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Determinants of Stress in Medical Practice
Evidence from Ontario Physicians
Les facteurs de stress dans la pratique médicale
Le cas des médecins en Ontario
Determinantes del estrés en la practica medica
Evidencias a partir de trabajo de los médicos del Ontario

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Article abstract

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Determinants of Stress in Medical Practice

Evidence from Ontario Physicians

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We use data from a unique survey of Ontario physicians to examine the determinants of work and personal stress in physicians with six stress indexes we constructed. We have a number of findings of particular interest. First, we find that males experience significantly less stress than women in a number of our regressions. Second, some of our estimates suggest that physicians who practice in health service organizations, which are paid primarily by capitation rather than fee-for-service, experience less stress. This estimate suggests that alternative payment systems, which are becoming more prevalent, may help to alleviate the stress experienced by physicians. Third, increases in the percentage of billings required to cover overhead expenses are associated with higher levels of stress. Finally, our most consistent empirical finding relates to the number of hours a week the physician works, which had a significant effect on all six of our stress indexes.

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In Canada, two major national reviews of the health care system revealed that, among other things, the public highly values the equality of access to health services provided by the current system (Standing Senate Committee on Social Affairs, Science and Technology, 2002; Commission on the Future of Health Care in Canada, 2002). The accessibility and universality principles of the *Canada Health Act* (the other three being portability, comprehensiveness, and public administration) are the most supported principles by the public. The overall supply of physicians, their geographic distribution, and productivity is an issue of concern for both the government and individuals as it determines service availability or access. Both national and provincial reviews of the health care system in Canada have concluded that there is a shortage of health care personnel, especially physicians (Standing Senate Committee on Social Affairs, Science and Technology, 2002; McKendry, 1999; Kralj, 2001a). Evidence of impending physician shortages are also beginning to appear in the United States (Cooper et al., 2002). Anecdotal evidence suggests that these shortages have generated onerous working conditions for practicing physicians (i.e., long hours, high volumes of services, administrative burden, as well as other factors) resulting in declining job satisfaction/morale and higher stress levels.

To the extent that job stress impacts physician productivity, migration patterns, and retirement decisions, it may exacerbate the current shortage problem and hinder timely access to needed services. As such, the study of the determinants of job stress in medical practice are an important, and in Canada a largely neglected policy and research area. The interaction of job stress with some major trends in the development of the Canadian physician workforce, namely the aging, and feminization of the physician workforce, and a move away from fee-for-service payment to alternative delivery and financing schemes (i.e., primarily capitation based) is of particular importance and interest.

In this paper we examine the determinants of physician stress using data from a unique survey of Ontario physicians. We create a number of stress indexes to measure several different types of stress that physicians may face. In particular, we construct indexes for stress arising from personal factors, workload, decision-making, administration and paperwork, professional interactions and interacting with patients. These indexes were then regressed on variables capturing demographic information (age, gender), household characteristics (marital status, number of children under 16 living at home, income), workload (number of hours worked, number of patients seen in a typical day and whether they provide on-call services) and practice characteristics (type of specialty, practice setting and percentage of billings required to cover overhead expenses).

Most of the estimates for the explanatory variables differ across our regressions, with significant impacts in some and insignificant impacts in other stress indexes. For example, male physicians experience statistically significantly less stress related to workload, dealing with patients, decision-making as well as administration and paperwork than female physicians, but there are no significant gender differences in the other stress indexes. Some of our estimates also suggested that physicians who practice in health service organizations, which are paid primarily by capitation rather than fee-for-service, were associated with fairly large declines in the level of stress (9.5 to 13.7 percent). We found that the percentage of billings required to cover overhead expenses was associated with a significant increase in stress in four of our six stress indexes (workload, dealing with patients, administration and paperwork and personal). In particular, for a 10-percentage point increase in the percentage of expenses going to cover overhead expenses, the estimates ranged from increases of about 2.3 percent for the dealing with patients stress index to a value of 4.7 percent for the personal stress index. However, our most consistent findings across these indexes are for the total hours of work in a week. Our estimates suggest that a 10-hour reduction in the length of the workweek would be associated with significant decreases of 2.5 to 4.9 percent in our stress indexes.

The next section presents some background information on physicians (in terms of their workload and remuneration) from Ontario. We present a brief discussion of the key findings in the literature on physician stress in the third section. The fourth section presents a discussion of our survey data, the construction of our stress indexes, which are the dependent variables in our regressions, and the explanatory variables. In the fifth section, we present the empirical results from our regressions. In the following section, we present some additional empirical findings that examine whether marital status or gender moderate any of the explanatory variables in our regressions. The last section concludes the paper with a summary of our principal findings and their potential implications as well as some suggestions for future research.

BACKGROUND INFORMATION ON PHYSICIANS IN ONTARIO

In 2004, there were a total of 21,793 active physicians, comprised of 10,439 general/family physicians and 11,354 specialists, in Ontario (OPHRDC, 2005). This corresponds to a population-to-physician ratio of one general/family doctor for every 1,187 persons and one specialist for every 1,091 persons. The higher the population-to-physician ratio the greater the workload of the physician because there may be a scarcity of

physicians in the region. The population-to-physician ratio varies greatly across regions of the province, for example, from a low of one physician for every 914 persons in Toronto to a high of one physician for every 1,507 persons in the Central East region of Ontario. Additionally, about 20 percent of Ontario's physicians are 60 years of age or older. The average general/family physician provides approximately 8,000 services to patients per year (Kralj, 2001b) or about 35 services a day.[1] The daily workload for a specialist is larger, with specialists providing about 45 services a day.

It is well established that there is both a maldistribution and a shortage of physician resources in Ontario, as is the case in most of Canada (Kralj, 2001a). The current Ontario shortage is estimated to exceed 2,300 physicians (Kralj, 2001b). Physician workload is among the heaviest of any profession in the Canadian economy. According to a report by the Ontario College of Family Physicians, which addressed the issue of residents working an average of 85 hours per week, "…these excessive hours are twice the national average of every other occupational sector and [are] a significant stressor likely contributing to doctors' poor physical and mental health" (Kasperski, 2000).

Different methods of physician payment are used by government to influence not only the supply and distribution, but also the type and practice of physicians. There are three main forms of physician compensation—fee-for-service, capitation, and salary. Fee-for-service is a linear function of medical services volume; capitation is a linear function of the practices' patient enrollment or 'roster'; salary is a function of hours worked.

With fee-for-service compensation, the most common form of physician payment in North America, physicians are paid for each element of service provided to patients—in effect, a piece rate. Approximately 85 percent of total public expenditures on physicians in Ontario is in the form of fee-for-service payments. This form of payment provides a financial incentive for the physician to perform a high volume of services and a disincentive to perform services or duties which are not remunerated, such as administrative, managerial, educational, or communications tasks. One way for fee-for-service physicians to deliver more services, and gain higher compensation, is to reduce the length of patient consultations. The main advantage of fee-for-service remuneration is that its rewards are sensitive to work level and productivity, and that it provides an incentive for completeness of care.

With a capitation system, the physician receives a fixed payment per unit of time, usually each month, for each patient enrolled or rostered

1. The daily figure was obtained by a special tabulation conducted with the Ontario Medical Association's administrative data.

with him/her. The fixed payment is typically adjusted for patient age and sex, and the physician is obliged to provide a full basket of services to enrolled patients. The set payment is received regardless of actual service volume or provision. In theory, this method of payment is associated with the incentive to provide a lower number of services, to focus on prevention, and to refer patients to hospitals and other providers. Currently in Ontario, approximately 10 per cent of family physicians (i.e., over 1,100 physicians) are remunerated by three capitation models—HSO (Health Service Organization), PCN (Primary Care Network), and FHN (Family Health Network). The FHN model, introduced in July 2003, covers about 800 family doctors. The HSO and PCN capitation models, covering about 300 family doctors, were in existence prior to the introduction of the FHN model. HSOs were introduced in the 1970s and the PCN model in the late 1990s.

Salaried physicians are paid a lump-sum annual salary for a specified number of hours of work per week regardless of the volume of services provided or the number of patients enrolled in their practices. The behavioural incentives are similar to those associated with capitation payments. In Ontario, the actual use of salary payment for the provision of publicly funded medical services is not common. The best example is physicians employed by CHCs (Community Health Centres), a total of about 180 doctors. In addition, some physicians in academic centres receive salaries to compensate them for their teaching and research responsibilities.

The 2004 Physician Services Agreement established a process and funding for the development of alternatives to fee-for-service payment for specialists in Northern Ontario and physicians located in academic health sciences centres (i.e., Toronto, Hamilton, Ottawa, London, and Kingston), who are mostly specialists. When implemented, this will enable about 6,000 physicians to switch from fee-for-service to non-fee-for-service remuneration.

PREVIOUS WORK

There is a considerable literature examining the determinants of physician stress (e.g., among others, Bowman and Allen, 1985; Gerber, 1983; Hawk and Scott, 1986; Aasland et al., 1997; and, Visser et al., 2003). However, very little has been published on the experience of Canadian physicians. We will not present an exhaustive review of previous work, but rather highlight the key findings in the literature. We organize our discussion in terms of the variables that other researchers have found to be important. Prior to presenting this review, we note that our outcome measure

of interest in the empirical analysis will be stress. The stress definition we are working with will be defined in terms of the difficulty of coping with work as well as at home. This is closely related to job satisfaction in which individuals rate their "satisfaction" with various aspects of work, but differs from the burnout definition that has also been used in the literature (Maslach and Jackson, 1981). Consequently, when reviewing the literature we have focused primarily on the papers that use a similar definition of stress.

Like studies of workers from different sectors and types of employment arrangements (e.g., retail and non-standard work arrangements: Zeytinoglu et al., 2005a, 2005b, hospital workers: Estryn-Behar et al., 1990),[2] gender differences are frequently found in the literature examining stress in physicians. In particular, a number of papers have found that women physicians experience more stress than men (Gross, 1997) provides a critical review of this literature). This gender difference in stress may arise because women have more domestic responsibilities than men and as such may have more time pressures because of their professional responsibilities and obligations at home (Angell, 1981). In contrast, the findings in Swanson, Power and Simpson (1998) suggest that there may be some convergence between the stress levels experienced by male and female physicians.

Family and household characteristics, such as the number of children, have been found to be correlated with the stress levels reported by physicians (Landsbergis, 1988). In related findings, Whitley et al. (1994) found that marriage was associated with lower levels of depressive symptoms in a cross-national study of emergency room physicians. Closely related to these household characteristics are the financial pressures that physicians face (Scheiber, 1987; Gosden et al., 2002; and, Williams et al., 2002) and the demands that a practice places on them (Visser et al., 2003). The financial pressures for physicians may be magnified if the physician is married or has children that he or she has to support. As a result, the household characteristics could also be correlated with the financial pressures that the physicians may face and, consequently, influence the stress levels in physicians.

While not explored extensively in the literature, regional differences in stress levels of physicians have also been found (e.g., Perkins et al., 1995 and Whitley et al., 1994). This might be quite relevant for Ontario, the province from which our data were collected, because of the large geographic area of the region, which could lead to the remoteness of some communities from large urban areas. This is important in our context because these more remote communities may be under-serviced by physicians and be isolated—to a certain extent—from the healthcare networks in the larger urban communities.

2. An extensive review of this literature can be found in Messing (1997).

Workload factors have also been found to be correlated with the stress levels of physicians as well as health care workers (Mawardi, 1979; McCue, 1982; Linn et al., 1985; Landsbergis, 1988; Fox, Dwyer and Ganster, 1993; Perkins et al., 1995; and, Gosden et al., 2002). These papers have found significant correlations and associations between workload variables, such as providing on call services, higher patient loads and longer hours of work, and stress levels for physicians as well as other health care professionals. Closely related to the workload variables is the structure of the practice (e.g., a solo practice/private practice, or partner in a group practice), which could also influence stress levels. For example, a group practice could reduce financial and time pressures and contribute to a reduction in stress (Evashwick, 1976; Simpson and Grant, 1991) because the physician has partners that help share the burden. However, a group practice could also bring conflicts with partners and loss of autonomy that could increase stress (McCue, 1982).

Recently, the method through which physicians are paid has attracted some attention in the literature. Physicians can be remunerated in a number of different ways, which provide different incentives that can influence their behaviour (Gosden et al., 2001). As we noted earlier, there are three primary methods of payment: 1) fee-for-service arrangements, in which physicians receive a payment for each service they provide; 2) capitation, in which physicians receive a payment for each registered patient they have; and, 3) salaries, in which the physician receives a lump sum payment for a specified number of hours of work per week per year. Gosden et al. (2002) found that there were some differences in physician stress levels that could be attributed to the method of payment. In particular, they found differences in stress levels between physicians who were paid with salaries and those on "standard contracts" (a combination of fee-for-service and capitation payments) in the United Kingdom, with the standard contracts being associated with higher stress levels. Similarly, Visser et al. (2003) in their study of stress, job satisfaction and burnout in Dutch specialists also concluded that different methods of remunerating physicians that do not rely exclusively on fee-for-service payments could help to alleviate stress levels. These findings suggest that capitation payments and salaries are associated with lower stress levels in physicians.

Finally, a connection between the specialty that physicians practice (e.g., general/family practice, emergency room, medical specialties, surgical specialties and psychiatry) and stress levels has also been observed in a number of studies. For example, Swanson, Power and Simpson (1998) found that general practitioners/family physicians report higher stress than many medical specialties. Similarly, Okinuora et al. (1990) found that emergency room physicians experience more stress than physicians in medical and surgical specialties.

DATA

We analyze data from a 2001 survey of physicians in Ontario conducted by the Ontario Medical Association (OMA). This survey is conducted by the OMA every two years beginning in 1999 to support the work of its physician human resources committee. The vast majority of questions are unchanged for each two-year cycle of the survey, but the focus of the survey (e.g., among others, stress and retirement) can differ across survey cycles. The sample of all physicians, both family physicians and specialists, was selected randomly from the computerized listings maintained by the Ontario Medical Association. A total of 5,000 survey questionnaires were mailed out, followed by a reminder letter and two notices/reminders via the OMA fax network and website. This produced a total of 2,302 usable completions and an effective response rate of 46 percent, a rate comparable to other physician mail surveys reported in the literature (i.e., Sibbald, Bojke, and Gravelle, 2003; Joffe and Weeks, 2002). All of the OMA surveys fielded in other years (i.e., 1999, 2003, and 2005) have almost identical response rates. The characteristics of our sample in terms of physician demographics, such as average age, gender, geographic location, and family physician and specialist split are consistent with data collected and published by the Ontario Physician Human Resources Data Centre on the entire population of Ontario physicians (OPHRDC, 2002). Moreover, the characteristics of our sample in terms demographic, geographic location and specialty tend to be very similar across surveys so there do not appear to be any systematic response biases across the different cycles of the survey. We used this data because it provides a unique opportunity to examine the stress levels in physicians with a large representative survey of the population of physicians in the province of Ontario. Moreover, physician surveys tend to have very low response rates. The advantage of the OMA survey is that the OMA is also the bargaining agent for physicians in Ontario, so it is likely that their survey will have a higher response rate than other surveys because physicians may be more likely to respond to a survey conducted by their bargaining agent than one conducted by other groups, who do not have this connection. Consequently, this data provides the best opportunity to provide insights on the antecedents of the stress levels in Canadian physicians that could be used to inform public policy debates.

The survey questionnaire collected information on the following factors: practice profile; professional activity/workload; human resource issues; professional satisfaction/stress; and, demographic information. We used the information from these modules to construct our dependent and independent variables.

We constructed our measures of stress using the questions in the professional satisfaction/stress module. This section of the survey asked physicians to evaluate a number of dimensions of job stress. The job stress questions were grouped into four broad categories: Professional; Patients; Hours of Work; and, Personal. A list of the potential types of stress in each group is provided in Table 1. Individuals were asked to rate each of these items on a four-point scale, where 1 was not stressful at all, 2 was somewhat stressful, 3 was very stressful and 4 was extremely stressful. Each of the four groupings of questions had fairly high Cronbach Alpha coefficients (α), which were above the 0.70 cutoff that is often used in the literature on reliability analysis (Nunnaly, 1978). More specifically, the professional grouping had $\alpha = 0.70$, the patient grouping had $\alpha = 0.84$, the hours worked had $\alpha = 0.85$ and the personal grouping had $\alpha = 0.76$.

TABLE 1

Stress Items

Professional
Finding a locum
Having to make difficult ethical or moral choices
Making decisions where mistakes can have severe consequences
Hospital referrals and paperwork
Practice administration/management
Having to be concerned about medical malpractice
Conflict with partners in group practice
Adverse publicity by media
Being unable to keep up to date in your field or specialty area
Patients
Making home visits to patients
Dealing with "problem" patients
Having patients who do not comply with your recommended treatment regimen, or who endanger their own health by smoking, drinking, overeating, etc.
Having to deal with patients' emotional problems
No appreciation of your work by patients
Patients with unrealistic expectations about your ability to cure illness
Dealing with terminally ill patients and their relatives
Patients who demand more information on diagnosis and treatment than is reasonably required
Hours of Work
Making night calls to patients
24 hour responsibility for patients' lives
Coping with job-related phone calls during night and early morning

Personal
Interruption of family life by telephone
Demands of your job on your family life
Demands of your job on your social life
Lack of emotional support at home, especially from spouse/partner
Personal financial concerns/problems

We used the items in these four sets of questions to construct our measures of stress. We preformed an exploratory factor analysis using principal components, with a Varimax rotation and Kaiser normalization, to extract the stress measures from these items. This analysis suggested that there were 6 underlying factors in the stress variables that had eigenvalues greater than 1.0.[3] We renamed these factors based on the characteristics they included from the underlying questions. In particular, we classified the stress measures as: Workload; Patients; Decision Making; Administration/ Paperwork; Professional Interactions; and, Personal. The items included in each measure are listed in Table 2. These indexes were sometimes subsets of the items listed in Table 1 and in one case crossed over to include items from two subsets. For example, the workload stress index includes the hours worked items as well as a few items from the personal stress questions (see Table 2). We constructed these stress measures by summing the individual responses to the items included in each factor. For example, in the hours worked stress index if the physician responded that they found each of the 6 items in the index extremely stressful then their index would take the value 24, the sum of the response 4 to each of the 6 items in the index. The means and standard deviations for these measures are also presented in Table 2. These stress measures are the dependent variables in our regressions.

The explanatory variables in the regression include a number of variables that control for personal characteristics, practice characteristics as well as community characteristics. These variables were selected because, as noted in our review of the literature, some earlier research has indicated they may influence the stress experienced by physicians. We control for the physician's age, gender (male = 1), and their marital status (married = 1). We also included a dummy variable indicating whether the physician had any children under the age of 16 living at home. These variables may capture some of the demands that personal life create. For example, physicians that are married and with young children may have more family commitments and so be under a great deal of pressure when work demands begin to spill over into their personal time. Moreover, earlier research findings generally indicate that male physicians experience less stress than female physicians.

3. A principal components analysis with a Promax rotation with Kaiser normalization and produced the same definition of the stress measures.

TABLE 2

Descriptive Statistics for Stress Indexes

	Mean	*Standard Deviation*
Workload	15.542	4.930
Includes: • Making night calls to patients • 24 hour responsibility for patients' lives • Coping with job-related phone calls during night and early morning • Interruption of family life by telephone • Demands of your job on your family life • Demands of your job on your social life		
Patients	17.687	4.997
Includes: • Making home visits to patients • Dealing with "problem" patients • Having patients who do not comply with your recommended treatment regimen, or who endanger their own health by smoking, drinking, overeating, etc., • Having to deal with patients' emotional problems • No appreciation of your work by patients • Patients with unrealistic expectations about your ability to cure illness • Dealing with terminally ill patients and their relatives • Patients who demand more information on diagnosis and treatment than is reasonably required		
Decision Making	7.378	2.295
Includes: • Having to make difficult ethical or moral choices • Making decisions where mistakes can have severe consequences • Having to be concerned about medical malpractice • Being unable to keep up to date in your field or specialty area		
Administration/Paperwork	4.637	1.555
Includes: • Hospital referrals and paperwork • Practice administration/management		
Professional Interactions	3.333	1.351
Includes: • Conflict with partners in group practice • Adverse publicity by media		
Personal	3.643	1.575
Includes: • Lack of emotional support at home, especially from spouse/partner • Personal financial concerns/problems		

We controlled for the income of the physician with dummy variables for the following groupings: less than $75,000; between $75,000 and $149,999; between $150,000 and $224,999; between $225,000 and $324,999; and, more than $325,000. These dummy variables might capture some of the effects of financial strains physicians, particularly those with lower incomes or higher household expenses, might face. In particular, greater financial strains should be associated with higher levels of stress.

Some information about the characteristics of the community in which the physician conducts his or her practice is also included in the regressions. As we noted in the review of previous work, these variables might affect the physician's workload as well as the other demands that are placed on them and, consequently, may influence the level of stress he or she may experience. In particular, we control for the community in which the physician's practice is located (a dummy variable for rural/remote communities, with urban communities as the excluded reference group) and the region his or her community is located in Ontario (dummies for Central East, Central South, Central West, East, North, Toronto and South West). These variables are proxies for the population-to-physician ratio (i.e., relative demand for physician services). For example, there may be fewer physicians, relative to population, in some regions of the province and this may increase the physician's workload. Consequently, we expect that physicians in rural communities and areas with higher physician-to-population ratios (i.e., those with a relative scarcity of physicians) would experience more stress.

We also included a number of variables to control for the practice setting of the physician and his or her workload. More specifically, we include the explanatory variables for the total number of hours worked in a week, a dummy variable indicating whether the physician provided on-call services, dummy variables for the practice setting (private office, community health clinic/center, emergency room, walk-in clinic, health service organization, hospital in-patient unit, nursing home/home for the aged, academic center, and other settings), and dummy variables for the number of patients the physician sees during an average day (less than 10, 11–20, 21–30, 31–40 and more than 40). We also include the percentage of gross billings or revenue going toward paying practice overhead expenses (i.e., overhead ratio) as an explanatory variable. In addition, we also include dummy variables that capture the type of specialty the physician engages in (general practitioner/family physician, medical specialty, surgical specialty, psychiatry and other), since earlier research has found differences in stress levels across specialties (with higher stress levels in general practice physicians). The practice setting variables control for a number of factors (or closely related variables) that could have an affect on the level of stress in physicians. For

example, a few of the practice setting variables (e.g., the health service organization, community health centre and academic centre) can capture some of the effects of different payment systems (capitation payments (health service organization) and some salary payments (community health centre and academic centre), respectively), which may be associated with lower stress levels than the more conventional fee-for-service payments.[4] We expect that heavier workloads, which would include the provision of on-call services, seeing more patients in a day and longer hours of work, would be associated with higher levels of stress.

We provide descriptive statistics on these explanatory variables in Table 3.

TABLE 3

Descriptive Statistics on Explanatory Variables

Variable Name	*Mean*	*Standard Deviation*
Age		
[Age < 35]	0.074	0.262
Age 35–39	0.128	0.334
Age 40–44	0.151	0.358
Age 45–54	0.351	0.478
Age > 55	0.296	0.457
Married	0.871	0.335
Number of Children < 16	1.046	1.215
Male	0.687	0.464
Income ('000)		
[< $75]	0.037	0.189
$75–$149.999	0.191	0.393
$150–$224.999	0.326	0.469
$225–$324.999	0.289	0.453
> $325	0.157	0.364
Type of Community		
[Urban]	0.866	0.341
Rural/Remote	0.134	0.341
Region		
[Toronto]	0.310	0.463
Central East	0.112	0.316
Central South	0.096	0.294
Central West	0.129	0.335
East	0.171	0.376
North	0.055	0.227

4. Many physicians in academic centres receive salaries in order to compensate them for their clinical/research and teaching activities. As noted earlier, physicians in community health centres also tend to be paid via salary.

TABLE 3 (continued)

Variable Name	*Mean*	*Standard Deviation*
South West	0.128	0.334
Total Hours of Work (weekly)	52.330	14.640
Percentage of Billings to cover overhead (percent)	29.963	16.854
Number of Patients seen in an average day		
[< 10]	0.165	0.372
11–20	0.221	0.415
21–30	0.262	0.440
31–40	0.213	0.410
> 40	0.138	0.345
Provide On-Call Services	0.782	0.413
Type of Practice		
[General Practice]	0.473	0.499
Medical Specialty	0.214	0.410
Surgical Specialty	0.148	0.355
Psychiatry	0.082	0.275
Other	0.084	0.277
Practice Setting		
[Private Office]	0.720	0.449
Community Clinic	0.118	0.323
Emergency Room	0.060	0.238
Walk-in Clinic	0.162	0.369
Health Service Organization	0.057	0.232
Hospital in-patient	0.024	0.153
Nursing home	0.337	0.473
Academic Setting	0.123	0.329
Other	0.195	0.396

Notes: Excluded reference category in the regressions is indicated in square brackets.

EMPIRICAL RESULTS

We present the estimates from our regressions in Table 4. We estimate the following regression with ordinary least squares

$$\log(stress_i) = X_i'\beta + u_i, \tag{1}$$

where *stress* is the stress index, X is a vector of explanatory variables, which we discussed in the previous section, and u is a residual term. We estimate this regression for each of the six stress indexes we created. The use of the log-linear specification means that we can interpret the coefficient estimates on the explanatory variables from these regressions as the percentage changes in the stress index associated with a 1-unit increase in the explanatory variable. Each column in Table 4 presents

TABLE 4

Stress Regressions

	Stress Measure					
Variable name	*Workload*	*Patients*	*Decision Making*	*Administration/ Paperwork*	*Professional Interactions*	*Personal*
[Age < 35]						
Age 35–39	0.0160	0.0002	0.0368	0.0484	–0.0426	0.0437
	(0.0507)	(0.0432)	(0.0380)	(0.0409)	(0.0484)	(0.0459)
Age 40–44	0.0067	–0.0013	0.0465	0.0611	0.0208	0.1018**
	(0.0493)	(0.0419)	(0.0376)	(0.0403)	(0.0473)	(0.0452)
Age 45–54	–0.0163	–0.0281	–0.0128	0.0542	0.0314	0.0890**
	(0.0445)	(0.0379)	(0.0339)	(0.0366)	(0.0428)	(0.0408)
Age > 55	–0.1154**	–0.0810**	–0.0591	–0.0130	0.0040	0.0846*
	(0.0477)	(0.0409)	(0.0363)	(0.0391)	(0.0467)	(0.0438)
Married	0.0371	0.0355	–0.0120	–0.0010	–0.0109	–0.2120***
	(0.0362)	(0.0296)	(0.0259)	(0.0269)	(0.0345)	(0.0339)
Number of Children	0.0083	0.0028	–0.0027	0.0028	0.0090	0.0355***
< 16	(0.0106)	(0.0091)	(0.0081)	(0.0084)	(0.0108)	(0.0098)
Male	–0.0769***	–0.0418*	–0.0359*	–0.0548***	–0.0238	–0.0027
	(0.0272)	(0.0236)	(0.0206)	(0.0212)	(0.0275)	(0.0248)
Income (‘000) [< $75000]						
$75–$149.999	0.0668	0.0040	0.0180	0.0327	–0.0491	–0.0144
	(0.0803)	(0.0618)	(0.0494)	(0.0548)	(0.0639)	(0.0593)
$150–$224.999	0.0736	–0.0021	–0.0084	0.0491	–0.0497	–0.0317
	(0.0805)	(0.0633)	(0.0500)	(0.0550)	(0.0650)	(0.0600)
$225–$324.999	0.0972	0.0228	–0.0159	0.0652	–0.0482	–0.0495
	(0.0824)	(0.0655)	(0.0524)	(0.0570)	(0.0680)	(0.0625)
> $325	0.0823	0.0085	–0.0287	0.0081	–0.0772	–0.1463**
	(0.0871)	(0.0725)	(0.0571)	(0.0613)	(0.0747)	(0.0681)
Rural/Remote	–0.0317	–0.0861***	–0.0514*	–0.0523*	–0.0985***	–0.0331
Community	(0.0321)	(0.0274)	(0.0264)	(0.0275)	(0.0371)	(0.0321)

Region [Toronto]						
Central East	–0.0766*	–0.0917***	0.0182*	–0.0254	–0.0120	–0.0593
	(0.0404)	(0.0336)	(0.0304)	(0.0312)	(0.0407)	(0.0369)
Central South	–0.0145	–0.0608	0.0202	–0.0126	–0.0813**	–0.0178
	(0.0405)	(0.0361)	(0.0313)	(0.0316)	(0.0406)	(0.0374)
Central West	0.0049	–0.0367	0.0058	0.0192	–0.0533	0.0009
	(0.0391)	(0.0327)	(0.0282)	(0.0295)	(0.0380)	(0.0341)
East	–0.0842**	–0.1113***	–0.0487	–0.0241	–0.0535	–0.0291
	(0.0354)	(0.0302)	(0.0259)	(0.0265)	(0.0337)	(0.0311)
North	–0.0294	–0.1230***	–0.0020	–0.0365	0.0193	–0.0142
	(0.0497)	(0.0416)	(0.0392)	(0.0405)	(0.0535)	(0.0465)
South West	–0.0891**	–0.1163***	–0.0646**	–0.0499*	–0.0685*	–0.0860**
	(0.0375)	(0.0329)	(0.0281)	(0.0293)	(0.0379)	(0.0337)
Total Hours of Work	0.0044***	0.0024***	0.0018***	0.0031***	0.0025***	0.0045***
	(0.0009)	(0.0008)	(0.0007)	(0.0007)	(0.0009)	(0.0008)
Percentage of Billings	0.0027***	0.0023***	0.0008	0.0034***	0.0013	0.0047***
for overhead	(0.0008)	(0.0008)	(0.0006)	(0.0006)	(0.0008)	(0.0007)
Number of Patients [< 10]						
11–20	0.0037	0.0953*	0.0255	0.0533*	–0.0456	–0.0442
	(0.0420)	(0.0508)	(0.0286)	(0.0302)	(0.0384)	(0.0345)
21–30	–0.0304	0.1337**	0.0304	0.0585*	–0.0189	–0.0429
	(0.0452)	(0.0527)	(0.0317)	(0.0332)	(0.0422)	(0.0379)
31–40	–0.0339	0.1060**	0.0149	0.0385	–0.0145	–0.0367
	(0.0490)	(0.0548)	(0.0346)	(0.03620	(0.0458)	(0.0415)
> 40	–0.0578	0.0922	–0.0143	0.0421	0.0207	–0.0334
	(0.0531)	(0.0583)	(0.0387)	(0.0398)	(0.0503)	(0.0457)
Provide On-Call	0.1105***	0.0136	–0.0105	0.0274	0.0245	–0.0198
Services	(0.0382)	(0.0254)	(0.0231)	(0.0237)	(0.0318)	(0.0279)
Practice Setting [Private]						
Community Clinic	0.0022	–0.0111	–0.0416	–0.0156	–0.0362	0.0657
	(0.0454)	(0.0388)	(0.0344)	(0.0357)	(0.0457)	(0.0407)
Emergency Room	0.0119	–0.0134	0.0275	0.0186	0.0084	–0.0195
	(0.0319)	(0.0309)	(0.0242)	(0.0250)	(0.0323)	(0.0288)

TABLE 4 (continued)

	Stress Measure					
Variable name	*Workload*	*Patients*	*Decision Making*	*Administration/ Paperwork*	*Professional Interactions*	*Personal*
Health Service	–0.1151*	–0.0950*	–0.0843	0.0698	–0.1204*	–0.1371**
Organization	(0.0636)	(0.0543)	(0.0520)	(0.0546)	(0.0657)	(0.0655)
Hospital in-patient	0.0102	–0.0216	0.0042	0.0163	0.0307	–0.0394
	(0.0262)	(0.0244)	(0.0202)	(0.0206)	(0.0261)	(0.0242)
Nursing home	0.0469	0.0269	–0.0012	0.0102	–0.0555	0.0267
	(0.0318)	(0.0247)	(0.0272)	(0.0279)	(0.0365)	(0.0331)
Academic Setting	–0.0742**	–0.1107***	–0.0535**	0.0362	–0.0464	–0.0489*
	(0.0339)	(0.0363)	(0.0249)	(0.0254)	(0.0314)	(0.0296)
Other	0.0528	–0.0461	0.0028	0.0130	–0.0058	–0.0072
	(0.0330)	(0.0302)	(0.0260)	(0.0269)	(0.0333)	(0.0313)
Type of Practice [General/family practice]						
Medical Specialty	0.0441	–0.0380	–0.0279	–0.1116***	–0.0029	0.0259
	(0.0391)	(0.0405)	(0.0284)	(0.0291)	(0.0375)	(0.0340)
Surgical Specialty	0.0571	–0.1480***	0.0307	–0.1320***	0.0056	0.0161
	(0.0394)	(0.0541)	(0.0296)	(0.0301)	(0.0401)	(0.0354)
Psychiatry	–0.0195	–0.0491	0.0881**	–0.0394	–0.0437	0.0862*
	(0.0638)	(0.0653)	(0.0381)	(0.0403)	(0.0569)	(0.0464)
Other	0.0101	–0.0363	0.0331	–0.0264	0.0208	0.0481
	(0.0535)	(0.0550)	(0.0365)	(0.0377)	(0.0456)	(0.0429)
Sample Size	1,011	888	1,705	1,696	1,209	1,632
Adjusted R-squared	0.0919	0.1138	0.0256	0.0749	0.0157	0.0905

Notes: Excluded reference category in square brackets. Standard errors in parentheses. Single asterisk denotes significant at 10 percent level. Double asterisk denotes significant at 5 percent level. Triple asterisk denotes significant at 1 percent level. All regressions include a constant term, but the estimate is not presented.

the estimates using a different stress index as a dependent variable. The number of observations varies from regression to regression because of missing values in the responses to the stress questions that were used to create our indexes.

Workload

The estimates for the 'workload' stress index are presented in the first column of Table 4. Most of the dummy variables for age had coefficient estimates that were not statistically significant. The only exception was the dummy variable for those aged 55 or older, which suggested that this age group would have 11.5 percent less workload stress than those under 35. Neither the dummy variables for marital status nor the children under age 16 living at home had coefficient estimates that were statistically significant. There were also no statistically significant relationships between income and this stress measure. This suggests that household characteristics are not important sources of workload stress. However, the estimates suggest that males may experience significantly less (7.7 percent) workload stress than women.

The control for the type of community (rural/remote) was not statistically significant. However, the estimates on the central east, southwest and east region dummies suggest that physicians in these regions would have less stress relative to those in Toronto, which is relatively well served by physicians (i.e., has a low physician to population ratio).

Not surprisingly, increasing the number of hours worked in a week leads to a significant increase in the 'workload' stress index. The estimate in Table 4 implies that each 10-hour increase in hours worked would be associated with a 4.4 percent increase in this stress index. Providing on-call services is also associated with a significant 11.1 percent increase in the amount of workload stress. Having a high percentage of billings required to cover overhead is also associated with a significant increase in this type of stress. In particular, each 10-percentage point increase in the overhead ratio would be associated with a 2.7 percent increase in the workload stress index. On the other hand, the number of patients seen in a typical day does not have a significant effect on this type of stress. This is in contrast to the results on the total hours worked variable. This might suggest that the cumulative effects of the physician's workload (time with patients, administrative work and other duties) is a more relevant determinant of this stress index. The estimates on the variables controlling for the specialty of the physician were not significant. We also found that, relative to physicians in private practice, physicians practicing in academic settings tend to report lower stress levels. Also, relative to private practice, health service

organizations are associated with a significant 11.5 percent reduction in the level of the workload stress. These last two results are of particular interest and importance. The Ontario physicians that practice in heath service organizations are paid using capitation rather than fee-for-service. This suggests that delivery systems in which physicians are paid primarily by capitation may be associated with lower stress levels. This finding is quite important because the Ontario Ministry of Health has expanded and plans to further increase the extent to which it uses capitation payments in the remuneration of physicians. Consequently, capitation payments may be a viable method to reduce physician stress in Ontario. Similarly, physicians in academic centres receive salaries, which also suggests that non-fee-for-service payment methods would be associated with less stress.

Patients

The estimates for the 'patient' stress index in the second column indicate that none of the controls for age are statistically significant at the 10 percent level except for the dummy variable for those older than 55. The controls for household characteristics (marital status and number of children) were not statistically significant. Similarly, the income of the physician was also not statistically significant in this regression. The estimate on the dummy variable for males suggests that males have less of this sort of stress than women.

The results for the community characteristics variables indicate that physicians in rural/remote areas are likely to have significantly less patient stress than their counterparts in urban communities. This effect is also quite large, suggesting an 8.6 percent reduction in the patient stress index. Relative to Toronto, physicians in central east, east, north and southwest regions were less likely to have stress resulting from interacting with patients. The magnitudes of these estimates ranged from a 9.2 to 12.3 percent reduction in the patient stress index. These findings are not consistent with our expectations because they suggest that physicians in more remote communities and under-serviced regions experience less stress than those in urban areas and Toronto. One explanation for this finding may be that some physicians may choose to locate in these communities even though they know the workload would be higher for other reasons. For example, some physicians may choose to locate in these communities because of the financial incentives provided by the government for locating in remote or northern communities. Similarly, some physicians may locate in these communities because of the lifestyle (hunting, fishing and other outdoor activities) or the other amenities provided by living in a small community.

As with the results from the hours worked stress index, total hours worked and a higher percentage of billings required to cover overhead

expenses were associated with an increase in the patient stress index. More specifically, each 10-hour increase in hours worked per week results in a 2.4 percent increase in the patient stress index, while each 10-percentage point increase in the overhead rate results in a 2.3 percent increase in the patient stress index. Unlike the estimates for the hours worked stress index, the on-call dummy variable was not statistically significant. On the other hand, most of the dummy variables controlling for the number of patients seen during a typical day were statistically significant at the 10 percent level or higher. These estimates suggest that an increase in the number of patients seen in a typical day is associated with an increase in patient stress. The estimate on the surgical specialties was statistically significant, indicating that, relative to general practice, surgical specialties would be associated with a significant 14.8 percent reduction in the patient stress index. This is consistent with earlier findings suggesting that physicians in general practice experience more stress than those in other specialties. Finally, physicians that practice in academic settings experience significantly less patient stress (an 11.1 percent reduction) than those in private practice. A similar finding holds for physicians practicing in health service organizations. Again these last two results point to the potential of alternative delivery and payment methods (i.e., non fee-for-service) in reducing the level of physician stress.

Decision Making

There were no statistically significant relationships between the age and household characteristic variables and the decision-making stress index. Similarly, almost all of the community characteristic variables in this regression were not significant at the 5 percent level. The only exception was the dummy variable for the southwest region, which suggested a 6.5 percent reduction in the index, relative to Toronto. The estimate on the dummy variable for gender suggests that males would be associated with 3.6 percent less decision making stress than women.

A similar pattern also emerges in the workload and practice variables. Most of the estimates on these explanatory variables were not significant. As with most of our stress indexes, increasing the number of hours worked would be associated with a significant increase in the amount of decision-making stress (about 4.9 percent for a 10-hour increase per week). The specialty dummies suggest that psychiatrists might be more susceptible to decision-making stress (8.8 percent increase in the index) than general practitioners. Also, relative to private practice, physicians in academic settings would be significantly less likely (at the 5 percent level) to have decision-making stress, suggesting a decrease of 5.3 percent in the level of the index. Since many physicians in academic centres are paid via salaries,

one interpretation of this estimate is that salary payments could be associated with a decline in stress levels. This finding also points to the possibility of alternative payment methods as a way to reduce physician stress.

Administration and Paperwork

The regression estimates for the 'administration and paperwork' stress index suggest that most of the variables controlling for demographic and household characteristics are not significant determinants of this stress index. However, we found that males would be significantly less susceptible to administration and paperwork stress than women, with the estimate corresponding to a 5.5 percent reduction in the index.

None of our controls for community characteristics were significant determinants of this stress index at the 5 percent level. However, we found that the estimate for the rural/remote dummy variable (a 5.2 percent reduction in the level of this stress index) was significant at the 10 percent level. Similarly, none of the practice setting variables were significant determinants of administrative and paperwork stress.

As with most of our stress indexes, increases in total hours worked and the percentage of billings required to cover overhead are significant determinants of stress. These estimates suggest increases of 3.1 (for a 10-hour increase in the workweek) and 3.4 (for a 10-percentage point increase in the overhead rate) percent in this stress measure. In addition, some of the estimates for the number of patients seen in a typical day suggest that decreasing the flow of patients would also be associated with a decrease in the level of this sort of stress. Finally, medical and surgical specialties were associated with significant declines (11.2 and 13.2 percent) in the administration and paperwork stress index, compared to general practitioners.

Professional Interactions Stress

The estimates for the professional interactions stress index are presented in the 5th column of Table 4. None of the demographic or household characteristics variables were associated with significant impacts on this stress index. However, some of the variables controlling for community and regional characteristics were significant determinants of stress arising from professional interactions. In particular, relative to urban communities, practicing in rural/remote communities is associated with significant 9.9 percent decline in this stress index. Moreover, being located in the central south region was also associated with a significant 8.1 percent decline in the professional interactions stress index, relative to the Toronto reference group. These estimates imply that urban areas and the Toronto

region, which are relatively well served by physicians, would be associated with increases in stress levels.

We also found, as with many of the other stress indexes, that increases in hours worked would be associated with an increase in professional interactions stress, with an increase of about 2.5 percent for each 10-hour increase in the workweek. Like some of the other stress indexes, the dummy variable for the health service organizations was associated with a statistically significant 12.0 percent decrease in the level of the professional interactions stress index. Once again, this estimate points to the potential of capitation payments as an alternative to fee-for-service arrangements as an effective means of reducing physician stress. None of the other variables controlling for workload, type of practice or practice setting were significant determinants of this stress index.

Personal Stress

The estimates from the personal stress regression are presented in the 6th column of Table 4. Unlike most of the other stress indexes we examined, most of the demographic and household characteristics have statistically significant estimates in this regression. For example, relative to the less than 35 age group, the dummy variables for the 40 to 44, 45 to 54 and over 55 age groups have statistically significant estimates, which were associated with 10.2, 8.9 and 8.5 percent, respectively, increases in personal stress. In addition, married physicians are less likely to have personal stress (21.2 percent less), but those with children under age 16 living at home tend to have more (3.6 percent greater). There are no significant gender differences on this stress index. Most of the income variables are not significant, but those that earn more than $350,000 are less likely to have this sort of stress relative to those who earn less than $75,000, with the estimate suggesting a 14.6 percent reduction in the level of the stress index.

We found that physicians practicing in the southwest region would also be associated with significant declines (8.9 percent reduction) in this stress index relative to those in Toronto. None of the other controls for community characteristics were significant in this stress regression.

The findings for workload variables indicate that, as with most of our analyses, increases in the total hours worked are associated with significant increases in the level of personal stress, suggesting an increase of 4.5 percent in this index for each 10-hour increase in the workweek. The dummy variables for the number of patients seen in a typical day have no significant impacts on this stress index. Similarly, providing on call services does not have a significant effect on this index. On the other hand, the percentage

of billings devoted to covering overhead expenses increases the level of personal stress index by 4.7 percent for each 10-percentage point increase in the overhead rate. The only practice setting variable that was statistically significant at the 5 percent level was the health service organization, for which level of personal stress is 13.7 percent less compared to private practice. This is consistent with the estimates from some of the other stress indexes, which suggest that capitation payments would be associated with a decline in physician stress. A few of the practice setting variables were also significant. Specifically, relative to private practice, practicing in a community clinic would increase by 6.9 percent the level of personal stress, while a walk-in clinic would be associated with a 7.2 percent decrease in the level of personal stress. Most of the dummies controlling for the specialty of the physician were not significant, but the estimate on the psychiatry dummy was associated with a statistically significant 8.6 percent increase in the level of personal stress, relative to a family physician. In general, most of the estimates on the specialty dummies were not significant. Of those that were significant those on the non-psychiatric specialties were associated with declines in stress levels, relative to general practice physicians. This is consistent with previous findings. However, our estimates on the psychiatric specialty dummies indicate that this specialty is associated with increases in stress levels (relative to physicians in general practice) in two of our stress indexes.

ADDITIONAL ESTIMATES

We also conducted a number of additional analyses to determine if there were any moderation effects. We focused on gender and marital status as moderators because they capture gender differences as well as differences in household structures. We do not report these estimates in order to conserve space and so only provide a discussion of the findings in this section.

We first examined gender as a moderator for the other explanatory variables in our analysis. Gender was not a statistically significant moderator for the explanatory variables in the workload, patient and administration and paperwork stress index regressions. In the decision making stress index regression, we found that gender (male = 1) was a negative moderator for the emergency room specialty. We also found that gender was a positive moderator for the dummy variable controlling for 21–30 patients seen during a day, but not for any of the other variables controlling for the number of patients seen. With the professional interactions stress regression, only the estimate for the central south region was moderated by gender. In the personal stress index, marital status and the dummy for the southwest region were both negatively moderated by gender. These findings are interesting

because even though female physicians experience more stress than male physicians, this does not appear to have a moderating effect on other factors, such as household characteristics, except for the estimate on marital status from the personal stress index. A plausible explanation of this finding is that women who require more flexible work arrangements in terms of their schedule because of non-professional obligations will select specialties that provide them this flexibility. For example, physicians in general practice have a great deal of flexibility in terms of their hours of work and the days they work. In contrast, surgeons have less flexibility in terms of their hours and days of work and also have to provide on-call services.

In contrast, many more variables appear to be moderated by marital status. Marital status is a negative moderator for total hours worked in the workload stress regression. In the patient stress index, marital status was a positive moderator for the number of children and for the psychiatric specialty. In the decision making stress regression we found that marital status was a positive moderator for the academic centres, but not for any of the other explanatory variables in the regression. Marital status was also a positive moderator for the south west region in the administration and paperwork stress regression.

The greatest evidence of a moderating effect of marital status can be found in the regressions for the professional interactions and the personal stress indexes. With the professional interactions stress index, marital status was a positive moderator for income between $225,000 and $325,000 and above $325,000, the southwest region and the psychiatry specialty. In the personal stress regression martial status was a negative moderator for gender and number of children. Marital status was also a positive moderator for the medical specialty dummy. Perhaps more interesting, marital status was a positive moderator for all of the dummies controlling for the number of patients seen during a day. While being married does moderate some of the relationships between the explanatory variables and the stress indexes, there does not appear to be a consistent pattern across our regressions that would allow us to make some definitive statements on the nature of this relationship.

CONCLUDING REMARKS

We used data from a survey of physicians from Ontario, Canada, to examine the correlates of stress. We constructed six stress indexes to capture different aspects of the stress that physicians face. Our results can differ substantially across stress indexes. For example, household characteristics, such as the number of children under age 16 living at home, marital status, and age are not significant determinants of stress in most of the indexes.

However, they are significant determinants of personal stress. Likewise, the dummy variables for the number of patients seen in a typical day are not significant for some stress indexes, but suggest a positive and significant relationship in some of the other measures. Likewise, providing on-call services was associated with a significant 11.1 percent increase in the workload stress index, but this variable had much smaller estimates that were not statistically different from zero at conventional levels in the other stress indexes.

We found that the estimates on the dummy variable for males were not significant in the regressions for the professional interactions and personal stress indexes. On the other hand, we obtained negative estimates on the male dummy that were significant at the 10 percent level in the regressions for patient and decision-making stress. We also found that males would also have significantly (at the 1 percent level) less 'workload' and 'administration/paperwork' stress than women. In 1961, 7 percent of physicians were women and in 2001, this proportion was 28 percent. By 2015, women are projected to comprise about 40 percent of the physician workforce. The growing number of female physicians means that these gender differences may be an issue of concern, particularly if the higher stress levels result in female physicians reducing the extent of their practices or leaving practice altogether, exacerbating shortages of physicians that already exist or reducing access to medical care.

We found that percentage of billings required to cover overhead expenses, the overhead ratio, was associated with a significant increase in our indexes for workload, dealing with patients, administration and paperwork and personal stress. These estimates ranged from an increase of about 2.3 percent for the patient stress index to a value of 4.7 percent for the personal stress index, for a 10-percentage point increase in the overhead ratio. Our most consistent finding suggests, not surprisingly, that increasing the total hours of work increases the level of stress that physicians experience. The magnitude of the increase varies according to the type of stress index. For example, for our patient stress index, an increase of 10 hours per week would be associated with a 2.4 percent increase in that index. On the other hand, an increase of 10 hours per week would be associated with a 4.5 percent increase in the personal stress index and a 4.9 percent increase in the decision-making stress index. From a policy perspective, attempts to reduce the overhead ratios (on either the revenue or cost side) would reduce the levels of stress experienced by physicians. Reductions in stress generated by high overhead ratios may also be achieved by moving physicians into group practices and salary positions. Whether an increase in fees would reduce the hours worked by physicians and, consequently, reduce stress levels is not clear. However, increasing the supply of physicians, potentially

through increasing medical school enrollment, may be an effective way to decrease individual physician workloads and lower stress.

Another result of interest concerns the estimates on the dummy variables for practice setting. In particular, the health service organization dummy variable was associated with significant declines (9.5 to 13.7 percent) in the level of stress in some of our regressions. Since the physicians that practice in these organizations are paid primarily by capitation this suggests that moving away from fee-for-service payment arrangements may also reduce the level of stress experienced by physicians. This will have a greater importance in the new capitation models (i.e., FHNs) for general/family physicians increases and more specialists, particularly those located in academic health science centres, enter non-fee-for-service remuneration models.

While we present a number of interesting and novel results, there are limitations to our findings. When this study was started, capitation was only used to pay a small number of physicians in Ontario. The recent changes in payment methods for Ontario's physicians mean that there is now a greater prevalence of capitation payments to physicians. Also we did not have explicit information on payment methods in our data, so we had to rely on some indirect measures. Having more explicit measures of physician remuneration methods means that we would have cleaner measures of the effect of payment methods on stress levels and not have estimates controlling for payment arrangements potentially confounded by other factors. More recently, there has also been more discussion of some sort of private health care in Canada, but it is still not clear what form this would take. This could also change the landscape surrounding physicians.

This paper has provided one of the few analyses of physician stress in Canada. Future research can extend and update the findings in this analysis. In particular, future research can collect information on how the physician is paid. This would make it possible to explicitly control for the increasing prevalence of alternative payment systems for physicians. There would also be the opportunity to include a Masclich burnout inventory. This would allow the possibility of comparing findings based on different types of stress definitions to determine the sensitivity of the estimates. Given the changing nature of the health care system, the persistent shortages in physicians and greater demands on physicians, more work addressing stress and work-family life balance issues for physicians would certainly be valuable contributions. This research could help inform future changes in physicians' role in the health care system.

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RÉSUMÉ

Les facteurs de stress dans la pratique médicale : le cas des médecins en Ontario

Le nombre de médecins, leur répartition géographique et leur productivité préoccupent aussi bien le gouvernement que les citoyens dans la mesure où ces variables déterminent la disponibilité et l'accessibilité aux soins de santé. Des études canadiennes et ontariennes ont révélé une

pénurie de main-d'œuvre dans le système de santé, spécialement un manque de médecins. Aux États-Unis, cette pénurie de médecins commence aussi à se faire sentir. Différents indices relevés sur le terrain suggèrent que cette pénurie résulte en des conditions de travail difficiles pour les médecins praticiens (c'est-à-dire de longues heures de travail, un nombre élevé d'actes médicaux, un surplus de tâches administratives contraignantes et bien d'autres) occasionnant une diminution de la satisfaction au travail et des niveaux de stress plus élevés.

Dans la mesure où le stress vécu par les médecins affecte leur productivité, leur mobilité professionnelle et leurs décisions en matière de retraite, ce stress peut exacerber le manque actuel de médecins et entraver l'accessibilité des soins de santé. Aussi, malgré que l'étude des déterminants du stress au travail dans le secteur de la santé soit importante, au Canada ce sujet demeure largement négligé par les chercheurs et par ceux s'intéressant aux politiques publiques. Le stress au travail, couplé aux différentes tendances actuelles structurant la force de travail dans la pratique médicale, notamment le vieillissement de la main-d'œuvre, la féminisation de la profession et le passage d'une rémunération à l'acte vers d'autres formes d'offre de services et de financement (c'est-à-dire principalement à forfait) devient d'une importance et d'un intérêt indéniables.

Nous avons utilisé des données provenant d'un sondage réalisé auprès de médecins de l'Ontario au Canada pour examiner les déterminants du stress. Nous avons construit six échelles différentes pour bien saisir les multiples composantes du stress auquel font face les médecins dans leur pratique. Ces échelles mesurent le stress lié à la charge de travail, aux interactions avec les patients, aux processus décisionnels, aux tâches administratives, à la relation avec les collègues de travail et à la vie personnelle.

Nos résultats peuvent différer substantiellement en vertu des échelles de stress. Par exemple, les caractéristiques personnelles, comme le nombre d'enfants de moins de 16 ans habitant à la maison, le statut familial et l'âge ne sont pas des variables contribuant significativement au stress lié à la vie personnelle. De même, le nombre de patients traités au cours d'une journée typique n'affecte pas significativement toutes les composantes du stress. En ce sens, l'offre de services sur appel fut associée de manière significative à 11,1 % du stress lié à la charge de travail, mais la même variable ne contribuait significativement à aucune autre composante du stress.

Nous avons donc déterminé, par régressions, que pour les hommes, la relation avec les collègues et la vie personnelle ne sont pas des dimensions contribuant significativement au stress. Par contre, le stress associé aux interactions avec les patients et aux processus décisionnels est significatif pour les hommes (au seuil de 10 %). Nous avons aussi déterminé que pour les hommes, la charge de travail et les tâches administratives sont

significativement moins des facteurs de stress que pour les femmes (au seuil de 1 %). En 1961, 7 % des médecins étaient des femmes et, en 2001, cette proportion est passée à 28 %. En 2015, les médecins devraient être des femmes dans une proportion de 40 % environ. Le nombre grandissant de femmes médecins signifie que les différences mesurées entre les hommes et les femmes concernant le stress pourraient devenir préoccupantes, particulièrement si les niveaux élevés de stress font en sorte que les femmes médecins restreignent leurs heures de pratiques ou quittent définitivement la pratique de la médecine, exacerbant ainsi la pénurie de médecins ou limitant l'accessibilité aux soins.

Nous avons trouvé que le pourcentage de facturation requis pour payer les frais généraux, ou le ratio des frais généraux, est associé significativement à une augmentation du stress lié à la charge de travail, aux interactions avec les patients, aux tâches administratives et à la vie personnelle. Ces estimations rendent compte d'une augmentation d'environ 2,3 % pour le stress lié aux interactions avec les patients et à 4,7 % pour le stress lié à la vie personnelle, pour une augmentation de un point au niveau de 10 % dans le ratio des frais généraux. Notre résultat le plus significatif suggère sans surprise que si on augmente le nombre d'heures travaillées, le niveau de stress vécu par les médecins augmente aussi. La force de cette relation varie selon la composante mesurée. Par exemple, pour l'échelle mesurant le stress lié aux interactions avec les patients, une augmentation de 10 % des heures travaillées augmente de 2,4 % le score obtenu à cette échelle. De plus, cette même augmentation entraîne une augmentation de 4,5 % à l'échelle mesurant le stress lié à la vie personnelle ainsi qu'une augmentation de 4,9 % à l'échelle mesurant le stress lié aux processus décisionnels. Du point de vue des politiques publiques, une diminution du ratio des frais généraux (peu importe que ce soit en augmentant les revenus ou en diminuant les coûts) diminuerait le niveau de stress vécu par les médecins. De telles réductions pourraient aussi être obtenues en regroupant les médecins au sein d'équipes de praticiens et en les employant en tant que salariés. La relation entre l'augmentation des frais des soins de santé et la diminution du nombre des heures travaillées et conséquemment du stress n'est pas claire. Plutôt, un nombre accru de médecins dans le réseau de la santé suite à l'entrée en formation de nombreux candidats aux études de médecine serait être un moyen efficace de diminuer le stress des médecins en réduisant leur charge de travail.

Un autre résultat intéressant concerne l'encadrement de la pratique de la médecine. En particulier, l'organisation des soins de santé autour d'un point de service a été associée à une diminution significative (de 9,5 à 13,7 %) du niveau de stress dans certaines régressions. Considérant que les médecins exerçant dans ce type d'organisation sont rémunérés à forfait,

on peut croire qu'abandonner le mode de rémunération à l'acte pourrait contribuer à diminuer le stress vécu par les médecins. Ces nouveaux modèles de rémunération à forfait (par exemple dans les Family Health Networks) devraient prendre une place de plus en plus importante afin d'augmenter le nombre de médecins généralistes et spécialistes, et particulièrement le nombre de ceux qui exercent dans les centres hospitaliers universitaires et qui sont actuellement rémunérés à l'acte.