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Trends in Pediatric Cardiology Referrals, Testing, and Satisfaction at a Canadian Tertiary Centre

Andrew J. Caddell, BSc,[a] Kenny K. Wong, MD, FRCPC,[b,c] Andrew P. Barker, MD, FRCPC,[d] and Andrew E. Warren, MD, FRCPC[b,c]

[a] *Department of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada*

[b] *Department of Pediatrics, Dalhousie University, Halifax, Nova Scotia, Canada*

[c] *Cardiology Division, Department of Pediatrics, IWK Health Centre, Halifax, Nova Scotia, Canada*

[d] *Emergency Department, Royal Alexandra Hospital, Edmonton, Alberta, Canada*

ABSTRACT

Anecdotal and European evidence suggests that outpatient pediatric referrals and their diagnostic testing burden are increasing. We sought to characterize new pediatric cardiology referrals, testing performed, outcomes, and patient satisfaction in a Canadian academic hospital and how these had changed over time. Clinical data were extracted from new outpatient consultations to the IWK Children's Heart Centre between August 1, 2011 and August 17, 2012 and compared with similar local data collected in July-February 2002 using χ^2 testing. Predictors of significant differences were sought using regression analysis. Satisfaction data were collected from a validated patient questionnaire, and 620 new outpatients were evaluated. Organic disease was more likely in younger patients (odds ratio [OR], 2.7; 95% confidence interval [CI], 1.8-4.0) or in patients referred by pediatricians

RÉSUMÉ

Les données anecdotiques et européennes suggèrent que les recommandations externes en pédiatrie et le fardeau de leurs examens diagnostiques ne cessent d'augmenter. Nous avons cherché à caractériser les nouvelles recommandations en cardiologie pédiatrique, les examens réalisés, les résultats cliniques, la satisfaction des patients d'un hôpital universitaire canadien et la façon dont ils avaient évolué au fil du temps. Les données cliniques étaient extraites des nouvelles consultations externes en cardiologie pédiatrique au IWK Children's Health Centre entre le 1er août 2011 et le 17 août 2012, et comparées aux données locales similaires qui avaient été recueillies de juillet à février 2002 en utilisant le test du χ^2. Les prédicteurs des différences significatives étaient examinés à l'aide de l'analyse de régression. Les données sur la satisfaction étaient recueillies dans un

Canadian pediatric cardiology consultation services are largely based at publicly funded, tertiary level–care institutions. These consultations are mainly for outpatients and are increasing worldwide.[1,2] Many centres restrict access to cardiology diagnostic testing to specialists, perhaps prompting referrals solely for such testing.[1,2] The US literature has shown that direct access to such testing is not cost-effective.[3,4] However, there is little Canadian literature on the subject. We sought to characterize new outpatient consultation at a tertiary academic institution. It was our belief that the referral burden and the absolute diagnostic testing burden had increased and that this had not coincided with a relative increase in discovery of organic disease. Previous data from our centre afforded the opportunity to describe changes in pediatric cardiology referrals that had occurred over a 10-year period.[5] If increased referral and testing burden was confirmed, we believed the results could provide support for alternative models of care delivery for select patient groups.

Methods

The IWK Health Centre in Halifax, Nova Scotia provides tertiary care to Maritime Canadian children. The IWK Children's Heart Centre provides the only pediatric cardiology service in the Maritimes. The research protocol was approved by the IWK Research Ethics Board.

Referral and consultation information

Information on new outpatient consultations at the IWK Children's Heart Centre was collected from August 1, 2011-August 17, 2012 (accessed through the IWK cardiology

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Corresponding author: Dr Andrew E. Warren, Children's Heart Centre, IWK Health Centre, 5850/5980 University Ave, Halifax, Nova Scotia B3K 6R8, Canada. Tel.: +1-902-470-8407; fax: +1-902-470-6622.

E-mail: andrew.warren@dal.ca

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(OR, 2.3; 95% CI, 1.6-3.3). Odds of echocardiography being performed were significantly increased if patients were younger than 1 year (OR, 2.0; 95% CI, 1.3-3.0), were seen at outreach clinics (OR, 1.7; 95% CI, 1.2-2.3), or were referred by pediatricians (OR, 3.7; 95% CI, 2.6-5.3). Cardiologists differed significantly in ordering echocardiograms for referred patients ($P = 0.002$). The patients referred in the current era have significantly less organic disease than did those in 2002 (27% vs 37%; $P = 0.007$), but they underwent significantly more echocardiography (58% vs 38%; $P < 0.001$) and Holter monitoring (12% vs 4%; $P = 0.001$). Satisfaction results were high and unrelated to diagnostic testing. Pediatric cardiology referrals in Maritime Canada have increased in volume, consistent with changes seen at other centres. This, coupled with changing cardiac investigations, has increased testing burden. Individual cardiologists affected the odds of echocardiography being ordered. Satisfaction with services was high, with no predictors identified.

questionnaire validé destiné aux patients; 620 nouveaux patients externes étaient évalués. La maladie organique était plus probable chez les plus jeunes (ratio d'incidence approché [RIA], 2,7; intervalle de confiance [IC] à 95 %, 1,8-4,0) ou chez les patients recommandés par les pédiatres (RIA, 2,3; IC à 95 %, 1,6-3,3). Les cotes d'échocardiographie réalisées étaient significativement augmentées si les patients étaient âgés de moins de 1 an (RIA, 2,0; IC à 95 %, 1,3-3,0), étaient vus aux cliniques de soins ambulatoires (RIA, 1,7; IC à 95 %, 1,2-2,3) ou étaient recommandés par les pédiatres (RIA, 3,7; IC à 95 %, 2,6-5,3). Les prescriptions d'échocardiogrammes des cardiologues aux patients recommandés différaient significativement ($P = 0,002$). Dans le cas présent, les patients recommandés ont significativement moins de maladies organiques que ceux de 2002 (27 % *vs* 37 %; $P = 0,007$), mais ils subissaient beaucoup plus d'échocardiographies (58 % *vs* 38 %; $P < 0,001$) et portaient beaucoup plus de moniteurs Holter (12 % *vs* 4 %; $P = 0,001$). Les résultats sur la satisfaction étaient élevés et non associés aux examens diagnostiques. Les recommandations en cardiologie pédiatrique dans les Maritimes au Canada ont augmenté en volume, parallèlement aux changements observés dans d'autres centres. Ceci, combiné aux changements dans les examens cardiaques, a augmenté le fardeau des examens. Les cardiologues en cabinet individuel affectaient les cotes d'échocardiographies prescrites. La satisfaction sur les services était élevée sans prédicteurs établis.

database). Patients were seen either at the IWK Health Centre or at an outreach clinic. Outreach clinics are run by the Children's Heart Centre in regional partner institutions in the Maritime provinces. All patients at outreach clinics see IWK cardiologists, but some locations have access to echocardiography, allowing imaging before cardiology consultation. Patients referred to the IWK Health Centre who have murmurs and no other signs or symptoms are assigned to murmur clinics (streamlined clinics allowing for shorter appointments). Organic disease was defined as structural or electrophysiological cardiac abnormalities. Comparisons were made with a previously collected data set including all new outpatients seen at the IWK Heart Centre from July 2001- February 2002.[5] No outpatient data collected at external sites were available for that period.

Patient satisfaction

Satisfaction data were collected from all new outpatients seen during the months of June, July, and August 2012. For a detailed description of the methods for patient satisfaction, see Supplemental Methods.

Statistical analysis

Data were entered into Microsoft Excel (Microsoft, Redmond, WA) and analyzed using IBM SPSS Statistics, version 20.1 for Windows (SPSS, Chicago, IL). Descriptive variables are given as frequencies with relative percentages. Frequency data were compared using χ^2 testing. Predictors of an organic diagnosis and the performance of echocardiography were sought using univariate binary logistic regression. Variables tested included age, sex, patient home province, referral source (general pediatrician vs other practitioner), reason for referral, and clinic location. Variables that were significant on univariate testing were entered stepwise into a binary multivariate logistic regression model to control for interaction. Categorical variables were coded as same. Both odds ratios (ORs) with 95% confidence intervals (CIs) and P values for predictors are reported as outcomes. Satisfaction scores were summed to form "composite" satisfaction scores, the means of which were compared with a Student's t test to look for differences between investigational and outcome groups. Missing responses were replaced with the average of previous scores given by the patient. Multiple linear regression was used to test for variables predictive of satisfaction score. Statistical significance was defined as $P < 0.05$.

Results

New outpatient referrals

Six hundred twenty new outpatients were evaluated in the study period; demographic information, diagnostic testing and diagnosis type can be seen (Supplemental Tables S1 and S2). Patients with previous diagnoses of organic disease were more likely to have originated from an external clinic than from the IWK Health Centre (18% vs 8%; $P < 0.001$).

Comparison with 2002 data

Compared with 2002, pediatric cardiologists are seeing 71% more newly referred outpatients per month, and these patients have significantly less organic disease proportionally (27% vs 37%; $P = 0.007$). In the current era, patients referred underwent significantly more echocardiography (58% vs 38%; $P < 0.001$) and Holter monitoring (12% vs 4%; $P = 0.001$). When patients seen at regional centres in the current era are excluded, current patients continued to undergo more echocardiography (54% vs 37%; $P < 0.001$) and had less organic disease (24% vs 37%; $P = 0.001$).