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## ORIGINAL ARTICLE

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### Description of the case mix experienced by chiropractic students during a clinical internship

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**Objective:** The primary objective of this study was to describe the case mix experienced by chiropractic students during their clinical internship at the Canadian Memorial Chiropractic College. Secondary objectives were to characterize teaching clinic patient populations, assess the similarity to previously published data for practicing chiropractors, and describe the treatment plans being recommended by interns.

**Methods:** A prospective, observational study was conducted using a convenience sample of 24 chiropractic interns. Data were collected by interns using a standardized form that was completed for each new patient and each new complaint examined during the 1-year internship. Standardized forms included data regarding patient demographics, complaint characteristics, and treatment recommendations.

**Results:** Data were included for 23 of 24 participating interns, who described 828 patients and a total of 948 unique complaint presentations. Overall, 60% of patients were female, 86% were 18 to 64 years old, and 23% were naive to chiropractic care. Of all presenting complaints, 93% were pain-based, 67% were chronic, 65% included spinal complaints, and 7% presented with red flags; individual interns' experiences were variable and are described. On average, treatment recommendations called for 9.4 visits and often included multimodal treatment approaches, most commonly soft-tissue therapies (91%), home-based active care (84%), and spine manipulation (70%).

**Conclusions:** The findings of this study suggest that patients presenting to CMCC teaching clinics are similar to those reported previously to attend private chiropractic clinics. While all participating interns encountered multiple complex clinical cases, very few had experience with pediatric populations. This study adds to the few that detail the characteristics of patients attending chiropractic teaching clinics; to our knowledge it is the first to describe average case loads of chiropractic interns.

**Key Indexing Terms:** Chiropractic; Education; Internships; Patients

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### INTRODUCTION

The chiropractic educational system in North America has undergone significant change since the inaugural opening of Palmer School of Chiropractic in Davenport in 1897 and continues to evolve today.<sup>1,2</sup> Part of the motivation for recent changes to North American chiropractic curricula stems from the desire to see chiropractic enter mainstream healthcare,<sup>3</sup> which will, in part, require the recognition of chiropractic education as equal to that of other health care professions. Undergraduate training standards in chiropractic currently require no less than 4200 hours of didactic and practical education, including not less than 1000 hours of supervised clinical training.<sup>4–6</sup> With regard to basic and clinical sciences, the curricular content of North American chiropractic programs has been described as similar to that of medical programs,

both in the kinds of subjects offered and in the time assigned to each subject.<sup>7</sup> Consistent with this finding, in 2005 the Canadian Memorial Chiropractic College (CMCC) was granted the privilege of offering a professional health care degree under the Post-Secondary Education Choice and Excellence Act,<sup>8</sup> which sets the program within the hierarchy of education in Ontario as comparable to that of other primary contact health care professions.

While didactic training may be equivalent between chiropractic and medical programs, there is a contrast in the volume and variety of patient exposures in a chiropractic clinical internship when compared to a medical internship.<sup>1,9</sup> Currently, in the chiropractic profession the clinical internship is a 1-year undergraduate endeavour, while it is a 2- to 5-year postgraduate program in medical training. Early studies (1980s–1990s) examining

North American chiropractic clinical education have suggested that patients in chiropractic college teaching clinics were not truly representative of patients seen by chiropractors in the field.<sup>10-14</sup> Moreover, those early studies suggested that patients seen by chiropractic interns may commonly be friends and family members of interns.<sup>11-14</sup> As such, it has been proposed that chiropractic students' clinical training may not reach the level that is necessary to manage patient problems in active practice after graduation.<sup>10</sup> Indeed, only 20.3% of surveyed North American orthopedic surgeons thought that chiropractors have sufficient clinical training, an opinion that may contribute to low rates of MD to DC referrals.<sup>15</sup>

North American chiropractic colleges are required to meet the standards set out by the Council of Chiropractic Education in the US (CCEUS) and by the Canadian Federation of Chiropractic Regulatory and Educational Accrediting Boards (the Federation) in Canada.<sup>5,6</sup> Standards are designed to ensure that chiropractic programs will provide students with a core knowledge and skill set that are sufficient for the chiropractor to perform the professional obligations of a primary contact health care professional. With regard to clinical education through internships, the CCEUS and Federation have established qualitative, competency-based standards that an accredited chiropractic program must demonstrate its students will achieve with regard to acquisition of knowledge and skills, and their application to patient care. In Canada, the Federation also maintains a quantitative minimum standard that an accredited chiropractic program must ensure that its students will meet. For example, according to the most recent (2011) Federation standards, accredited institutions must ensure that their interns examine, for the purpose of developing a diagnosis, formulate a treatment regimen, and manage the case for at least 35 different patients under faculty supervision.<sup>5</sup> The quantitative standards in Canada also specify that no more than 20% of the minimum requirements can be performed on other students in the program, and/or other students' families and interns may not provide services to their own immediate family.

Very few recent studies have examined chiropractic students' clinical education. A study of one United States chiropractic institution has suggested that the demographic and clinical characteristics of patients seen by interns at teaching clinics remain dissimilar to those seen in private chiropractic practices; however, they did not assess the relationships between interns and patients.<sup>16</sup> Another study at a single teaching clinic in Canada found that the general demographic and clinical characteristics of patients were similar to those attending private practice chiropractors and approximately one-quarter of new patients (22.9%) were family members of interns.<sup>17</sup> While some general analysis of what presents to today's North American chiropractic teaching clinics can be found, there is an absence of current literature that actually quantifies the clinical experiences of chiropractic interns. A need remains in the literature for updated research examining the clinical education of chiropractic interns. Therefore, the purpose of this study was to describe the average case

mixes experienced by interns, assess the components of treatment plans being recommended, characterize the demographics of teaching clinic patient populations, and assess the similarity to previously published data for practicing chiropractors.

## METHODS

### Study Design

A prospective, descriptive case-series was conducted using a practice-based research protocol, whereby a convenience sample of 24 chiropractic interns collected data on their patient experiences at CMCC teaching clinics between May 2011 and May 2012. This sample represented approximately 13% (24/183) of the 2012 graduating class from CMCC.

Data were collected by participating interns using a specifically designed, single page abstraction form (Appendix A, available online at [www.journalchiroed.com](http://www.journalchiroed.com)). The abstraction form was designed to collect information on demographics and referral sources of patients; nature, location, and duration of chief complaint; presence of comorbidities, red and yellow flags; imaging and referral activities; and treatment plan details. The abstraction form did not require interns to document treatment progress or success, it was designed to assess the examination, diagnosis, and suggested treatment plan that had attained approval by the supervising clinicians. Participating chiropractic interns were asked to complete an abstraction form for each new patient and each new complaint that presented to them during the entirety of their 1-year internship. New patients were defined as those who the respective intern had never examined or treated before, but who may have been examined and treated by another intern previously. New complaints were defined as those complaints that an existing patient presented with, but that had never before been examined or treated by the respective intern. If a patient's condition were to change in a manner significant enough to potentially alter the diagnosis or treatment during the course of a treatment plan, interns were asked to complete an additional abstraction form.

### Data Analysis

Data were extracted from all completed data abstraction forms into a Microsoft Excel (Microsoft Corp, Redmond WA) spreadsheet by 2 different authors (AP, CR). Descriptive statistics were used to present the data. Missing data points were not included in the final analysis. Ethics approval was granted by the Research Ethics Board of the Canadian Memorial Chiropractic College (REB Approval # 1106X01).

## RESULTS

Data from 23/24 subject interns were included in the analysis; the data from 1 subject was excluded because they returned multiple, partially-completed data abstraction forms. Participating interns completed 46 internship sessions and provided data that represented all possible

**Table 1 - Frequency of Common Co-Morbidities (n = 741 Co-Morbid Conditions Identified among 833 New Patient Experiences)**

Co-Morbidity	% of Total Co-Morbidities
Hypertension	13.3
Allergies	10.1
Depression/anxiety	9.3
Osteoarthritis	8.1
Diabetes	5.8
Cardiovascular disease	4.3
Osteopenia	3.9
Thyroid disease	3.9
Asthma	3.1
Cancer	2
Other <sup>a</sup>	36

<sup>a</sup> Those co-morbidities that each represent <1% of total comorbidities identified by interns.

CMCC student teaching clinics except for one (Anishnawbe). The college campus clinic was best represented, with 35/46 data sets; South Riverdale, Sherbourne, and St. Mike's Hospital clinics were each represented by 3 data sets; and St. John's Rehabilitation Hospital and Bronte were each represented by 1 data set. Interns who traditionally volunteer at a community-focused center in Toronto (Aptus Treatment Centre [Formerly Muki Baum Centre]) that provides support to children and adults with autism and other complex disabilities were not represented.

In total, data were included for 833 new patient experiences. Of the 23 participating interns' new patient experiences overall, 60% (n = 497) were with female patients, 86% (n = 713) were with patients aged 18 to 64, 12% (n = 99) were with patients aged 65 and older, and only 2% (n = 19) were age 17 and under. Of the new patients, 51% (n = 425) had never seen another chiropractic intern before and 23% (n = 195) were completely naive to chiropractic. Besides the chief complaint, acute and/or chronic comorbidities were identified in 46% (n = 433) of new patient experiences. The types and frequencies of common comorbidities are listed in Table 1. On average, participating interns examined 36 patients that were new to them, with a range of 35 to 45 unique patients. The demographic characteristics for the average case mix of participating interns is presented in Table 2.

In addition to 833 new patient experiences, participating interns reported on 115 new complaint experiences, for a total of 948 unique diagnostic workups and treatment plans. Of all the unique complaint workups, 93% (n = 886) were for pain-based complaints, 67% (n = 636) were chronic complaints, and 65% (n = 614) of patient presentations included a complaint in the cervical, thoracic, or lumbar spine, or pelvis. Figure 1 details the overall distribution of the reported complaints. Yellow flags were present in 16% (n = 149) of unique complaint presentations and red flags in 7% (n = 66). Plain-film radiographs were ordered in 14% (n = 133) of unique complaint presentations and a referral to a medical physician (for diagnostic studies, or management) was

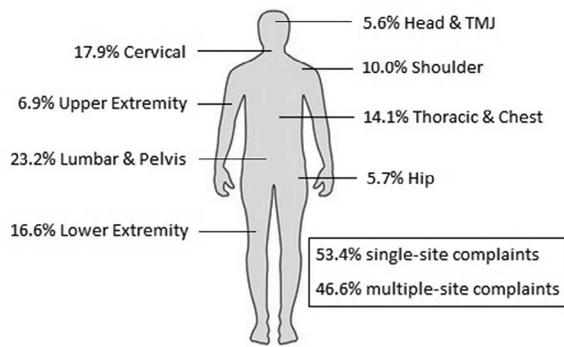
**Table 2 - Demographic Characteristics of the Average New Patient Case-Mix of 23 Clinic Interns Over a 1-Year Period (n = 833 New Patient Experiences)**

	Female	≤5 Years			6-17		18-64		≥65 Years		Familiar To Intern <sup>a</sup>		Naive To Chiropractic Care <sup>b</sup>		Naive To Chiropractic Interns <sup>b</sup>		Co-Morbidities Present <sup>c</sup>	
		Old	Old	Old	Years Old	Years Old	Years Old	Old	Old	Old	Old	Old	Old	Old	Old	Old	Old	Old
Average # of new patients (SD)	21 (4)	0 (0)	1 (1)	31 (4)	4 (2)	9 (3)	9 (3)	9 (3)	9 (3)	9 (3)	19 (4)	19 (4)	16 (6)	16 (6)	16 (6)	16 (6)	16 (6)	16 (6)
Average % of new patients (SD)	59 (11)	0 (1)	2 (2)	85 (8)	12 (7)	24 (8)	24 (8)	23 (8)	23 (8)	23 (8)	51 (10)	51 (10)	46 (17)	46 (17)	46 (17)	46 (17)	46 (17)	46 (17)
Max # (max %)	29 (81)	1 (3)	3 (9)	42 (97)	10 (31)	16 (42)	16 (42)	18 (40)	18 (40)	18 (40)	30 (78)	30 (78)	29 (80)	29 (80)	29 (80)	29 (80)	29 (80)	29 (80)
Min # (min %)	14 (37)	0 (0)	0 (0)	21 (66)	1 (3)	4 (12)	4 (12)	3 (9)	3 (9)	3 (9)	12 (34)	12 (34)	7 (18)	7 (18)	7 (18)	7 (18)	7 (18)	7 (18)

<sup>a</sup> A "Familiar Patient" was considered a fellow CMCC student, a friend of the respective intern, or a family member of another intern; whereas, an unfamiliar patient would be any patient who did not fit one of those descriptions.

<sup>b</sup> A naive patient was one who had never been examined or treated by a chiropractor and/or chiropractic intern.

<sup>c</sup> Included those patients who had an identified acute and/or chronic health issue other than the chief complaint they were presenting for.



**Figure 1** - The distribution of patient complaints by anatomical region.

required in 9% ( $n = 87$ ) of cases overall. In addition to an average of 36 new patient experiences, participating interns examined an average of 5 new complaints from their existing patients, with a range of 0 to 22. As such, participating interns experienced an average of 41 unique complaint presentations, with a range of 35 to 58. The characteristics of presenting complaints in the average case-mix of participating interns is presented in Table 3.

Treatment plans were developed for 942 unique complaint presentations. In total, 91% ( $n = 858$ ) of treatment plans included the use of soft-tissue therapies, 84% ( $n = 795$ ) included home-based exercise prescription, and 70% ( $n = 659$ ) included spine manipulation or mobilization. Passive therapeutic modalities, such as diathermy, electrotherapy, phototherapy, taping, and orthoses (61%), in-clinic rehabilitative exercise (49%), and extremity manipulation/mobilization (28%) were recommended less frequently. On average, treatment plans recommended 9.4 (SD 4.2) in-clinic visits before the first re-evaluation. The average characteristics of treatment plans recommended by participating interns is presented in Table 4.

## DISCUSSION

Chiropractic educational programs must ensure that their students will graduate with a core knowledge and a skill set that is sufficient for the chiropractor to perform the professional obligations of a primary contact health care professional. With regard to clinical internships, programs should be designed to enhance clinical experience by providing a diverse patient base that also is reflective of private clinical practice. During the time of this study, CMCC interns were expected to complete two 6-month internship rotations; each session took place at one of six CMCC-affiliated external teaching clinics or the on-campus clinic. Each session was supervised by a primary faculty clinician who provided direction, supervision, and information, and was responsible for patient care and intern education. This study has characterized the demographics of teaching clinic patient populations and, distinct from previous work, described the average case mixes experienced by interns during their 12-month internships.

**Table 3 - Characteristics of the Unique Patient Complaints Seen by 23 Chiropractic Interns Over a 1-Year Period ( $n = 948$  Unique Patient Complaint Presentations)**

	Pain Complaint	Sub/Acute Complaint, <12 Wks	Spinal Complaint <sup>a</sup>	Yellow Flags	Red Flags	X-Rays Ordered <sup>b</sup>	Referral Necessary <sup>c</sup>	Serious Pathology Suspected <sup>d</sup>	Special Issues <sup>e</sup>
Average # of unique complaints (SD)	39 (6)	14 (5)	27 (5)	7 (5)	3 (2)	6 (3)	4 (3)	4 (3)	5 (4)
Average % of unique complaints (SD)	93 (5)	33 (12)	65 (11)	16 (13)	7 (6)	14 (7)	9 (8)	9 (6)	6 (5)
Max # (max %)	56 (100)	24 (50)	35 (84)	21 (55)	9 (24)	11 (28)	11 (29)	10 (26)	17 (22)
Min # (min %)	28 (80)	3 (8)	16 (46)	0 (0)	0 (0)	1 (3)	0 (0)	0 (0)	1 (1)

<sup>a</sup> Included those complaints where a patient indicated cervical, thoracic, lumbar, or pelvic regions as, or a part of, the chief complaint.

<sup>b</sup> Included those complaints where the intern/clinician determined plain film imaging to be necessary.

<sup>c</sup> Included those complaints where the intern/clinician determined that a referral to a medical physician was necessary; could be for advanced imaging, blood work, or for management of a condition.

<sup>d</sup> Included those complaints where the intern/clinician suspected that a serious medical pathology was a probable cause of the chief complaint.

<sup>e</sup> Included those complaints where the intern had to consider more than the chief complaint when designing the treatment plan (e.g., relevant comorbidity, pregnancy, disability, and so forth).

**Table 4 - Characteristics of the Treatment Plans Recommended by 23 Interns for Unique Patient Complaints Over a 1 year Period (n = 942 UNIQUE TREATMENT PLANS)**

	Included Spine Manipulation/Mobilization <sup>a</sup>	Included Extremity Manipulation/Mobilization <sup>a</sup>	Included Soft-Tissue Therapies <sup>b</sup>	Included Passive Therapeutic Modalities <sup>c</sup>	Included Active Rehabilitation in Clinic <sup>d</sup>	Included Active Rehabilitation at Home <sup>d</sup>
Average # of unique treatment plans (SD)	29 (5)	11 (4)	37 (7)	25 (8)	20 (14)	35 (8)
Average % of unique treatment plans (SD)	70 (10)	28 (11)	90 (8)	60 (16)	48 (31)	83 (12)
Max # (max %)	41 (85)	21 (48)	57 (100)	50 (88)	56 (97)	56 (98)
Min # (min %)	19 (54)	4 (10)	26 (74)	13 (33)	1 (3)	21 (54)

<sup>a</sup> Could include manual, instrument-assisted, or drop-table manipulation/mobilization techniques.

<sup>b</sup> Could include manual, or instrument-assisted soft-tissue mobilization techniques.

<sup>c</sup> Could include diathermy, thermotherapy, phototherapy, electrotherapy, taping, orthoses, and so forth.

<sup>d</sup> Could include the prescription of specific stretches, exercises, or any other activity recommendations.

The findings in this study suggest that the general demographic and clinical characteristics of patients presenting to interns at CMCC teaching clinics are more similar than not-similar to those reported attending private practice chiropractic clinics. Comparable to the findings of this study, recent analyses of chiropractic patient characteristics in private practices have found that most patients are between 18 and 64 years old, 12% to 20% are 65 and older, and they are somewhat more likely to be female than male.<sup>18-21</sup> Similar to the findings of our current study, recent analyses also have found that the vast majority of chiropractic patients (>90%) are presenting with a specific complaint, as opposed to presenting for “wellness” care, and more than half of presenting complaints have a spinal component,<sup>18-21</sup> and are chronic in nature.<sup>20-23</sup> A previous investigation of new patients presenting to a single “external” CMCC teaching clinic also suggested that patients presenting were similar to those reported attending private practice chiropractors.<sup>17</sup> Collectively, these recent data support the idea that the demographics of patient populations at CMCC teaching clinics and the reasons for patient visits generally are representative of patients seen by chiropractors in the field.

With regard to case mix and complexity of presenting complaints, the data from participating interns suggest that clinical experiences can be variable. While the vast majority of chiropractic patients have been shown to present for back pain,<sup>18-21</sup> several medical conditions, such as cancer, infections, and fractures, are known to mimic nonspecific, mechanical back pain.<sup>24-26</sup> As such, appropriate and skilled examinations are imperative for the delivery of optimal patient care. Indeed, DCs are taught numerous diagnostic and therapeutic procedures during their undergraduate education and clinical internships. To graduate with the ability to competently apply these skills, students must have an opportunity to apply the skills in a clinical setting under supervision. The findings of this study suggest that all interns are experiencing case mixes that include complex cases. For example, all interns reported experiencing cases that required plain-film radiographic imaging and all interns reported cases with special considerations (disability, pregnancy, and so forth). Moreover, most participating interns reported patient experiences where yellow flags (22/23 interns) or red flags (19/23 interns) were present, cases that required a referral back to the patient’s family physician (22/23 interns), or where serious underlying pathologies were suspected (21/23 interns). While generally positive, the data do suggest that there is a range of case mix on a variety of measures, including clinical flags, the necessity of medical referral, and suspicion of underlying pathology. As such, it is possible that some interns are not exposed to many situations beyond noncomplicated musculoskeletal (MSK) pain with regard to these specific measures. In the current curriculum, the simulation lab does offer simulation learning in situations that include nontypical, non-MSK, and emergency situations.<sup>27</sup>

It is noteworthy that, while all participating interns managed at least 1 case with a patient over 65 years old, they had little or no experience with pediatric cases. This finding is consistent with an earlier report indicating only 5% of cases seen at 1 of CMCC's clinics (Bronte) were in the age range 0 to 20 years.<sup>17</sup> The current study found that very few interns saw any grade-school or teenage patients (12/23) and almost none had any clinical experiences with children or infants (2/23). This study did not capture any data from those students who volunteer at the Aptus Treatment Centre (which provides support to children and adults with autism and other complex disabilities); however, this is not a primary clinical placement within CMCC's teaching clinics and, thus, is not available to most students. Whether chiropractors in private practice see a large number of pediatric patients is disputable. A retrospective survey of chiropractors has suggested that approximately 17% of patient visits represent pediatric populations;<sup>18</sup> however, it has been reported as much lower (2%–4%) in a prospective, practice-based study.<sup>20</sup> As such, it is difficult to postulate whether or not the experiences of participating chiropractic interns are similar or dissimilar to what can be expected from private practice with regard to experiences with pediatric patients. Regardless of the similarity to private practice, this study did find that only a small fraction of participating interns experienced any adolescent, or infant cases. While managing the treatment for a teenager might not offer much added complexity when compared to an adult, the care of infants and children has been suggested to require a more nuanced approach.<sup>28</sup> There are no limits to the age of patients who can be assessed and treated by chiropractors in clinical practice once a license has been granted. CMCC's undergraduate curriculum does include aspects of pediatric care in the context of basic and clinical courses; indeed, in their preclinical year students complete a 22-hour course in pediatric topics. Nevertheless, it seems reasonable to suggest that there may be value in ensuring that students have hands-on experience with pediatric populations before completing their formal chiropractic education.

With regard to treatment plans, our study suggests that soft-tissue therapy techniques, home rehabilitation programs, and spine manipulation/mobilization are the most common treatment modalities used by chiropractic interns at CMCC. This finding is consistent with recent research that has shown that in private chiropractic clinics, patients are treated most commonly with manual and/or manipulative interventions directed towards the joints and/or soft-tissues, as well as exercise instruction and postural/ergonomic advice.<sup>29</sup> The current study found spine manipulation to be the third most common modality recommended as part of treatment plans, while soft tissue treatments and home rehabilitation programs were used most commonly. This finding seems inconsistent with previous research that has shown spine manipulation to be the most common modality used by chiropractors in private practice, but might be explained by the fact that soft-tissue and rehabilitation could be applied to spinal and extremity complaints and 35% of patient presenta-

tions did not include a spinal complaint. Further, these 3 interventions may be provided in a multimodal fashion, as recommended in many current clinical practice guidelines.

There are limitations associated with this study. First, the sample of participating interns was a convenience sample and may not be typical of the general population of chiropractic interns. Second, the study relied on self-reported data, which may reflect inherent biases or misunderstanding of questions. Finally, the forms were completed by interns in their respective teaching clinics and, thus, it is difficult to ensure that forms were completed for every new patient and new complaint.

## CONCLUSION

The findings of this study suggest that patients presenting to interns at CMCC teaching clinics are similar, with regard to demographics and reasons for seeking care, to those reported attending private practice chiropractic clinics. Treatment plans recommended by participating interns rely on modalities that are similar to those being used by chiropractors in private practice. All participating interns experienced case mixes that included complex cases; however, there was variability among interns' exposure to clinical flags, the necessity of medical referral, and suspicions of underlying pathology. Almost no interns experienced pediatric cases during their primary clinical placements. This study adds to the few that detail the characteristics of patients attending chiropractic teaching clinics and, to our knowledge, it is the first to describe average case loads of chiropractic interns. These data are important to assess the comprehensiveness of learning opportunities provided to chiropractic students during their clinical internships, and may assist in the planning, evaluation, and policy development on a wide spectrum of chiropractic clinical education issues.

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This work was funded internally. The authors have no conflicts of interest to declare relevant to this work.

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## Author Contributions

Concept development: AP. Design: AP. Supervision: HIS, AT. Data collection/processing: AP, CR. Analysis/interpretation: AP, CR. Literature search: AP. Writing: AP, CR. Critical review: AP, CR, HIS, AT.

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