and social histories were unavailable. Oral hygiene assessment used the Quick Impression Index (QI), a score of 0 or 1 being classified as 'good' while QI scores 2 or 3 were deemed 'poor' (Bratthall, 1994). Teeth with gross decay, cavitation, recurrent decay on restorations or visual caries (shadowing without cavitation) were coded as carious using FDI notation to derive DMFT data. Radiographs were not taken. Periodontal disease was diagnosed visually using the following markers: gingival inflammation/bleeding, calculus, frank infection, and mobility. All soft tissue abnormalities were recorded with two premalignant lesions being detected and full details reported elsewhere (O'Sullivan, 2011).

Collected data were analysed using SPSS v18.0 including: 1-way and 2-way frequency distributions, measures of centrality and dispersion; independent sample t-tests and chi-square tests; and, multivariate analysis performed using binary logistic regression. Statistical significance was accepted as  $p < 0.05$ .

## Results

Of 283 residents, only 7% (20) refused to participate but 43 were unavailable and 10, though examined, were excluded as they denied any drug or alcohol abuse, yielding 210 participants (148 males, 62 females). Over half of the participants (53%, 111) were abusing alcohol plus drugs, 44% (92) had an 'alcohol-only' abuse while 3% (7) used drugs alone. Due to the limited sample size of the "drugs-only" sub-group, the remaining results section focuses on individuals who abused "alcohol-only" or "alcohol plus drugs". Participant ages ranged from 18 to 73, mean 37.9 years (sd 13.9) with 59% being under 40. 'Alcohol-only' abusers were significantly older than those using "alcohol plus drugs" ( $p < 0.001$ ), (Table 1). Despite the youthful participant profile, 42% had over 20 years 'drinking experience'; those with an "alcohol-only" abuse had abused alcohol for longer than those with a

**Table 2.** Types of alcohol and drug used by gender

	Males n (%)	Females n (%)	p
Alcohol consumed:			
Beer	119 (84%)	42 (69%)	0.02
Spirits	21 (15%)	14 (23%)	0.16
Wine	7 (5%)	6 (10%)	0.19
Drug used:			
Cocaine	60 (42%)	17 (48%)	0.05
Ecstasy	53 (37%)	19 (31%)	0.40
Marijuana	51 (36%)	16 (26%)	0.16
Speed	34 (24%)	13 (21%)	0.18
Prescription	13 (9%)	7 (12%)	0.61
Heroin	9 (6%)	6 (10%)	0.38
Methadone	9 (6%)	2 (3%)	0.38
LSD	3 (2%)	1 (2%)	0.82

dual abuse (20.5 years, sd 14.8 vs 13.9, sd 8.7,  $p < 0.001$ ). Average self-reported weekly alcohol consumption prior to admission was extremely high, with 88% either reporting an intake of over 60 units/wk (range <5-784 units/wk), or describing their habit as 'binge drinking' i.e. episodic excessive drinking. Mean weekly alcohol intake did not vary significantly between "alcohol-only" and "alcohol plus drugs" abusers. High rates of tobacco consumption were recorded as 87% (177/203) were current smokers. 'Alcohol-only' abusers were less likely to smoke tobacco (77%) than those who abused "alcohol plus drugs" (96%;  $p < 0.001$ ), the difference persisting when controlled for age.

Participants reported that their preferred beverages were beer (83%), spirits (17%) and wine (6%), see Table 2. Multiple preferences were allowed. Beer drinkers reportedly consumed various products including beer, stout, lager and cider, depending upon availability. Males were more likely to drink beer ( $p = 0.02$ ), as were those who abused "alcohol plus drugs" ( $p = 0.006$ ). Beer drinkers were significantly younger than non-beer drinkers

( $p < 0.05$ ) while wine drinkers were older than non-wine drinkers ( $p < 0.05$ ). Cocaine was the most widely used drug (38%, 77/203), being used by 42% of the males and 28% of the females ( $p < 0.05$ ). Among drug users, the average number of drugs used was 2.8 (sd 1.3); with multiple drug usage evident for 79% of users. The number of drugs used correlated negatively with age ( $r = -0.33$ ,  $p < 0.001$ ).

Participants were questioned regarding their oral hygiene practices. While 87% reportedly brushed their teeth daily during rehabilitation, and 52% brushed more frequently, all admitted to infrequent oral hygiene practices while under the influence of alcohol/drugs. Almost a third of the participants (31%, 63) used mouthwash, with the vast majority (97%; 61/63) using high alcohol-containing rinses. Most participants admitted being irregular dental attendees; the time since last dental visit ranged from 3 days to over 30 years with 51% (103) attending only when in pain. On examination, 79% participants (90% of females, 74% of males,  $p < 0.01$ ) exhibited good oral hygiene (QI 0/1). Despite the youthful profile of the participants, only 46% had 24 or more teeth, including 27% of the “alcohol-only” abusers and 61% of the “alcohol plus drug” abusers,  $p < 0.001$ . The mean DMFT was 14.4 (sd 7.3, range 2-32, median 13). Mean DMFT scores increased with age and were consistently higher for smokers than non-smokers for all age categories, particularly in later life (Figure 1). Those with an “alcohol-only” abuse had significantly higher DMFT scores than “alcohol plus drugs” abusers (17.7, sd 7.3 vs 11.7, sd 6.1,  $p < 0.001$ ). While the “alcohol-only” group had more missing teeth ( $p < 0.001$ ), and more filled teeth ( $p < 0.01$ ), the number of decayed teeth was similar for the two study groups (mean 1.7 vs 2.4,  $p = 0.14$ ) as illustrated in Table 1.

The number of decayed teeth (DT) ranged from 0-16 (mean 2.1, sd 2.9), with the highest DT scores recorded among teenagers (mean 4.4) and those aged 30-39 (mean 2.6). Bivariate analysis showed the influence of two background variables namely gender ( $p = 0.002$ ) and oral hygiene ( $p = 0.018$ ) on DT status (1+ versus 0), see Table 3. Multivariate analysis confirmed the significance of gender (males: OR 2.31,  $p = 0.009$ ) while good oral hygiene (OR 0.48,  $p = 0.06$ ) also remained a considerable influence.

The mean number of missing teeth (MT) was 7.3 (sd

6.8). MT scores increased with age ( $r = 0.72$ ,  $p < 0.001$ ), ranging from 3.2 (sd 2.0) for those aged  $< 30$ , to 19.4 (sd 9.2) for those aged 60 or more. Older females (60 or over) were missing significantly more teeth (mean 29.5, sd 5.0) than males of that age (mean 16.3, sd 7.9), ( $p < 0.01$ ). Smokers in their 40s had higher MT scores than non-smokers (means 8.4 and 3.2,  $p = 0.02$ )  $p < 0.05$  but for those in their 50s and 60s there were no significant differences. Multivariate analysis (Table 3) confirms the highly significant influence of age (age  $\leq 36$ , OR = 0.007,  $p < 0.001$ ) on MT status (6+ teeth versus  $\leq 5$ ) and the lack of influence of study group (“alcohol-only” vs “alcohol & drugs”) once age is controlled for.

The number of filled teeth (FT) ranged from 0-19 (mean 5.0, sd 4.3). Age was a significant background

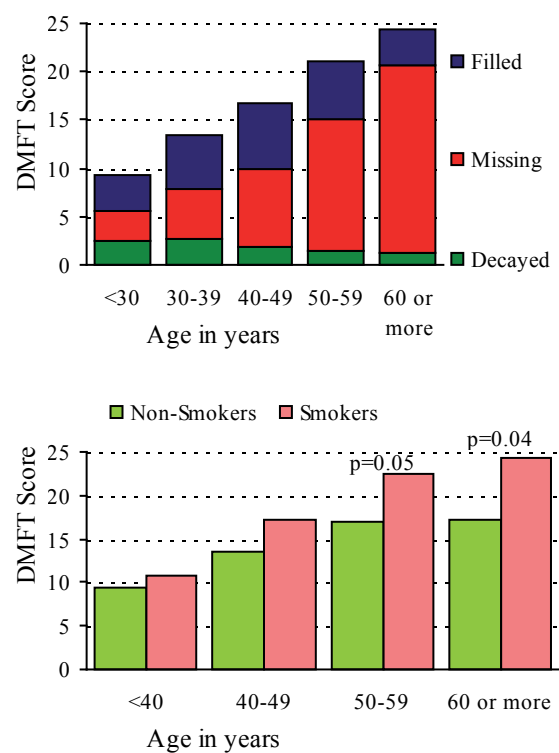


Figure 1. DMFT by age and smoking status

Table 3. Factors which significantly influenced tooth decay, missing teeth and filled teeth

Variable & influencing factors <sup>(a)</sup>	Bivariate analyses			Multivariate analyses		
	OR	95% CI	p	OR	95% CI	p
Decayed teeth (1+ vs 0)						
Male (vs Female)	2.56	1.39-4.76	<b>0.002</b>	2.31	1.24-4.32	<b>0.009</b>
Good oral hygiene (vs poor)	0.41	0.19-0.87	<b>0.018</b>	0.48	0.22-1.03	0.06
Missing teeth (6+ vs $\leq 5$ )						
Age $\leq 36$ (vs age 37+)	0.07	0.04-0.14	<b>0.001</b>	0.08	0.04-0.17	<b>&lt;0.001</b>
Alcohol only (vs alcohol & drugs)	4.00	2.17-7.14	<b>0.001</b>	1.08	0.72-1.59	0.71
Filled teeth (5+ vs $\leq 4$ )						
Age $\leq 36$ (vs age 37+)	0.48	0.27-0.84	<b>0.009</b>	0.56	0.29-1.09	0.08
Alcohol only (vs alcohol & drugs)	1.85	1.05-3.22	<b>0.032</b>	1.16	0.83-1.61	0.37

<sup>(a)</sup> Factors investigated: gender, age, study group, beer drinker, wine drinker, spirit drinker, current tobacco user, mouthwash user, brushing habit, oral hygiene.

influence, with mean FT scores peaking for those aged 40+yrs (mean 7.02, sd 3.7), decreasing thereafter to 6.0 for those aged 50 or more and 3.8 for those aged 60 and over. While 'alcohol-only' abusers had higher FT scores ( $p < 0.01$ ), multivariate analysis revealed that study group was not a significant influence once the impact of age was taken into consideration. The number of filled teeth was negatively correlated with number of decayed teeth for the overall study population ( $r = -0.28$ ;  $p < 0.001$ ), for 'alcohol-only' abusers ( $r = -0.22$ ;  $p < 0.05$ ) and for those who abused 'alcohol plus drugs' ( $r = -0.32$ ;  $p < 0.01$ ).

Many participants (119, 57%) had evidence of overt periodontal disease, the prevalence increasing with age from 22% among teenage participants to 74% of those aged 50-59 ( $p < 0.01$ ). However, periodontal status was not influenced by abuse type. Individuals with periodontal disease had poorer oral hygiene ( $p < 0.001$ ), higher DMFT scores ( $p < 0.05$ ) and more decayed teeth, ( $p < 0.05$ ). Most participants (82%, 87% of males and 69% of females,  $p < 0.01$ ) were deemed to be in need of urgent dental treatment and 49 (23%, 29% of males and 10% of females,  $p < 0.01$ ) needed at least one extraction. Higher extraction needs were recorded among infrequent dental attendees ( $p < 0.01$ ), heroin users, ( $p < 0.05$ ) and those with dental infection ( $p < 0.001$ ); 27 participants (13%) reported substantial oro-dental pain at the time of the examination.

## Discussion

This study provides baseline data on the dental health of individuals undergoing treatment for alcohol/drug abuse in southern Ireland and compares the dental experience of "alcohol-only" abusers and those who abused "alcohol plus drugs". Several limitations are acknowledged, namely: (i) the cross-sectional study design prevents the establishment of a temporal relationship between exposure and disease; (ii) potential inaccuracies in self-reported retrospective estimates of tobacco and alcohol/drug intake; (iii) limitations associated with 'field-work' dental examinations; and (iv) use of a sole examiner/interviewer. However, these limitations were distributed non-differentially among both study groups. While the age profile of the participants is younger than that of similar European studies (Harris *et al.*, 1996, 1997; Hornecker *et al.*, 2003), it concurs with reports of a decreasing age profile among Irish alcoholics (Farren, 2006). The gender distribution, levels of tobacco and alcohol consumption, and high prevalence of dental disease among alcohol/drug abusers in this study are in line with similar international studies (Dasanayake *et al.*, 2010; Harris *et al.*, 1997; Hornecker *et al.*, 2003; Pitiphat *et al.*, 2003; Reece, 2007). The consistently higher DMFT scores observed among smokers in this study suggests a strong association between tobacco usage and dental disease as reported by Johnson and Hill (2004) and the US Surgeon General (2004).

Although the DMFT scores in this study (mean 14.4) are considerably higher than scores recorded for the general Irish population (Whelton *et al.*, 2007), particularly for younger individuals (9.1 versus 5.7), they are in line with the DMFT scores (mean 15.4) recorded among British abusers (Harris *et al.*, 1996). Even higher DMFT scores have been recorded in similar German (20.0) and Swiss studies (26.0) (Hornecker *et al.*, 2003; Niquille *et al.*, 1993).

The level of tooth loss experienced by Irish abusers (MT 7.3) was nearly 5 times that recorded for the general Irish population (MT 1.5, Whelton *et al.*, 2007). High levels of tooth loss have also been reported in similar British, German and Swedish studies (Dasanayake *et al.*, 2010; De Palma *et al.*, 2005; Hornecker *et al.*, 2003).

While the "alcohol-only" and "alcohol plus drugs" abusers reported comparable levels of alcohol consumption and similar patterns of dental attendance, the "alcohol-only" group had significantly higher DMFT scores ( $p < 0.001$ ), more missing teeth ( $p < 0.001$ ) and more filled teeth ( $p < 0.01$ ) than the "alcohol plus drugs" group. Somewhat lower levels of decay (mean DF 1.7) were also recorded among the "alcohol-only" abusers compared to the "alcohol plus drugs" users (2.4), ( $p = 0.14$ ). Multivariate analysis was therefore undertaken to explore whether the differences in dental caries experience and tooth loss were attributable to any particular habit or substance. This analysis (Table 3) revealed that male abusers were significantly more likely to have decay than female abusers (OR 2.31,  $p = 0.009$ ), and that tooth loss was more common in older participants. However, individual study group was not an influence on any DMFT component once the impact of age was taken into consideration. Similarly, the slightly lower DT scores recorded in the "alcohol only" group may be related to the lower number of teeth present in these individuals. This provides an interesting contrast to the recent study by Dasanayake *et al.*, (2010) which reported a higher risk of having decayed teeth among the 'alcohol and drug' abuse group compared to the 'alcohol only' group" (OR 1.38;  $p = 0.049$ ).

This study reveals a high rate of dental disease in those suffering from alcohol and alcohol/drug abuse in Ireland. Further research is required to elucidate the true dental impact of the various substances involved. However, the multi-factorial nature of dental disease, combined with the pattern of multiple substance abuse and heavy smoking habit frequently exhibited by alcohol and drug abusers will make this task challenging.

The high prevalence of caries, overt periodontal disease, infection and pain recorded in this study suggests a lack of meaningful engagement between Irish alcohol/drug abusers and general dental practitioners. A growing body of scientific evidence suggests that oral health has a significant impact on nutrition, cardiovascular disease, respiratory disease and diabetes (Katz *et al.*, 2010; Touger-Decker and Mobley, 2007). Furthermore, the loss of natural teeth has been associated with a diminished nutritional intake, which may in turn lead to illnesses such as osteoporosis, atherosclerosis and bowel disease (Allen *et al.*, 2010). Failure to address the dental needs of this underserved population may therefore result in a substantial public health problem, given the rising level of alcohol and drug consumption in Ireland. Strong consideration should therefore be given to the inclusion of oral healthcare competencies in all professional healthcare curricula to highlight the significant links between oral health and general well-being. Furthermore, the introduction of a state-funded scheme to provide basic dental treatment to residents of abuse treatment centres as an integral component of care could provide a cost-effective means of enhancing both their oral and general health, ultimately reducing overall healthcare costs.

## Conclusions

The study reveals a high level of dental disease among Irish alcohol and drug abusers. While some studies suggest that 'alcohol-only' abusers may experience less decay than 'alcohol plus drug' abusers, this study found no difference in the caries experience of the two groups once age was taken into consideration.

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Appendix

ORO-DENTAL HEALTH STUDY

Date: \_\_\_\_\_ Site: A B C Subject Number: \_\_\_\_\_

Name: \_\_\_\_\_

Age: \_\_\_\_\_ DOB: \_\_\_\_\_ Sex: M F

Tobacco: Present Past Never Quantity: /day Duration: Quit: yrs

Alcohol: Present Past Never Quantity: /wk Duration: Quit: yrs

Other: Cocaine Ecstasy Hash Heroin Marijuana  
Methadone Speed Other \_\_\_\_\_

Dental History: LDV \_\_\_\_\_

Regular (1) No need/interest (2) Trouble/Pain (3) Phobia (4) Cost (5)

Brushes: Daily (1) >once/day (2) < once/day (3) Once/wk (4) ~Never (5)

Mouthwash: Yes (1) No (2) \_\_\_\_\_

Dental Status affects QOL: No (1) Slightly (2) Significantly (3)

Dental Status:

Edentulous = 1, No uppers = 2, No lowers = 3, Part dentate =4, ~Full =5

Dentures: UPPER No Full Part Good Poor Worn

LOWER No Full Part Good Poor Worn

No Denture: Wanted (1) Not Wanted (2)

Soft Tissues:

Extra-oral: NAD Pathology: \_\_\_\_\_

Cervical Nodes: NAD N+ \_\_\_\_\_

Intra-oral: NAD Pathology: \_\_\_\_\_

\_\_\_\_\_

**Teeth Present:**

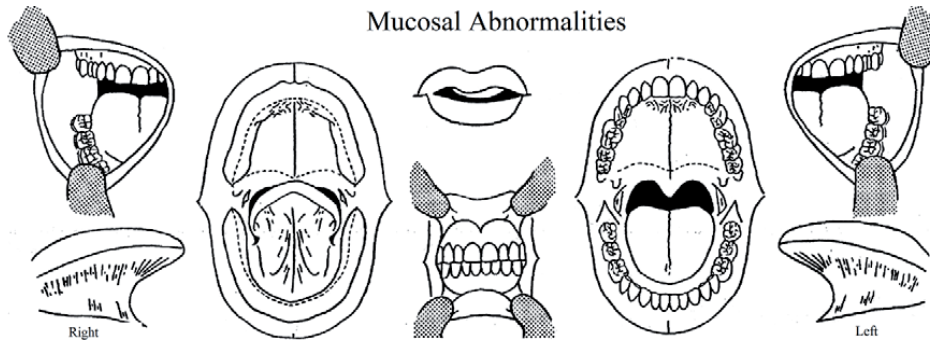
1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8

*D - decay      M - missing      F - Filled      #      DMFT = /28*

**Dental Condition:**

*Caries      Perio      #teeth      xs wear      infection      OH: 0 1 2 3*

*Trismus      Dysphagia      Hoarseness      Other \_\_\_\_\_*



**Tx Needs:**      *NTR      Fillings      Extractions      Perio      Dentures*

*Mucosal lesion:      Further investigation advised: Yes      No \_\_\_\_\_*

*Offered Appt CDH:      Y      N*

*Accepted Appt:      Y      N*

*Attended FU Appt: Y/N      Date attended CDH: \_\_\_\_\_*