POSTER PRESENTATION

(Poster 1)

COSTS, OUTCOMES, AND WORK-RELATED FACTORS OF OCCUPATIONAL MELANOMA AND NON-MELANOMA SKIN CANCER. WORKER'S COMPENSATION BOARD OF BRITISH COLUMBIA ANALYSIS, 1992 – 2013

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Objectives: To describe work-related factors, outcomes and economic impact of occupational skin cancer among workers in British Columbia. Design: Retrospective analysis of accepted melanoma and non-melanoma skin cancer (NMSC) worker's compensation claims from British Columbia (1990 - 2013). Methods: Claims Management Solutions database contains aggregated claims data from 15 Workers Compensation Board of BC offices. The database was searched by ICD-9 codes of known occupation-related dermatoses. Accepted claims between 1990 to 2013, inclusive were analyzed. Results: Of 4442 analyzed claims, nine claims were for melanoma and seven for NMSC. Six fatal melanoma claims accounted for all fatal occupationally-induced dermatoses. Eight melanoma claims listed ultraviolet radiation (UVR) as the primary occupational precipitator. One claim was accepted for occupational exposure to polychlorinated biphenyls. Melanoma had the greatest mean short term disability days of work (155), greatest mean short-term disability amount ($8934.89) and greatest mean total amount per claim ($220,258.14). Melanoma, comprising 0.2% of accepted dermatology claims, accounted for 6.47% of the total cost of all occupational dermatoses. Of the NMSC claims, six were for squamous cell carcinoma and one accepted for basal cell carcinoma. Four included UVR as the exposure while three listed exposure to carcinogenic chemicals. NMSC did not disproportionally affect short term disability time off of work, short term disability costs, nor total costs considerably. Conclusions: Though occupational melanoma disproportionally contributes to total cost of dermatologic work-related claims in British Columbia, the absolute burden of melanoma is relatively small in terms of cost and short term disability.

Category: Pilot/exploratory experiments (for study design, hypotheses creation, etc)

(Poster 2)

THE EFFECT OF PATCH TESTING FOR METAL SENSITIVTY IN THE PERIOPERATIVE SETTING ON ORTHOPEDIC SURGEON DECISION MAKING

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The role of patch testing for metal sensitivity in the perioperative setting is unknown. Evidence based guidelines are lacking. The objectives of this study are to review patch testing data for all

patients referred to the University of British Columbia (UBC) Contact Dermatitis Clinic to investigate for a metal sensitivity in the perioperative setting, to understand the implications of patch test results on orthopedic surgeon decision making, and to propose a prospective controlled trial to investigate the use of patch testing for metal sensitivity in the perioperative setting. Forty-one patients were reviewed with an average age of 59 years old. The most common positive patch test was to nickel sulfate; however, additional metals such as manganese, iron, cobalt, cobalt chromium, vanadium, palladium, gold and indium also resulted in positive patch tests. Eighty-one percent of patients who reported nickel hypersensitivity tested positive to nickel sulfate. The most common complaint for patients who were referred postoperatively was pain, either alone or in association with a rash or swelling. Pain was most commonly associated with a positive patch test to metal. Thirty-nine questionnaires were sent and the response rate was 90%. Some of the ways that the results changed their management in the pre-operative setting included: using oxinium, titanium or ceramic joints, cancelling surgery, proceeding with a regular prosthesis in the setting of negative patch tests. A prospective controlled trial is needed to determine the role of patch testing in the perioperative setting.

Category: Early experiments with well defined objectives/hypothesis.

(Poster 3)

OPTICAL DETERMINANTS BETWEEN NEOPLASTIC LESIONS AND NORMAL SKIN – A PILOT STUDY TOWARDS MONITORING THE OUTCOME OF SKIN CANCER THERAPY

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Background: Non-surgical methods for treating skin cancer do not provide histological confirmation of complete tumor extirpation and rely primarily on periodic visual evaluation of the tumor-bearing site for clinical evidence of recurrence. Optical methods for assessing the presence of recurrent disease would presumably assist in patient monitoring and long term follow up. In this study, we identified candidate optical parameters by comparing superficial basal cell carcinoma (sBCC) and actinic keratosis (AK) lesions from their normal surrounding skin (NS) using polarization speckle and reflectance spectroscopy. Methods: Using a sample of 29 patients from a general dermatology clinic, the polarization speckle method was applied to 13 AK and 16 sBCC, as well as their NS using blue (407nm) and red (663nm) lasers. Reflectance spectroscopy was also used to measure 7 AK and 9 SBCC and their NS. The median values and the distribution of extracted parameters for each lesion and its NS were compared using the Wilcoxon signed-rank test. Results: For AK, the parameters with significant p-values (i.e. <0.05) were: depolarization ratio of blue and red lasers, and intensity ratio. For sBCC, significant parameters included: depolarization ratio of blue and red lasers, speckle contrast, intensity ratio, reflectance at 663nm, Oxy-Hb, Deoxy-Hb, L*, a*, and scattering. Conclusions: Several parameters were found to help differentiate sBCC from normal surrounding skin, including

values derived from both imaging techniques, whereas parameters useful for AK were limited to laser speckle. Examining these parameters following non-surgical skin cancer therapy may be useful for monitoring the efficacy of therapy.

Category: Pilot/exploratory experiment

(Poster 4)

PREVALENCE OF BODY DYSMORPHIC DISORDER IN DERMATOLOGY PRACTICES IN BRITISH COLUMBIA

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Body Dysmorphic Disorder (BDD) is a common psychiatric disorder that is characterized by a preoccupation with imagined or slight defects in physical appearance. For a DSM IV diagnosis these perceived defects must be associated with clinical distress and impairments in social, occupational or other important areas of functioning. Although BDD patients are known to seek care from Dermatologists, there has never been a Canadian study on the prevalence of BDD in clinical dermatology setting. The purpose of this study is to establish the prevalence of patients screening positive for BDD in dermatology offices in British Columbia. A published and validated self-reporting questionnaire, the Body Dysmorphic Disorder Questionnaire (Dermatology Version), was be used to screen for BDD in a Dermatology Clinic in Burnaby, BC. For patients in the Chinese and South Asian community who are unable to read English, a translated questionnaire was administered. A total of 433 questionnaires were completed. The BDD screening rate was 25.6% (n=112; 95% CI 23.7-28.9%). BBD has similar rates in BC as reported for other dermatology clinics outside of Canada. Knowledge of the high prevalence rate is important given the number of procedures dermatologists may be pressured to perform without a clinical indication. This studies outline the importance of screening for BDD in Dermatology clinics in BC.

Category: Early experiments with well defined objectives/hypotheses

(Poster 5)

COMPARISON OF FAST-ABSORBING SUTURES FOR MOHS SURGERY REPAIR ON THE FACE (COMFAS): A RANDOMIZED CONTROLLED SPLIT-SCAR STUDY

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Background and aim: This study is being carried out to assess equivalence of scar outcome for two suture materials (rapidly absorbable polyglactin 910 (Vicryl Rapide™) and fast-absorbing plain gut (5-0 fast)) used for wound closure on the face in dermatologic and Mohs micrographic surgery (MMS). Study design and methods: Prospective randomized controlled split-scar observer-blinded study. One hundred consecutive patients attending for MMS on the face are included in the study. Each participant's final surgical wound/scar is divided in two, with each half (superior/medial or inferior/lateral) randomly assigned to each study arm receiving either material. Scar analysis is performed by DMZ at one-week, two-month and six-month intervals with the Stony Brook Scar Evaluation Scale (SBSES), Visual Analogue Scale (VAS) and Wound Evaluation Scale (WES). Clinical photographs are taken, with the final six-month assessment to be performed by two independent observers (SH and AS). Interim results: REB approval was obtained January 26, 2015. By the time of presentation we expect to have 40 patients enrolled, with preliminary data available on 30 patients. Full statistical analysis comparing both study arms will be performed when recruitment and follow-up is complete by late 2015. A previous study by DMZ (RAVNAS) has demonstrated equivalent scar outcomes for facial surgery between absorbable and non-absorbable sutures. The benefits from the RAVNAS study affects patients directly, supporting a decreased need for follow-up clinic visits and no need for suture removal. The current study will help determine if there is further cosmetic benefit to patients by using specific absorbable suture.

Category: Applied/functional experiments

(Poster 6)

SUM-11 AS A POTENTIAL ONCOGENE AND A THERAPEUTIC TARGET FOR MELANOMA

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Melanoma, or malignant transformation of melanocytes, is the most severe form of skin cancer with rising incidence around the world. Using high-throughput methods screening of expression changes in melanoma tissues, we have identified SUM-11 (specific up-regulated in melanoma) as one of the most significantly upregulated genes in melanoma biopsies compared with normal nevi and skin tissues, indicating that SUM-11 may play an important role in melanoma. The objectives of my research are to investigate SUM-11 expression profile in melanoma biopsies and cultured melanoma cell lines, to identify the potential prognostic value of SUM-11 expression in melanoma, to understand the bio-functions of SUM-11 in melanoma pathogenesis and progression, and to study the underlying mechanisms of SUM-11 upregulation and its functions in melanoma. We hypothesize that SUM-11 expression is upregulated in melanoma and higher SUM-11 expression level is associated with more vigorous cancer proliferation and metastasis. To test the hypothesis, we have designed the following experiments: Firstly, real-time PCR, Western blot and immunohistochemistry on cultured melanoma cell lines and clinical samples will be done to check SUM-11 mRNA or protein expression levels.

Secondly, tissue microarray with 707 biopsies and specific antibody for SUM-11 will be used to examine the prognostic value in melanoma. Thirdly, regulation and functional studies on melanoma cell lines will be conducted. Our study will lead to a better understanding of SUM-11 expression levels and functions, and hence its potential prognostic or diagnostic value, in melanoma pathogenesis and progression, which will be beneficial for future therapeutic treatment.

Category: Early experiments with well defined objectives/hypotheses

(Poster 7)

SKIN BIOPSY PRACTICES OF DERMATOLOGISTS AND NON-DERMATOLOGISTS

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BACKGROUND: While skin biopsy is a useful diagnostic and therapeutic technique commonly used by dermatologists and family practitioners (FPs) there is associated cost and morbidity. OBJECTIVE: This retrospective study is designed to assess and compare the skin-biopsy practices of dermatologists and non-dermatologists to determine the frequency and characteristics of potentially avoidable skin biopsies. METHODS: We reviewed all (822) pathology reports for biopsies submitted to Vancouver Coastal Health and reported by dermatopathologists in a two-week period (June 8 – 21, 2014). Biopsies were categorized by specialty of submitting physician and further classified based on diagnosis as medically indicated, optional, or insufficient for diagnosis. A biopsy was classified as medically indicated if a clinician experienced in the care of skin diseases would typically be unable to make the diagnosis clinically without biopsy confirmation, *or* if surgical treatment is medically indicated for the condition in most cases. Any diagnostic biopsy not meeting either criterion was classified as optional. RESULTS: Basal cell carcinoma was the most commonly biopsied condition by dermatologists (20% of all dermatologist-conducted biopsies), and seborrheic keratosis by FPs (17% of all FP-conducted biopsies). The percentage of optional biopsies conducted by FPs (61%) was significantly higher than that of dermatologists (46%; p =0.0006). CONCLUSION: FPs conduct a significantly higher proportion of potentially avoidable skin biopsies than dermatologists, representing a target for continuing education to improve patient care and optimize use of health-care resources.

Category: Early experiments with well defined objectives/hypotheses

(Poster 8)
USING HLA TYPING TO IDENTIFY PREVENTABLE CASES OF DRESS SYNDROME: A CASE SERIES

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Drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome is a severe, adverse drug reaction that is fatal in 10% of cases. Diagnostic criteria is based on the presence of a generalized cutaneous eruption, hematologic abnormalities, lymphadenopathy, as well as internal organ involvement in the form of hepatitis, nephritis, carditis or pneumonitis. Research has uncovered specific genetic markers, in the form of HLA subtypes, which predispose certain ethnic groups to the development of DRESS. At Vancouver General Hospital, over a period of five months, three patients were diagnosed with DRESS by the dermatology consult service. In all three cases, the patients were Chinese and on medications deemed to be high-risk for inducing severe drug eruptions based on the presence of HLA-B5801 and B-1502 allotypes in this ethnic group. In two of the cases of DRESS, allopurinol was the triggering medication while phenytoin was the culprit in the remaining case. Post-diagnosis HLA testing was ordered by the dermatology service. In all three cases, HLA typing was positive, indicating that if testing had been done prior to initiation of the high risk offending medications, these cases of DRESS would have been prevented. HLA testing is available in Vancouver, however, it is rarely obtained. In 2013, in the context of severe adverse cutaneous drug eruptions, HLA-B1502 and HLA-B5801 testing was ordered only 11 times in British Columbia. Further research is necessary to identify the barriers to testing which are resulting in the underutilization of a potential life-saving investigation.

Category: Pilot/exploratory experiments

(Poster 9)
EXTERNAL VALIDITY OF CLINICAL TRIALS IN METASTATIC MELANOMA

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Background: We aimed to determine how clinical trial findings and eligibility criteria for novel therapeutics are applied in a population-based setting and the treatment outcomes of these patients. Methods: We focused on melanoma as several new therapies have been recently introduced. Patients with unresectable or metastatic disease from 2013 to 2014 and referred to any British Columbia Cancer Agency centre were reviewed. Based solely on eligibility criteria from registration trials of vemurafenib (Vem) and ipililumab (Ipi), we classified patients into trial eligible (TE) and ineligible (TI) and those treated and untreated with these agents. During the study period, Vem was approved for 1st line use in BRAF mutant patients and Ipi for 2nd line use. Results: We identified 185 patients with known BRAF status for the Vem analysis and

114 patients for the Ipi analysis. Of the 86 BRAF mutant patients, 59 were considered TE of whom 51 received treatment. In the Ipi cohort, 96 cases were deemed TE of whom 63 received therapy. Factors most frequently associated with non-treatment in both Vem and Ipi TE patients included comorbidities (41%), patient refusal (23%), and treatment-associated toxicities (14%). Compared to TI patients as well as non-treated TE patients, treated TE patients achieved the best survival (HR 0.53, 95% CI 0.28-1.00 for Vem and HR 0.33, 95% CI 0.13-0.83 for Ipi, adjusted for age, gender, and ECOG). Conclusions: A fair number of patients were considered TI for new melanoma treatments, highlighting further opportunities to optimize real world effectiveness of these new therapies.

Category: early experiments with well-defined objectives/hypotheses

(Poster 10)

MULTIPLE FACIAL VELLUS HAIR CYSTS, EAR PITS, LIPOMAS, MACROCEPHALY, JOINT LAXITY AND CARDIAC DEFECTS: A NOVEL GENODERMATOSIS?

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Eruptive vellus hair cysts (EVHC) often occur on the trunk and limbs. Facial involvement is uncommon. Autosomal dominant inheritance has been described but associated extra-cutaneous anomalies have not. We describe a 4-patient kindred presenting with multiple facial EVHC, and an association of ear pits, lipomas, macrocephaly, joint laxity and cardiac defects. Patients were interviewed, examined, and photographed with consent. Evaluations performed include skin biopsy (3 of 4 patients), echocardiogram, and electrocardiogram. Cutaneous histopathologic examination confirmed the diagnosis of EVHC in all 3 affected individuals. Data on clinical findings (lipomas (3 of 4 patients), joint laxity (4 of 4 patients), ear pits (4 of 4 patients), cardiac defects (1 of 4 patients), macrocephaly (1 of 4 patients) were documented. We propose that facial EVHC may indicate the presence of a novel inherited autosomal dominant disorder with multisystemic manifestations.

Category: Early experiments with well defined objectives/hypotheses

(Poster 11)

ENHANCING OPTICAL CLEARING OF HUMAN SKIN FOR COMBINED MULTIPHOTON AND REFLECTANCE CONFOCAL MICROSCOPY

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Multiphoton microscopy (MPM) and reflectance confocal microscopy (RCM) are two non-invasive imaging modalities for examining the microstructure of the skin. A significant limitation with MPM/RCM is that the penetration of light into the skin is limited by high photon scattering, leading to decreased resolution and contrast at deeper levels within the skin. Topical application of hyperosmotic optical clearing agents (OCAs) such as glycerol are reported to decrease scattering of the skin through better refractive index matching and tighter packing of skin components due to osmotic water efflux out of the tissue. The application of OCAs is limited by the barrier function of the *stratum corneum* (SC) which prevents the penetration of these agents into the skin. Using combined MPM/RCM we assess the optical/structural changes in the skin elicited by removal of the SC and application of hyperosmotic glycerol. Twenty facial human skin specimens were acquired and their SC peeled away using a 30G hypodermic needle. Specimens were imaged using combined MPM/RCM prior to, one, and two hours after topical glycerol application, and the maximum effective imaging depth was thus measured as a function of time. The maximum imaging depth increased from 140μm by 79% (to 251μm) and 130% (to 322μm) on average at one and two hours, respectively. There was also evidence of epidermal cell shrinkage. This study suggests that SC removal enhances OCA delivery, which in turn results in cutaneous optical/structural changes that greatly increase light penetration. This improved light penetration should be beneficial for therapeutic and certain diagnostic applications.

Category: Applied/functional experiments

(Poster 12)

THE ECONOMIC IMPACT OF PSORIASIS AT A SINGLE CENTER IN TORONTO, ONTARIO

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The use of biological therapies for the treatment of psoriasis has the potential to increase the productive lives of patients and reduce future health costs. Accessing biological therapies has

been challenging due to their high cost and eligibility requirements. This study aims to quantify the direct and indirect costs of psoriasis in order to determine if these costs are significant enough to warrant the cost of biological therapies. Questionnaires were administered to 200 patients with psoriasis to assess direct and indirect health costs in the preceding 12 months. Patients who did not use medications, therapies or health services over the past year were included in the calculation with a value of $0. Of the patients in this study, 135(73.4%) were using topical therapies, 27(14.1%) were taking DMARDS, and 19(9.5%) were using biologic therapies over the past year. The average SF36-PCS, SF36-MCS and HAQ were 51.3±8.4, 50.7±9.5 and 0.11±0.28, respectively. The average annual costs for topical therapies, DMARDS, biological therapies, phototherapy and OTC medications were $89.43, $90.76, $1,849.88, $55.70, $157.10, respectively. The average annual cost per patient for clinic visits, lab tests and hospital admissions was $1,663.19 and the cost for alternative medicines was $1,341.57. Patients with psoriasis lost on average 1.83 days of work per fiscal quarter due to their health. Six patients(3%) were unemployed due to psoriasis, losing on average 6.8 years of employment and $24,501/year. Biological therapies were the highest direct cost, however, further analysis is required to determine whether this cost is balanced by gains in productivity.

Category: Early experiments with well defined objectives/hypotheses

(Poster 13)

HIGH LIFr EXPRESSION IS ASSOCIATED WITH LESS FAVORABLE MELANOMA OUTCOMES BY REGULATING MELANOMA CELL MIGRATION

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Leukemia inhibitory factor (LIF), an IL-6 family cytokine, plays biological roles in cell proliferation and differentiation. Deregulated expression of LIF receptor (LIFr) has been reported in several human cancers, but its role in melanoma is unknown. In this study, we constructed tissue microarrays and examined the expression pattern of LIFr in melanocytic lesions at different stages, including 35 normal nevi, 61 dysplastic nevi, 292 primary melanomas and 149 metastatic melanomas. We found that cytoplasmic LIFr expression had a significantly increased trend from normal nevi, dyspastic nevi, and primary melanoma to metastatic melanoma (P = 0.0003). The increased expression of LIFr was associated with poorer 5-year survival in subjects with melanoma (overall survival, P = 0.0000; disease-specific survival, P = 0.0000). Multivariate Cox regression analyses indicated that LIFr expression was an independent prognostic marker for primary melanoma (P = 0.036). Wound healing assays and stress fiber formation assays showed that LIFr knockdown inhibited melanoma cell migration and LIFr regulated STAT3, but not YAP and MAPK (P38), in melanoma cell migration, suggesting that LIFr might regulate melanoma cell migration through the STAT3 pathway. Our data indicate that LIFr may serve as

a novel biomarker to identify potentially highly malignant melanocytic lesions at an early stage as well as a potential target of future early intervention therapeutics.

Category: Early experiments with well defined objectives/hypotheses

(Poster 14)

A HYBRID COLOR AND STRUCTURE ANALYSIS FOR AUTOMATED DETECTION OF ARBORISING VESSELS IN DERMOSCOPY IMAGES

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Image analysis techniques were used on 127 dermoscopy images (700*500 px) labelled by experts with blood vessels absent (82 images) /present (45 images) to determine the existence of blood vessels and also to segment them As a preprocessing step, the images were contrast-enhanced. A hybrid HSV and RGB color space filtration was used to remove unwanted regions such as bubbles, hairs and pigment networks. For multiscale analysis, Gaussian filters with different window sizes (3,5,7)pixels were used to extract structural features. Then, these filters were used for segmentation of the blood vessels in the lesion. This procedure was performed on different red, green and blue color channels in order to get the best result for classification. Furthermore, in order to increase the performance and flexibility of our algorithm, thresholds of the HSV and RGB color space filters were chosen automatically according to the histogram of each color channel. Window sizes of 3,5, and 7 provided accuracy of 80.8%, 81.1% and 80.3% accuracy for classification of blood vessels present/absent, using a logistic classifier for the data set of 127 images. It was found that the green channel would lead us to an optimum result for detecting vessels rather than other channels. Moreover, the optimum window size of the Gaussian filter was found to be 5 pixels which is directly related to the blood vessels thickness in the images.

Category: Pilot/exploratory experiments (for study design, hypotheses creation, etc).

(Poster 15)

TREATMENT OF CHRONIC WOUND *STAPHYLOCOCCUS AUREUS* BIOFILMS WITH *STAPHYLOCOCCUS EPIDERMIDIS* ESP PROTEIN TO PROMOTE HEALING.

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Biofilms are communities of bacteria attached to a surface. They are commonly found in chronic wounds, where they lead to a non-healing inflammatory phase and are associated with persistent infection. *Staphylococcus aureus* is one of the most common microorganisms to form biofilms and has been found to be present in 64-94% of chronic wounds. *S. epidermidis* strain JK16 cells and its culture supernatants have previously been shown to destroy preexisting *S. aureus* biofilms and inhibit the formation of new ones *in vitro*[1]. This biofilm destruction activity was found to be due to the Esp protein isolated from this *S. epidermidis* strain[1]. *S. epidermidis* JK16 cells as well as purified Esp can also eliminate nasal carriage of *S. aureus* in humans. This serine protease causes the intercellular matrix to breakdown and changes *S. aureus* from a sessile to a planktonic form, making it more susceptible to antibiotics and the immune system. This makes Esp an attractive candidate to use in anti-biofilm strategies. To date, Esp has not been studied in relation to chronic wound biofilms or in relation to wound healing in animals or humans. A pilot study to explore the biologic activity of *S. epidermidis* JK16 Esp on biofilms and healing of chronic wounds was undertaken. The *S. epidermidis* JK16 Esp protein was purified and tested *in vitro* on *S. aureus* lawns and with a spectrophotometric assay. The idea was that the purified *S. epidermidis* Esp protein would be compared to standard therapy in 10 patients with chronic wounds using a cross-over design. The goal of this pilot study was to assess the feasibility of conducting a more definitive trial to examine the efficacy of the Esp in healing chronic wounds.

Category: Early experiments with well defined objectives/hypotheses

(Poster 16)

DERMATOLOGY IN RURAL COMMUNITIES: A TELEHEALTH PROJECT IN BRITISH COLUMBIA

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Dermatology care through telemedicine is well established although not universally accepted. In British Columbia, there is a secure "store and forward" system currently well used and being evaluated. In addition, there is the equally well established "RACE Line" providing timely telephone consultations. There is still an unmet need for secure "real-time" consultations, particularly those involving images. Such consultations now occur *frequently* on an ad hoc basis; images and identifiers are sent separately but not securely. This proposal is for a "mixed model" telehealth service that combines immediacy with secure data transfer on a network meeting the standards of BC privacy legislation. A small number of northern communities, effectively without dermatology service at all, will participate in a prototype and limited service for a defined period of time. Essential components in the design are a realistic evaluation of the use of such a service, and inclusion of a model for continuing professional development. We believe that CPD within such consultations is an important goal.

Category: Pilot/exploratory experiments (for study design, hypotheses creation, etc).