THE INDIRECT COSTS OF NON-TRAUMATIC DENTAL EMERGENCY ROOM VISITS IN BRITISH COLUMBIA

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Objective: To assess the indirect costs of non-traumatic dental visits at the Emergency Rooms (ERs) in British Columbia (BC). Methods: Data from the Canadian Institute for Health Information on demographics, diagnostic codes, length of stay, procedural and management information from hospital-based ERs visits in Alberta, Ontario and British Columbia between 2012 and 2014 were collected. Continuous variables (e.g., age, time of ER visit, etc) were summarized using descriptive statistics (n, mean ± SD). Categorical variables (e.g., gender, main problem, diagnosis and triage level) were summarized using frequencies and percentages. Results: Non-traumatic ER visits were non-urgent (70%), were made by adults between the ages of 19 and 65 years-old (75%), had toothache or abscess as the main complaint, and lasted for about 2 hours at the cost ranging from $183.75 to $245.51 each compared to $124.00 for all ER visits; 98% of these patients were dismissed without treatment. Dental-related ER visits accounted for around 1% of the total annual visits and their direct costs added up to CAD $12.6 million in Ontario and $2.3 million in BC. The indirect cost of using ER in BC is much higher: oral diseases are left untreated, 24.7 million hours are lost annually from school or un-paid time off work, and individual and societal productivity decreases. Conclusion: Non-traumatic dental ER visits and their direct costs may seem insignificant when compared to $200 billion Canada spends on health care annually, the indirect costs are much higher. Use of ERs for such conditions not only adds an extra burden and contributes to overcrowding, but also makes the health care system costly. Public health programs would benefit by using such funds to provide preventive and curative dental care.
ADDRESSING ACUTE DENTAL INFECTIONS IN EMERGENCY DEPARTMENTS

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Objective: Acute Dental Infections (ADI) represent a frequent occurrence in Emergency Departments (ED) and patients are commonly referred to Outpatient Parenteral Antibiotic Therapy (OPAT) programs for intra-venous antibiotic. The aim of this project is to evaluate a referral coupon system for patients with ADI in Calgary, Canada. Methods: Referral coupons were provided to OPAT/ED patients, offering them a free of charge dental treatment for the current ADI. Dental treatments were offered at two Public Health Dental Clinics (PHDC) in Calgary. All the patients had to present their referral coupon at their dental treatment appointment. After dental treatment of the ADI, patients under the eligibility criteria of PHDC were scheduled for further appointments. Patients received dental hygiene advice and referral to smoking cessation as applicable. Results: A total of 166 patients with ADI were referred to the PHDC for treatment through the coupon referral system between June 1st 2015 to April 30th 2016. Twenty-one (13%) of coupon recipients did not present for dental care. Amongst the 145 patients who accessed PHDC services, the treatment provided included: 200 extractions, 35 fillings and 11 root canal treatments. The value of the dental treatments offered totaled $80,733 according Blue Cross Dental Fee Guide, representing an average coupon value of CA$ 557.00. A smoking rate of 52% was observed amongst these patients. Conclusions: ADI represent a common preventable cause of recurrent morbidity. This collaborative care approach between the acute health care system and the PHDC illustrates a potentially cost effective initiative to address ADI. The coupon referral system increased the referral rate of patients utilizing ED for ADI, potentially increasing the accessibility to dental care especially for those with low income.
PATTERNS OF EMERGENCY DEPARTMENT VISITS FOR NON-TRAUMATIC DENTAL CONDITIONS IN ONTARIO FROM 2006 TO 2014

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Objectives: To assess patterns in Emergency Department (ED) visits for Non Traumatic Dental Conditions (NTDCs) in Ontario from 2006 to 2014. Methods: Aggregate data for Ontario were obtained from the Canadian Institute for Health Information’s (CIHI) National Ambulatory Care Reporting System (NACRS). Descriptive analysis was conducted for overall numbers of visits by age, sex, region, neighborhood income, and neighborhood proportion of immigrants. Rates were calculated wherever population estimates were available. Results: Over the study period, 403,399 people in Ontario made 482,600 visits to EDs for NTDCs. On average, 341 per 100,000 people, per year, visited. By age, children aged 0 to 5 years, at an average of 1,435 per 100,000, had the highest rate of visiting. Among 14 regions, rates were highest in the North East region, at an average of 882 per 100,000. Those living in neighborhoods with the lowest income quintile visited most often, with an average of 15,856 visits per year (2.3 times more as compared to the highest income quintile). Those living in neighborhoods that fall into the highest tercile in terms of immigrant concentration made an average of 39,759 visits per year (nine times more as compared to the lowest immigrant concentration tercile). Conclusion: Patterns of ED visits for NTDCs in Ontario suggest that young children, people living in neighborhoods with lower income and higher immigrant concentration, and people living in the North East region, had the highest rates of ED visits for NTDCs during 2006-2014, suggesting barriers to accessing dental care. To enhance equitable access to dental care, policy advocacy is required for publicly funding essential and emergency dental services for all.
FLUORIDE EXPOSURE AND INDICATORS OF COGNITIVE FUNCTIONING: IMPLICATIONS FOR COMMUNITY WATER FLUORIDATION

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**Objectives:** Since its implementation, community water fluoridation (CWF) has been considered an important public health intervention to prevent tooth decay. Recently, several Canadian municipalities have abandoned CWF partly owing to concerns regarding potential harms, including cognitive functioning. Our objectives were to examine the association between fluoride exposure and 1) diagnosis of a learning disability and 2) indicators of cognitive functioning among a national population-based sample of Canadians. **Methods:** We analyzed data from Cycles 2 and 3 of the Canadian Health Measures Survey (CHMS). The association between fluoride (urinary and tap water) and learning disability diagnosis (yes/no) was examined using logistic regression. The association between urinary fluoride and cognitive functioning (no cognitive dysfunction/some cognitive dysfunction/high cognitive dysfunction) was examined using multinomial logistic regression. Other available variables in the CHMS permitted additional exploratory analyses among the subset of participants for whom we could discern fluoride exposure from drinking water and/or dental products. **Results:** In age and sex adjusted models, the diagnosis of a learning disability was not significantly associated with urinary fluoride (Cycles 2 and 3) or fluoride from tap water (Cycle 3). The multinomial logistic regression model revealed that the relative risk ratio for a one-unit increase in urinary fluoride (\(\mu\text{mol/L}\)) was statistically higher among those classified as having some cognitive dysfunction relative to those classified as having no cognitive dysfunction, holding age and sex constant (\(p<0.05\)). However, when the sample was constrained to the subset of participants for whom we could discern fluoride exposure from drinking water, this association was no longer apparent. **Conclusion:** Results suggest an association between higher urinary fluoride and having some degree of cognitive dysfunction. However, the observation that this association disappeared amongst the subset for whom we could discern the source of fluoride exposure suggests it does not reflect exposure from CWF.
Objectives: Animal studies suggest that high concentrations of fluoride have negative effects on thyroid functioning. There are concerns that altered thyroid functioning among humans could be the result of ingesting too much fluoride and community water fluoridation (CWF) is an important source of fluoride exposure. Our objectives were to examine the association between fluoride exposure and 1) diagnosis of a thyroid condition and 2) indicators of thyroid functioning among a national population-based sample of Canadians. Methods: We analyzed Cycles 2 and 3 of the Canadian Health Measures Survey (CHMS). Logistic regression was used to assess associations between fluoride from urine and tap water samples and the diagnosis of a thyroid condition. Multinomial logistic regression was used to examine the relationship between fluoride exposure and three categories of thyroid-stimulating hormone (TSH) (low/normal/high). Pregnant women and those taking thyroid medication were excluded. Other available variables in the CHMS permitted additional exploratory analyses among the subset of participants for whom we could discern fluoride exposure from drinking water and/or dental products. Results: There was no evidence of a relationship between fluoride exposure (from urine and tap water) and the diagnosis of a thyroid condition in age and sex adjusted models. There was no statistically significant association between fluoride exposure and abnormal (low or high) TSH levels relative to normal TSH levels. Rerunning the models with the sample was constrained to the subset of participants for whom we could discern fluoride exposure from drinking water and dental products did not reveal any significant associations. Conclusion: These analyses suggest that at the population level, fluoride exposure is not associated with impaired thyroid functioning in a period where multiple sources of fluoride exposure, including CWF, exist. Future research should utilize this rich, high-quality data source to explore relationships between fluoride exposure and other potential harms.
SOCIOECONOMIC POSITION AND CUMULATIVE BIOLOGICAL RISK IN PERIODONTAL DISEASE: EVIDENCE FROM NHANES IV

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Objectives: Poor social and living conditions have been postulated to “get under the skin” to alter the body’s immune responses and bring about disease and related health inequalities. This study aims to evaluate the association between socioeconomic position (SEP) and periodontal disease (PD) in a nationally representative sample of American adults, and assess whether the observed relationship is modified by cumulative biological risk and immune system factors.

Methods: This is a secondary data analysis of the National Health and Nutrition Examination Survey (NHANES IV) (2001-2002). PD was identified using loss of attachment and bleeding on probing. Cumulative biological risk was assessed using individual and aggregate markers of systemic disease risk and inflammation, including central obesity, systolic and diastolic blood pressure, C-reactive protein and neutrophil to lymphocyte (NL) ratio. Poverty to income ratio (PIR) and level of education were used as indicators of SEP. Univariate and multivariate logistic regressions were conducted to assess the relationship between SEP, cumulative biological risk markers and PD, both unadjusted and adjusted for covariates (age, sex, dental insurance).

Results: SEP was significantly associated with PD in adjusted and unadjusted models. Significant associations were also observed between individual biological risk markers and PD. Adjusting for covariates attenuated these relationships. Interactive relationships were observed between SEP and markers of systemic inflammation, particularly neutrophil to lymphocyte (NL) ratio. Conclusion: The association between NL ratio and PD was only significant in interaction with SEP, indicating the potential role SEP plays in altering the body’s immune responses and its contribution to oral inflammation, increased risk of disease, and associated inequalities.
EMERGENCY DEPARTMENT VISITS FOR DENTAL PROBLEMS IN ALBERTA, CANADA

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**Objectives:** Emergency department (ED) visits for dental problems not associated with trauma (DPNAT) represent inappropriate utilization of health care resources increasing the economic burden of the health care system and affecting the quality of care delivered. The objective of this report is to describe the occurrence of ED visits for DPNAT in Alberta, Canada. **Methods:** In Alberta, between January 2011 and March 2016, ED visits for DPNAT, were identified using the codes from the International Classification of Diseases (ICD-10-CA). The codes for DPNAT range from K00 to K14, described as diseases of the oral cavity, salivary glands and jaws. The data was gathered from the National Ambulatory Care Reporting System (NACRS) database and from The Alberta Real Time Syndromic Surveillance Net (ARTSSN). The information gathered on ED visits for DPNAT was related to the primary diagnosis of the discharge disposition of the visits. **Results:** During the studied period, there were a total of 203,954 ED visits for DPNAT in Alberta. The most prevalent reason for ED visits related to dentistry was for diseases of pulp and periapical tissues (K04) such as periapical abscess (34.0% of the visits); followed by disorders of teeth and supporting structures (K08) such as toothache (18.7%), and dental caries (K02; 13.3%). The majority of the visits were made by patients from 0 to 20 years old (39.4%) and patients from 20 to 44 years old (35.2%). Calgary and North Health Zones were those with the highest occurrence of ED visits (30.1% and 25.9% respectively), and South Health Zone, the lowest percentage of visits (9.1%). **Conclusion:** In Alberta, the occurrence of ED visits for DPNAT suggests barriers faced by the population in accessing dental care resources especially for urgent dental issues. Policy efforts and political will are needed to provide alternative options for seeking emergency dental care.
UNIVERSAL VERSUS TARGETED POLICY FOR HEALTH: A CRITICAL ANALYSIS OF THE EXAMPLE OF COMMUNITY WATER FLUORIDATION IN CALGARY IN 2011

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Objectives: In May of 2011, a decision was made by Calgary’s City Council to cease community water fluoridation and to re-allocate the annual operating costs to targeted dental programming. The purpose of this study was to describe and critically analyze the shift from a universal population-level health intervention (community water fluoridation) to a targeted health intervention (dental programming delivered to schools in low income communities), drawing on the broader debate within public and population health between the advantages/disadvantages of universal and targeted preventive health interventions. Methods: We identified, retrieved and summarized publicly available documents pertaining to the shift from community water fluoridation to targeted dental programming in Calgary. We then critiqued the decision, drawing on relevant scholarly literature in the areas of population/public health, social policy, community water fluoridation, multilevel governance and public health ethics. Results: We found that some Councilors displayed a belief that targeted dental health programming was the best and only way of addressing the dental health needs of children living in poverty, and appeared to have a different understanding of what it means to say that a health intervention is equitable, than the speakers who made that point. Conclusion: Despite the existence at the City of Calgary of a ‘triple bottom line’ policy approach, the economic and social implications of this decision were not clearly considered. This research is timely considering the apparently increasing frequency of cessation of community water fluoridation in Canada.
PRACTICE ADAPTATIONS OF DENTAL HYGIENISTS IN ALBERTA, CANADA, ACCORDING TO COMMUNITY WATER FLUORIDATION STATUS

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Objectives: The purpose of this research was to examine whether, or the extent to which, dental hygienists report having engaged in practice adaptations, according to community water fluoridation status of the communities in which they work. We were particularly interested in practice adaptations in response to cessation of community water fluoridation; for example, if dental hygienists began to devote more time to health promotion activities following cessation, perhaps in an effort to offset an anticipated impact of cessation. Methods: We recruited dental hygienists in Alberta by email via their professional affiliation (the College of Registered Dental Hygienists of Alberta) and invited them to participate in an online questionnaire which asked them to report changes to their practice of dental hygiene (i.e., changes to in-office fluoride treatment recommendations, recommendations for patient use of fluoride at home, oral hygiene education, and other changes to practice) since community water fluoridation cessation or, for those in non-ceSSION communities, during a similar time period. We sought information from dental hygienists working in one of three types of municipalities: 1) municipalities where cessation of community water fluoridation has occurred, 2) municipalities where community water fluoridation is in place and cessation has not occurred, and 3) municipalities that have never practiced community water fluoridation. The questionnaire was pilot-tested prior to use. Results: The online questionnaire closed in mid-May 2016. Data cleaning and analysis began shortly after. It is anticipated that preliminary results will be available for presentation at the 2016 CAPHD Conference. Conclusion: Cessation of community water fluoridation appears to be occurring with increasing frequency, in Alberta and elsewhere. Research on fluoridation cessation is complex, and must consider other factors (aside from cessation of community water fluoridation) that may have changed during the time period. The present research focuses on one such factor: dental hygiene practice.
THE BARRIERS AND FACILITATORS OF PRIMARY ORAL HEALTH CARE: A SCOPING STUDY

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Objective: Despite its importance, the integration of oral health into primary care is still an emerging health care pathway. This CIHR funded scoping study has therefore been conducted to provide an evidence-based synthesis on the barriers and facilitators of the primary oral health care approach. Methods: Grounded in the conceptual model of integrated care (rainbow model) and using the Arksey and O’Malley framework, a five-step scoping review was conducted. We performed a systematic search of electronic databases such as OVID, NCBI, EBSCOhost, ProQuest, databases in Public Health, databases of the National Institutes of Health, organizational websites and other sources of grey literature. Two researchers reviewed the title and abstract of English and French publications from 1970 to April 2016. All research studies with a focus on the integration of oral health into primary care were included. Publications were excluded if they were commentaries or editorials. Analytic approach included qualitative description and thematic analysis. Triangulation among data sources and content cross-analysis were performed to ensure the transferability and credibility of the synthesis. Results: From a total of 1583 identified citations, 76 publications from 13 countries were included in the final analysis. Barriers and facilitators were related to six interconnected domains at micro, meso and macro levels. The domains included clinical, professional, organizational, functional, normative and system integration. Barrier-related themes included discipline-oriented training, lack of interprofessional education, conflict of perspectives, practice behaviour and health-care prioritization, lack of clinical, organizational and political leadership and lack of community-sensitive care. The main facilitators of integration were implemented policies and interprofessional, collaborative practices. Conclusion: The implementation of integrated primary care is dependent on the existence of facilitators at different levels of health care system organization. Multi-level and diverse interventions are needed to support the development and the continuity of this approach.
INEQUALITIES IN ORAL HEALTH: UNDERSTANDING THE CONTRIBUTIONS OF EDUCATION AND INCOME

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Objective: To quantify the extent to which income and education explain social gradients in oral health outcomes. Methods: Using data from the Canadian Community Health Survey (CCHS 2003), binary logistic regression models were constructed to examine the relationship between income and education on poor self-reported oral health and chewing difficulties while controlling for age, sex, ethnicity, employment status, and dental insurance coverage. The relative index of inequality (RII) was utilized to quantify the extent to which income and education explain social gradients in self-reported oral health (SROH) and chewing difficulties (CD). Results: Income and education gradients were present for SROH and CD. Fully adjusted models suggest that income inequalities were greater for CD (RII_{inc}=2.85) than for SROH (RII_{inc}=2.75), with no substantial difference in education inequalities between these outcomes. Income explained 37.4% and 42.4% of the education gradient in SROH and CD, respectively, whereas education explained 45.2% and 6.1% of income gradients in SROH and CD, respectively. Interestingly, education plays a larger role than income when explaining inequalities in SROH; however, it is the opposite for CD. Conclusion: In the Canadian adult population, income explained over one third of the education gradient in SROH and CD, whereas the contribution of education to income gradients varied by choice of outcome. Results call for policy advocacy on the structural determinants of oral health, in particular the affordability of dental care.
CARIES PREVALENCE DATA FOR GRADE 1 STUDENTS IN ALBERTA, CANADA BY COMMUNITY DEPRIVATION INDEX LEVEL AND GEOGRAPHY

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Objectives: Province-wide oral health data on dental caries prevalence in school-aged children has not been gathered in Alberta for several decades. 1977 was the last year provincial data for grade 1 students was collected. Regional data collection between 1997-2010 has demonstrated changing dental caries rates in parts of Alberta. The objective of this oral health survey was to determine the overall provincial dental caries prevalence rates in primary and permanent dentitions for grade 1 students, also determining disease patterns by community deprivation level (Pampalon Index- material deprivation scale) and geography. Methods: A stratified random sample of schools was drawn from across the province to obtain a representative group of grade 1 students by deprivation scale level and geographic location. Parental consent was required for participation. Data was collected by calibrated teams using standardized indices. To maximize efficiency the schools sampled in Calgary and Edmonton were from an existing community water fluoridation survey already being completed in those communities. The remaining schools across the province were surveyed by calibrated dental public health professionals. Data analysis first involved the merging of the two data sets and proper weighting of samples. Results: Initial unweighted descriptive data from 5,297 children demonstrates an average deft score of 2.32 and a DMFT of 0.1. No dental caries experience was noted in 48.1\% of the children and 26.3\% had untreated dental caries with 3.1\% showing urgent needs. Of those who could be assessed, 21.4\% demonstrated some evidence of fluorosis. Further analysis will be reported on describing variations in dental caries by community deprivation index level and geography (urban/rural locations). Conclusion: Since the last province-wide data of 1977, dental caries prevalence in grade 1 children has declined significantly. Demonstration of dental caries prevalence variation by community deprivation index level and geographic location will also be highlighted.