Headache

P.024

Educational needs in migraine care: results from a mixed-methods study among Canadian primary care providers and specialists

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Background: Migraines are sub-optimally treated, affect millions of Canadians, and are underrepresented in medical training. A study was conducted to identify the needs of Canadian Healthcare Providers (HCPs) for migraine education, with the aim to inform the development of learning activities. **Methods:** This ethics-approved study was deployed in two consecutive phases using a mixed-methods approach. Phase 1 (qualitative) explored the causes of challenges to migraine care via a literature review, input from an expert working group, and semi-structured interviews with multiple stakeholders. Phase 2 (quantitative) validated these causes using an online survey. **Results:** The study included 103 participants (28 in phase 1; 75 in phase 2): general practitioners=37; neurologists=24; nurses=14; pharmacists=20; administrators, policy influencers and payers=8. Four areas of sub-optimal knowledge were identified: (1) Canadian guidelines, (2) diagnostic criteria, (3) preventive treatment, and (4) non-pharmacological therapies. Attitudinal issues related to the management of migraine patients were also identified. Detailed data including the frequencies of knowledge gaps among general practitioners and general neurologists will be presented along with qualitative findings. **Conclusions:** Educational activities for general practitioners and general neurologists who treat patients with migraines should be designed to address the four educational needs described in this study.

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P.025

Is this headache normal?: Assessing electronic referrals for headache from primary care physicians

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Background: Headache is one of the most frequent complaints in primary care. We reviewed headache questions submitted to an electronic consultation service in Ontario to classify the types of headaches and describe the questions being asked. We also identified reasons why answers were not retrievable within UpToDate, an online clinical resource . **Methods:** 65 headache eConsults were further divided into 85 questions and categorized by headache type and question theme. Questions were manually searched within UpToDate to determine if they could be answered using this resource. The intent to refer the patient for a face-to-face referral after the eConsult was collected. **Results:** The top classifications were migraine, unclassified headache, and exertional and/or coital headache. The themes identified were medication questions (41.7%), investigation questions (33.3%), clinical concerns despite normal neurologic exam and/or imaging (15.5%); and abnormal imaging findings (9.5%). Answers to 40.1% of the questions were not retrievable in UpToDate. The main reason for irretrievability was an unusual presentation. Only 33.8% of eConsults resulted in a face-to-face referral to a specialist. **Conclusions:** Although electronic resources may be useful in some cases, clinical nuances cannot be accounted for. By providing physicians with rapid access to specialists, eConsult services may obviate the need for formal, face-to-face referrals.

P.144

Health care utilization by patients seen at a tertiary headache clinic

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Background: Multidisciplinary treatment programs benefit headache patients. No evidence exists as to whether they change resource use.

A historical prospective cohort study was performed to compare the frequency of ambulatory care and emergency department visits for the purposes of headache by patients seen at the Calgary Headache Assessment and Management Program (CHAMP) in the three years before, and after, their first appointment. **Methods:** Administrative data from Alberta Health was used. All patients seen by a physician at CHAMP from 2003-2013 were included. Sample characteristics were described and the Wilcoxan signed rank sum test was used to compare the number of ambulatory care and emergency department visits in the three years before and after each patient's first physician appointment at CHAMP. Follow-up visits at CHAMP were excluded from analyses. **Results:** The median number of ambulatory care visits over three years changed from 4 to 2 ($p < 0.001$). The median number of emergency department visits was zero before and after assessment at CHAMP. The mean number of emergency department visits changed from 1.5 to 1.2 ($p < 0.0001$). **Conclusions:** Enrollment in a multidisciplinary headache program reduces the number of ambulatory care visits and emergency department visits for purposes of headache.

MS / Neuroinflammatory disease

P.026

Rare association in childhood vasculitis: unique case of pituitary involvement in a child with GPA

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Background: Granulomatosis with polyangitis (GPA) is a rare systemic vasculitis with a prevalence of 0.6 per million in the pediatric population. CNS involvement occurs in 7-18% of cases. Pituitary involvement is only noted in 1% of cases. **Methods:** A 16-year-old

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girl with newly-diagnosed GPA presented to our hospital with progressive debilitating headaches, polyuria, and polydipsia. **Results:** Initial MRI showed changes to the pituitary. Lumbar puncture (LP) revealed opening pressure of 26. She developed central diabetes insipidus (DI) and visual changes. Repeat head imaging showed adenohypophysitis. The GPA was previously treated with steroids and cyclophosphamide, followed by Cellcept. Once the pituitary involvement was discovered, she was given re-induction therapy with Rituximab and steroid dose was increased. DI is being treated with DDAVP. Her headaches are improving. **Conclusions:** CNS inflammatory diseases are rare in childhood. Pituitary involvement is extremely rare in GPA. Induction therapy for adults with GPA and pituitary involvement includes glucocorticoids and cyclophosphamide, which often leads to improvement of MRI abnormalities but is not effective in resolving pituitary dysfunction. Our patient had already received this treatment when she developed the CNS findings. This case demonstrates that cerebral involvement is often resistant to classic therapy, and one should be vigilant in looking for CNS inflammation in these patients.

P.027

Efficacy of a fourth alemtuzumab course in RRMS patients from CARE-MS II who experienced disease activity after three prior courses

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Background: In RRMS patients with inadequate response to prior therapy, 2 alemtuzumab courses (12 mg/day; baseline: 5 days; 12 months later: 3 days) significantly improved outcomes versus SC IFNB-1a over 2 years (CARE-MS II [NCT00548405]). Efficacy remained durable in a 4-year extension (NCT00930553); patients could receive as-needed alemtuzumab retreatment (≥12 months apart) for disease activity, or another disease-modifying therapy (DMT). Through Year 6, 88% remained on study; 50% received neither alemtuzumab retreatment nor another DMT; 16% received ≥4 courses; 3% received ≥5 courses. We evaluated Course 4 (C4) efficacy in patients receiving ≥4 courses. **Methods:** Annualized relapse rate (ARR); improved/stable Expanded Disability Status Scale (EDSS) score (versus baseline); 6-month confirmed disability improvement (CDI). 11% of patients met inclusion criteria: ≥4 courses within 60 months of baseline; no DMT. Those receiving C5 were censored at that time. **Results:** ARR decreased after C4 (12 months pre-C4 [-12M]: 0.75; 12 months post-C4 [+12M]: 0.19; $P<0.0001$), remaining low (0.23) at Year 3 post-C4. More patients had stable/improved EDSS scores +12M (67.5%) versus at C4 administration (53.5%). Percentage with CDI increased post-C4 (-12M: 10.0%; +12M: 26.7%). **Conclusions:** C4 reduced relapses and stabilized/improved disability in patients with disease activity after initial treatment (C1, C2) plus one additional course (C3).

P.028

Each revision of the McDonald diagnostic criteria for multiple sclerosis allow earlier diagnosis in more patients

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Background: The 2005, 2010, and 2017 McDonald diagnostic criteria for multiple sclerosis (MS) were compared at baseline in participants of a Canadian multicentre clinical trial of minocycline in clinically isolated syndrome (CIS). **Methods:** The cohort included 142 participants. Baseline clinical and imaging data were used to determine if participants met criteria for dissemination in space (DIS) and time (DIT) as required for each version of the criteria. We also explored the impact of permitting a clinical diagnosis of transverse myelitis to represent a spinal cord lesion, and for multifocal clinical onset to represent DIS. **Results:** The clinical trial excluded patients meeting the 2005 McDonald criteria at baseline. The 2010 criteria were met by 28.9% (41/142) of participants. If a multifocal clinical presentation was considered evidence of DIS 29.6% (42/142) met the 2010 criteria. The 2017 criteria were met by 36.7% (52/142). Allowing a clinical diagnosis of transverse myelitis to confirm a spinal lesion, or multifocal onset to confirm evidence of DIS, led to a diagnosis in 38% (54/142) and 38.7% (55/142), respectively. **Conclusions:** This study confirms that each revision of the McDonald diagnostic criteria allowed an MS diagnosis in more CIS patients at onset. Exploration of other modifications suggests further improvement may be possible.

P.029

Case report: pediatric enterovirus encephalitis - a rare complication of rituximab therapy

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Background: Opportunistic infection should be considered when seeing neurological complications in the setting of immunosuppression. Accumulating evidence that enteroviral meningoencephalitis can occur after rituximab administration exists but differentiating it from non-infectious conditions can be challenging. **Methods:** Case report **Results:** We describe a 4 year-old-boy with a history of pulmonary capillaritis, treated with immunosuppressive therapy including steroids, rituximab, and azathioprine. He developed mutism and ataxia after 18 months on rituximab. MRI Brain/Spine revealed extensive T2/FLAIR hyperintensities in the deep subcortical white matter, temporal lobes, globus pallidi, thalami, brainstem, and cerebellum; and swelling of the dorsal cervical cord, showing primarily grey matter involvement. IgG levels had a decreasing trend over the course of Rituximab. CSF, and subsequent brain biopsy, were both positive for enterovirus RNA by RT-PCR. He was thought to have enterovirus encephalitis secondary to rituximab therapy, and was treated with IVIG and fluoxetine. **Conclusions:** One should consider chronic opportunistic CNS infections in children treated with immunosuppressive therapy, and to consider chronic enterovirus infection when B-cell suppression has occurred. As rituximab is being increasingly used in the pediatric population, and is generally

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