

2007 CSN Nephrology Manpower Survey

Background

Nephrology is a subspecialty of Internal Medicine that developed over 40 years ago with the emergence of the ability to treat kidney failure by means of dialysis and transplantation. Technical advances within the field have made such therapies available to an increasing proportion of people suffering from kidney failure. Nephrologists have also been actively involved in research and clinical care of a whole range of disorders related to the functions of the kidney. Nevertheless, the increasing burden of care required to look after the growing population with advanced kidney failure has had the greatest impact on nephrology medical human resource requirements in the past few decades.

The Canadian Organ Replacement Register (CORR), currently operated by CIHI, reports the incidence and prevalence of end stage kidney disease and kidney transplantation for Canada. The most recent data refer to the year 2004. CORR data show that between 1998 and 2001 there was a steady increase in the incidence of end stage kidney disease treated by renal replacement therapy. However, the incidence rate stabilized or declined very slightly between 2001 and 2004. Also evident from the CORR data is the fact that the incidence per million population of end stage kidney disease requiring replacement therapy is pretty constant over the years 1995 to 2004 among people aged less than 65 years. However, the incidence per million among those aged >65 rose, and particularly among those aged >75, the incidence more than doubled between 1995 and 2001. As a result of these incidence trends, patients aged >65 years made up more than half the cases starting dialysis by 2004. Patients with advanced kidney disease, and particularly the elderly, tend to have other comorbidities. This is also evident from the CORR report. Although there may have been a slight leveling off of the incidence rate rise, the growth in the prevalent population on dialysis continues through 2004, particularly for those treated by hemodialysis. The prevalence of those aged > 75 years rose at an annual rate of 15.3% between 2000 and 2004.

As the number of patients requiring kidney replacement therapy grew over the years, delivery of service has also changed from a model dependent on dialysis services located in university or city hospitals to a more dispersed delivery of services. At the same time there has been a shift from home based therapies to facility based therapies. The vast majority of patients in Canada on dialysis now rely on hemodialysis as their modality of choice with most of this being delivered in units located either in hospitals or, to a lesser extent, community settings. Over the years there has been a change in the distribution of nephrology medical human resources. These have followed the distribution of dialysis services to a degree. Nephrologists have changed from being predominantly university based subspecialists to include a sizable fraction now working in so-called community nephrology settings. The growth in the dialysis population has also led to a trend to development of satellite hemodialysis units that may or may not be staffed by nephrologists present within the facility. In many jurisdictions nephrologists working primarily at a parent unit may travel intermittently to, or deliver care at a distance to, patients dialyzing in satellite units. This need has been provoked by geographic factors

and the dispersion of dialysis to smaller facilities potentially not large enough to justify the presence of a nephrologist on site.

As dialysis was initially developed as a therapy, nephrologists were responsible for more of the hands on delivery than they are today. Improvements in technology reduced the risk of acute dialysis-related complications and the implementation of the procedure was then almost completely delegated to nurses. Over time there has been further evolution of roles with technicians, licensed practical nurses and medical service aids all now involved in the delivery of dialysis. Involvement of nurse practitioners, clinical associates, pharmacists, dietitians, automation and protocol guided care may all have changed the roles that nephrologists play in dialysis delivery. Responsibility for renal replacement therapy in ICU settings varies by institution, with nephrologists having greater or lesser roles to play alongside intensivists.

Nephrologists generally provide care to in-patients with nephrologic problems, but there have been changes over time in how this is organized as well. Variation between jurisdictions exists in regard to on-call requirements, and availability of trainees and hospitalists as contributors to care. Some nephrology services have dedicated in-patient beds, while others largely function as consultative services.

A growing awareness of the prevalence of chronic kidney disease in the general population has been fueled in part by the educational and other messages put out by nephrologists. The impact of recent initiatives to have laboratories report estimated GFR cannot be fully determined at this time, but there is a potential that more referrals for nephrology consultation would occur. At the same time, initiatives at the Primary Health Care level may offer opportunities for different approaches to management of chronic diseases, including CKD. It remains to be seen how nephrologists will fit into these trends.

Care for patients with kidney transplants also varies across the country. In many places this care is shared with transplant surgeons. Some nephrologists are dedicated to care of transplant patients, while others spend no time on this aspect of nephrology. Traditionally, transplanted patients would be seen regularly at a transplant centre for follow-up. It is not clear to what extent this still occurs, or to what extent these patients are now cared for in settings closer to their place of residence. How this impacts the work of transplant clinic coordinators as opposed to nephrologists is not known.

Prior Studies of Nephrology Manpower and Needs

Dr. David Hollomby of London Health Sciences Centre was actively involved in collecting information on existing nephrology human resources across Canada for several years. His most recent report was written and circulated in 1998 (CSN Physician Resources Planning Report). Since that time there have not been any specific national studies of nephrology physician resources, how they work, with projections for future needs. The Hollomby report has as a basis for future planning the ratio of nephrologists to patients on dialysis. While this approach has merit in being measurable and linked to a

strong indicator of nephrologist workload, it may not account for changes in the way nephrologists work.

Apparent Recent Trends

In recent years several University based nephrology programs have moved to alternative funding plans. This impacts the ability and need to recruit new nephrologists. The clinical workload assigned to nephrologists within such programs likely also varies from place to place and time to time.

The care of nephrology patients in community practice appears to have changed over time as well. Anecdotally it appears that existing nephrologists in dialysis units as they grow may seek to recruit other physicians to extend their ability to care for patients. The new physicians recruited may or may not be nephrologists, but might operate under supervision of the nephrologists already in place. We have no national data on the extent to which this is true.

As mentioned previously, there has been a trend towards development of satellite hemodialysis units. In the majority of cases it is believed that these units have patients who are cared for at a distance by nephrologists based elsewhere, including those in academic centres. It is not clear to what extent local medical staff not trained as nephrologists have input to the day to day care of patients on dialysis in these satellite units. The intensity of care provided by the nephrologists to patients on dialysis in satellite units is not clear. Frequency of in-person review, telehealth review, review of transmitted data (like lab results, treatment flow sheets) may vary between units and jurisdictions as well as over time.

There have been two countervailing trends in home based dialysis therapy. Home peritoneal dialysis has declined substantially across the country, while newer modes of home hemodialysis therapy, such as nocturnal hemodialysis, have been introduced in a limited way and have not been widely geographically dispersed at this time.

Linked to the heightened general awareness of chronic kidney disease, there has been a continued growth over the past 10 years of specialized clinics dedicated to the care of patients with advanced kidney disease. Many of these clinics are multidisciplinary and the role of the nephrologist may vary from place to place. To the extent that many of those with even Stage 4 kidney disease will not progress to dialysis, it may be quite appropriate to have them cared for by a variety of physician providers. Evolution of the health care system may impact the need for nephrologists to undertake long term management of those with non-progressive kidney disease.

Finally there has been a growing recognition of the need for improvements in the end-of-life care of patients on dialysis. Nephrologists have been involved in this area to varying degrees. It is not clear how care will be organized in the future if this area becomes a greater source of focus.

Most nephrologists beginning practice in Canada in recent years are likely to have obtained certification through Royal College accredited training programs in Canada. We have no national data on the degree to which nephrology human resources have drawn upon international medical graduates in recent years. This is a trend that can vary depending on national human resource needs and policies regarding licensure of physicians from other jurisdictions. Over the past ten years or so nephrology has apparently been viewed as an attractive career choice with application pressure for the ministry sponsored nephrology training positions across the country being generally high. In the last year or two it has been observed that the application pressure has diminished. Anecdotal reports from trainees suggest that a perceived lack of desirable consulting positions following completion of training may be a factor in this trend. It is not clear to what extent this is true across the country. Program Directors in Ontario suggest that this is the case in that jurisdiction, while Program Directors in Quebec indicate that Government regulations may have more to do with the number of applicants and trainees. Previous nephrology human resource surveys have indicated that the work force included a sizeable fraction of physicians likely to reach retirement age within the next decade. It is unclear to what extent these physicians actually will exit practice or reduce their contribution to patient care as they age. Understanding this trend is clearly important to estimating future nephrologist needs.

The Importance of a Nephrology Physician Human Resource Study at This Time

As the demands on nephrologists to provide clinical care continue to grow driven in large part by the growth in prevalent dialysis populations, there is a possibility that the existing nephrology human resources will be stretched or that the ability of the nephrology community to contribute to other activities, such as research, teaching and administration will be compromised. This is particularly true if in fact a fraction of the nephrology work force choose to leave practice in the next short period of time during which new trainees are diminished in number. It is also important to understand current trends in regard to care of patients with kidney disease. It has been the view of bodies such as the Canadian Society of Nephrology and others that care of dialysis patients should reside with nephrologists primarily. This may be at odds with the views of others such as the Royal College as they move towards a greater emphasis on training of generalists who may or may not acquire the skills and interests to care for such patients. The extent to which people who obtain complete certification in the subspecialty of nephrology are unable to obtain work within Canada is also worthy of attention. It would be important to distinguish factors related to any such trend. Some factors might include: a wish to remain within a geographic location; a wish to practice in a particular type of setting; control of access to a source of income by either administrative programs or senior colleagues. Understanding these trends will be very important to be able to appropriately plan for the subspecialty manpower requirements of the future.

In an effort to gain an understanding of some of these issues, a survey of current nephrology practice leaders was carried out across the country during the period February to April 2007.

Methods

The survey instrument was developed by a group of interested CSN members and circulated by email to identified leaders of nephrology divisions, and practice groups across the country. Potential respondents were either known to be the relevant contact by CSN executive, were identified as group leaders through provincial contacts (for Ontario and B.C.), or were identified as the contact person for a dialysis site through the CORR registry (for Quebec as suggested by the leaders of the Quebec Society of Nephrology). The survey instrument was made available in both English and French. The total number of potential respondents by province is shown in Table 1, along with the number with whom contact could be established (i.e. valid email address) and the number returning completed surveys.

Table 1.

Province	Total number of potential respondents	Number that could be reached via email	Number returning surveys N (%)
BC	7	7	3 (43)
AB	2	2	2 (100)
SK	2	2	2 (100)
MB	2	2	1 (50)
ON	26	23	9 (35)
PQ	25	18	6 (24)
NB	3	3	3 (100)
NS/PEI	3	3	3 (100)
NL	2	2	2 (100)

The results are based on 31 surveys returned by mid July, 2007. It is possible that some groups may be represented by more than one potential respondent for PQ in particular. In one identified case, two respondents did report on the same group when approached. After checking with the respondents only one of these survey responses was used. It should be noted that given the incomplete response rate, the quoted number of recruits required within the next five years is likely an underestimate for Canada as a whole.

Measures reflecting workload at each site:

Figure 1 shows the number of in-centre hemodialysis patients, figure 2 the number of satellite hemodialysis patients, figure 3 the number of peritoneal dialysis patients and figure 4 the number of home hemodialysis patients for each of the reporting sites. Nephrologists at 12 of 30 sites responding to the item were not involved in General Internal Medicine practice, while GIM practice accounts for $\leq 15\%$ of group workload in a further 13 cases. GIM makes up between 30 and 60% of nephrologists practice in 5 sites.

Figure 1.

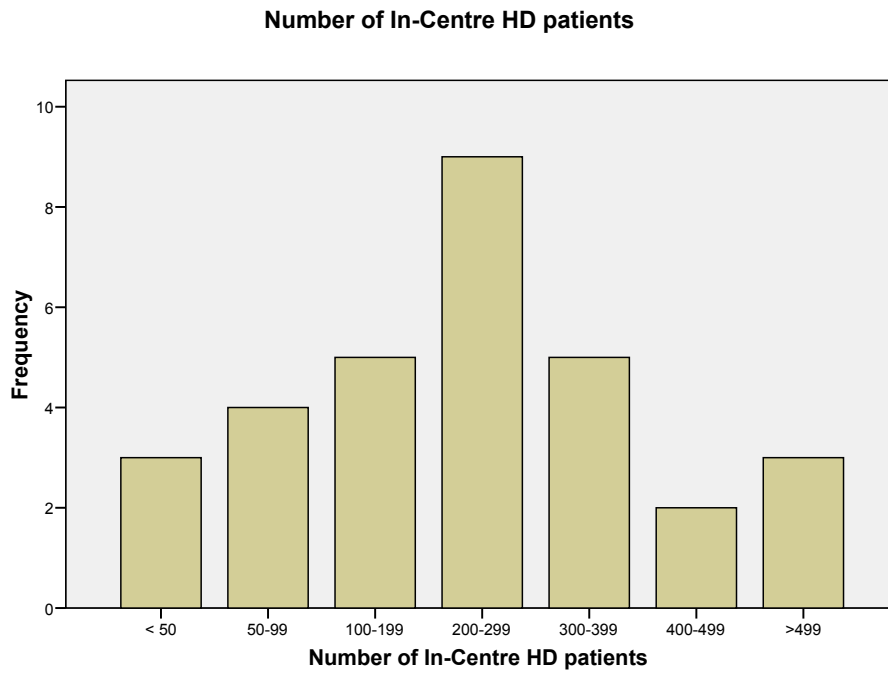


Figure 2.

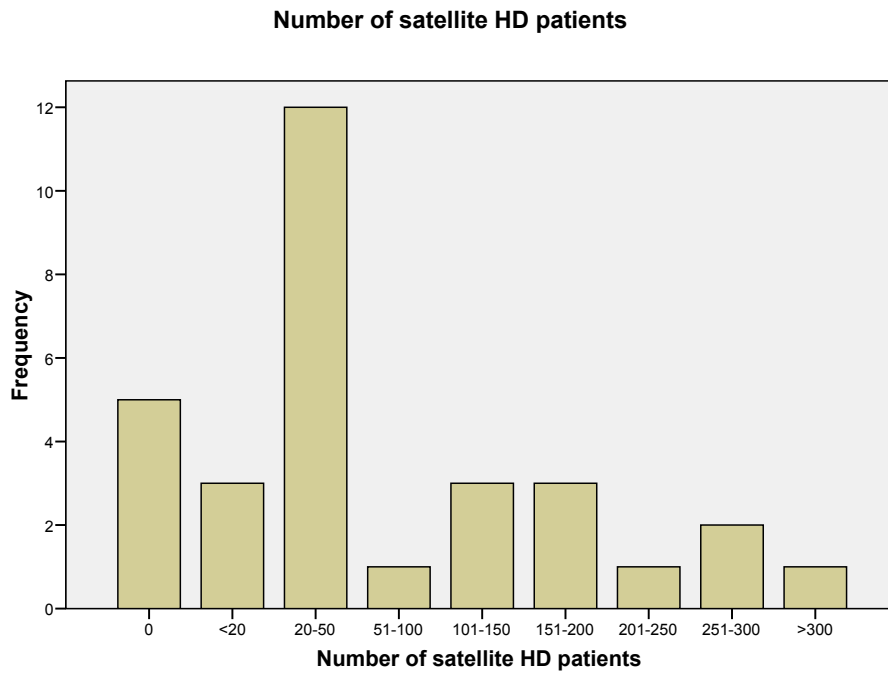


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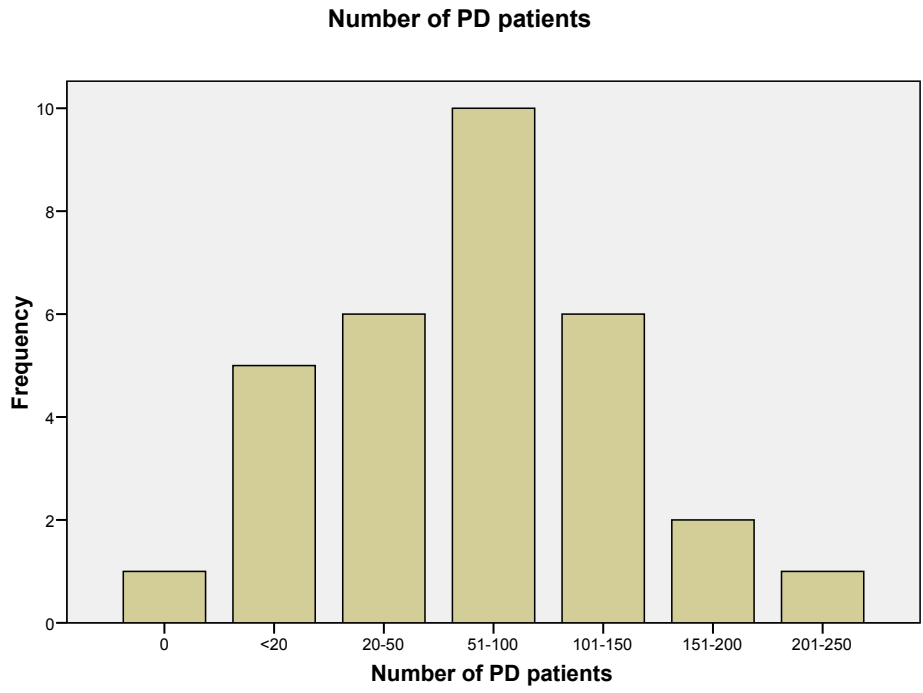


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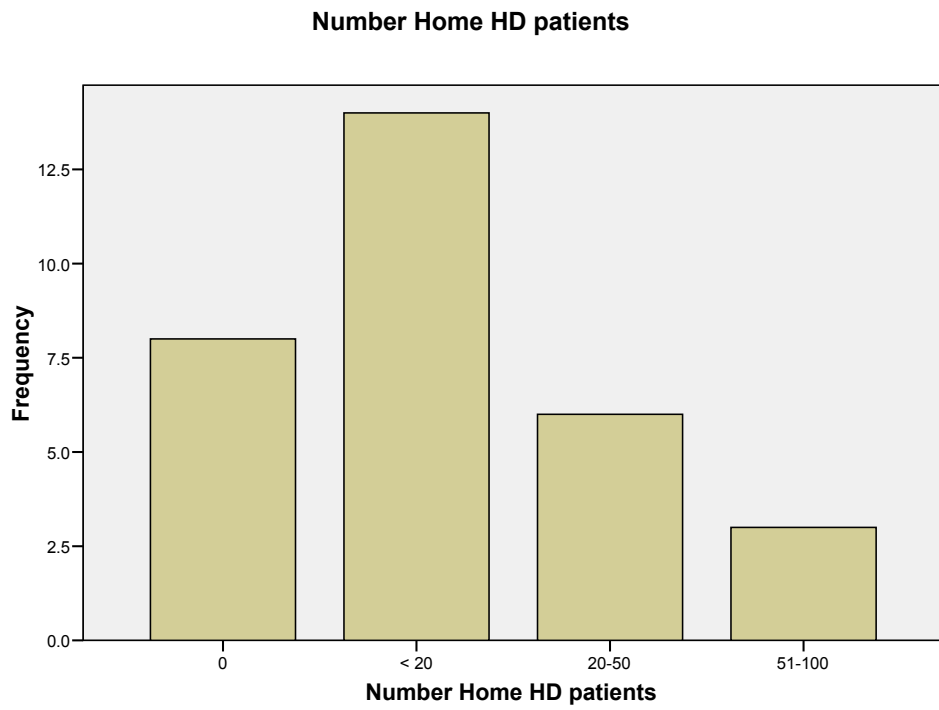
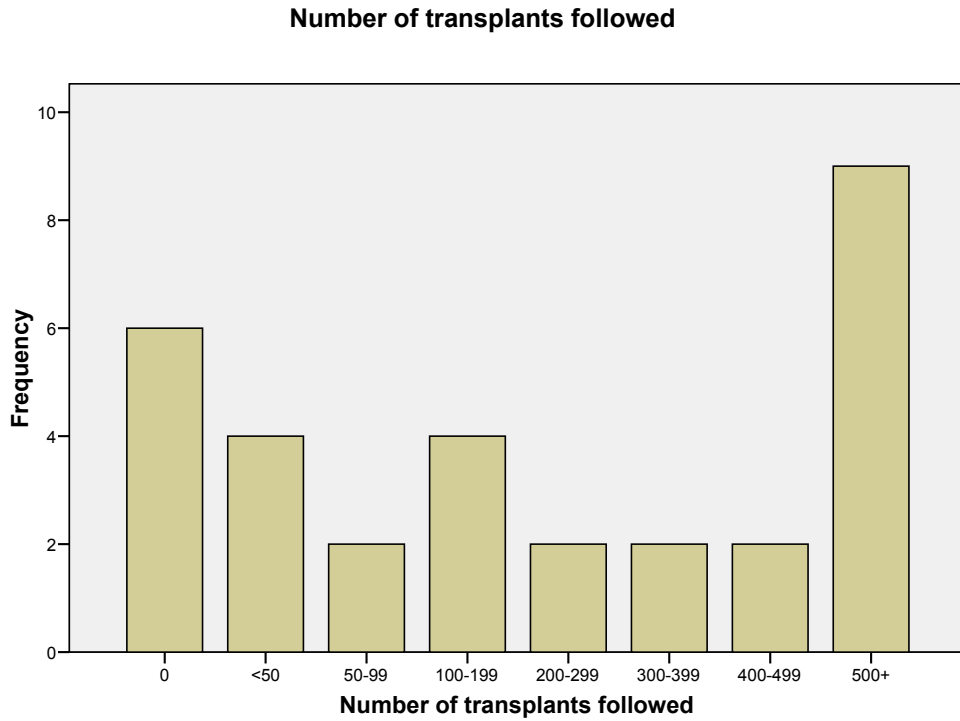


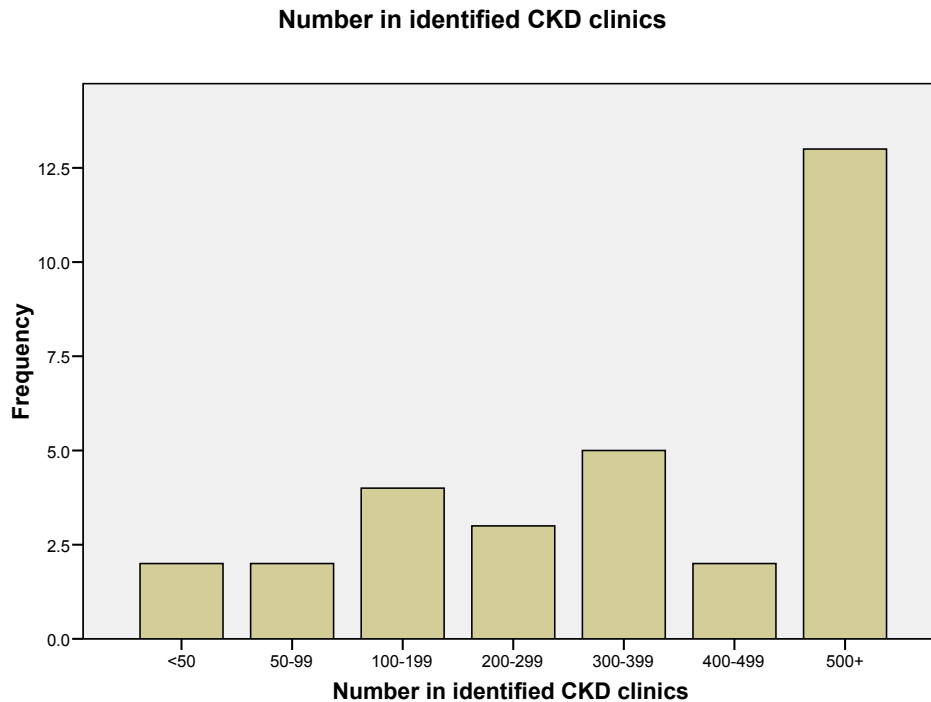
Figure 5 shows the number of transplanted patients followed. It should be noted that 14 of the 31 reporting sites actually perform kidney transplant surgeries.

Figure 5



The survey asked respondents to identify the number of patients with advanced chronic kidney disease followed in clinics dedicated to that purpose. It was assumed that a nephrologist would be involved in the care of all cases, but no information was gathered as to the stage of kidney disease required to be followed in the clinic, or to what extent care by other health professionals was involved. Figure 6 shows the number of patients followed in CKD clinics per reporting site.

Figure 6.



It is interesting to note the different shape to the distribution in figure 6 as opposed to say figure 1. There are likely to be major differences between sites in the nature of patients followed in dedicated CKD clinics. It is quite possible that the care requirements of such patients may also differ across sites, depending on whether the nephrologists make this population a target for care, whether they choose not to identify them as such, or indeed whether care of CKD patients is more generally assumed by non-nephrologists in a given region.

The number of cases with ESRD was the factor most consistently identified as likely to increase workload for nephrologists in the next five years (25 or 81% of sites). Furthermore, the requirement to provide care during extended care delivery hours (e.g. in the evening) was identified as likely to increase demands on nephrologists at 22 (71%) of sites.

Nephrology and Related Manpower Available:

Figures 7 and 8 show the number of nephrologists, and the number of nephrologist clinical full time equivalents per reporting group. The ratio of full time clinical to total nephrologists is a measure of academic involvement. Within the past 5 years, 18 (58%) of sites reported that this had not changed, while in eight (26%), the ratio increased reflecting a relative reduction in group academic activity.

Figure 7.

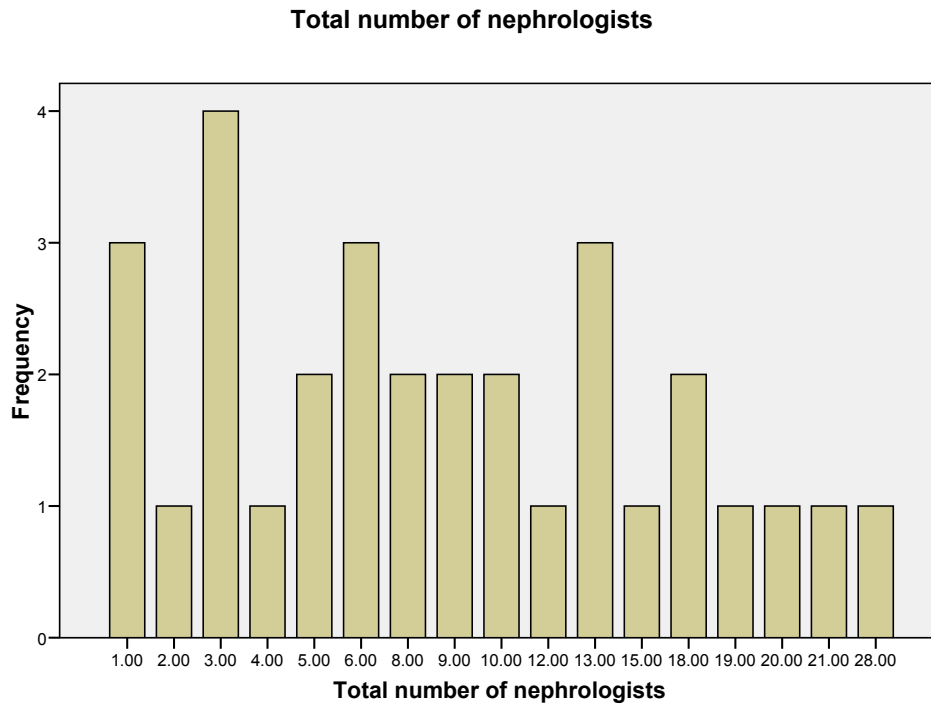
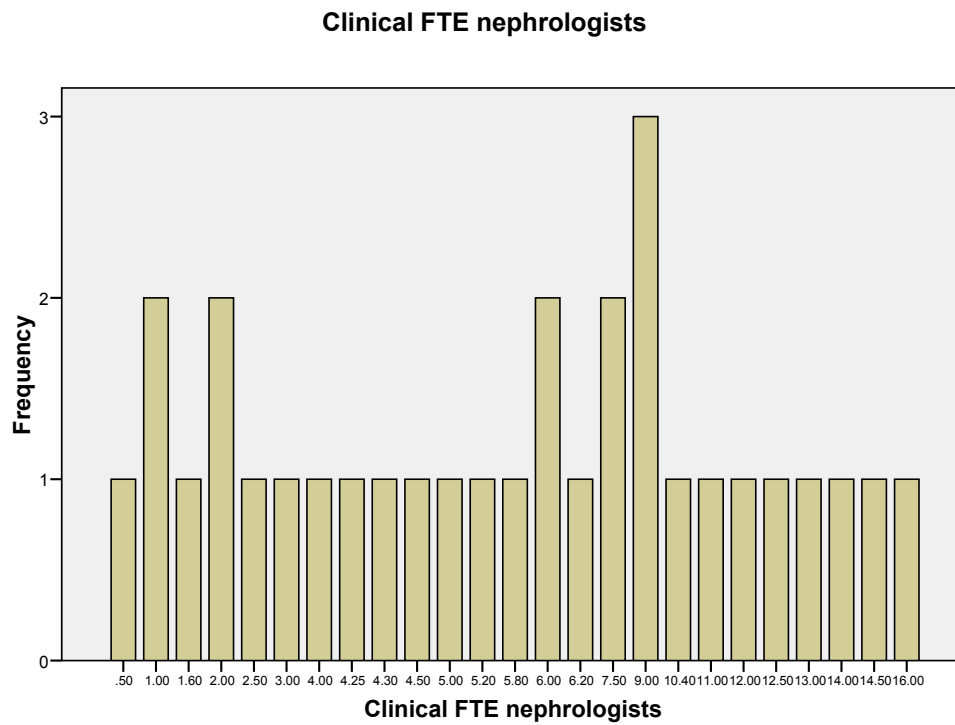
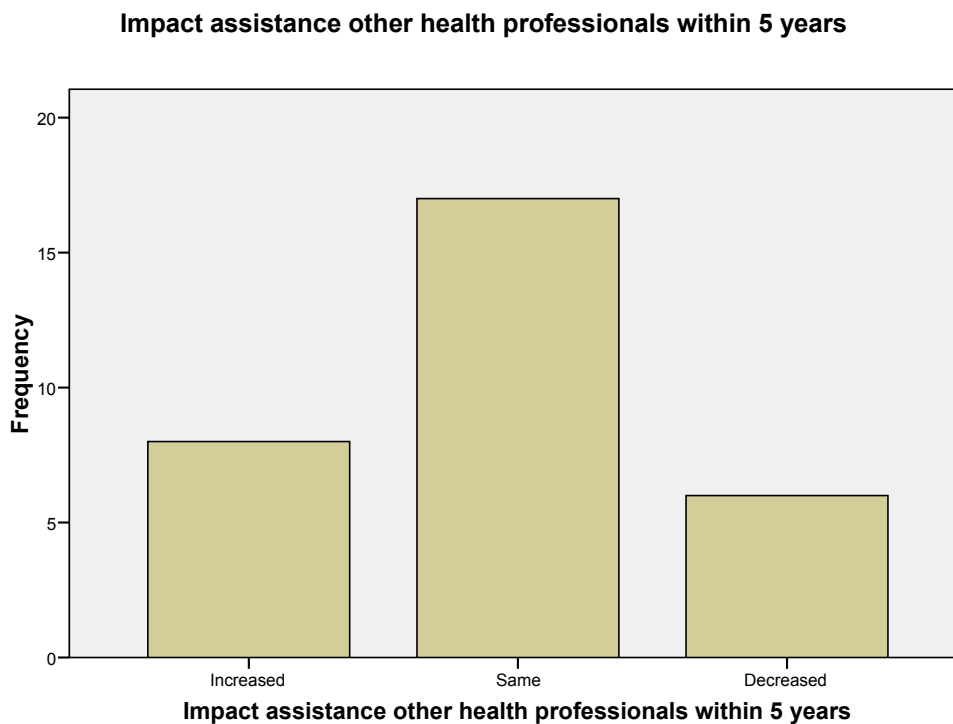


Figure 8.



Nephrology extenders are available at many sites. These include non-nephrologist MDs (at 8 sites) or nurse practitioners (at 18 sites) responsible for some ESRD patient care. The number per site varies, with at most 10 NPs and 3 MDs involved at any one site. However, it should be noted that the respondents did not include many of the larger non-University associated groups in Ontario who may rely on such support to a greater degree. Academic programs may be able to rely on assistance from fellows and other trainees in providing care. In the vast majority of cases (74-93%), the level of support from these sources was expected to remain the same over the next 5 years. The only exception was in relation to the anticipated trend in assistance from other health professionals in general where there was variation as shown in figure 9.

Figure 9.

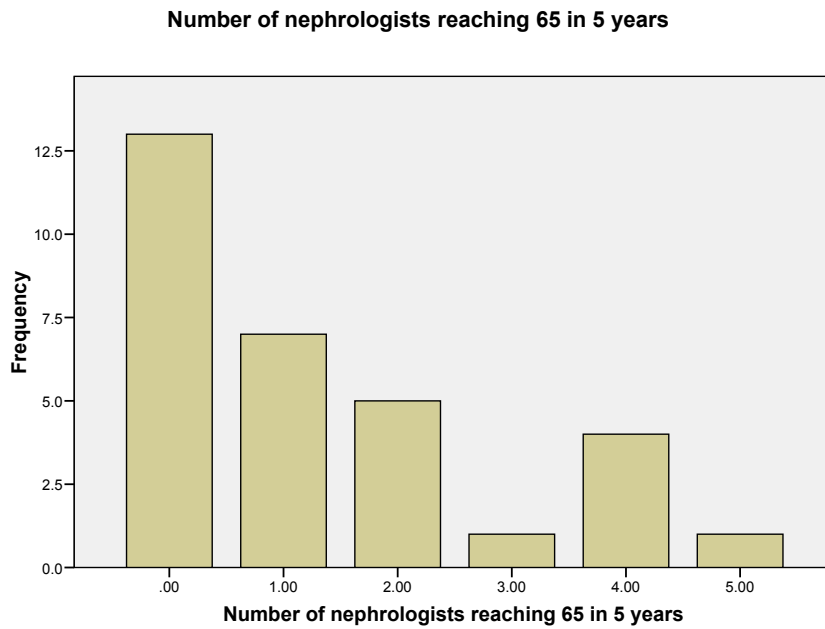


Changes in practice patterns within groups (e.g. availability of group members to provide care) was identified as likely to increase workload for those working at 13 sites, while this was likely to remain unchanged at 15 sites.

Challenges and Opportunities in Anticipated Manpower Needs:

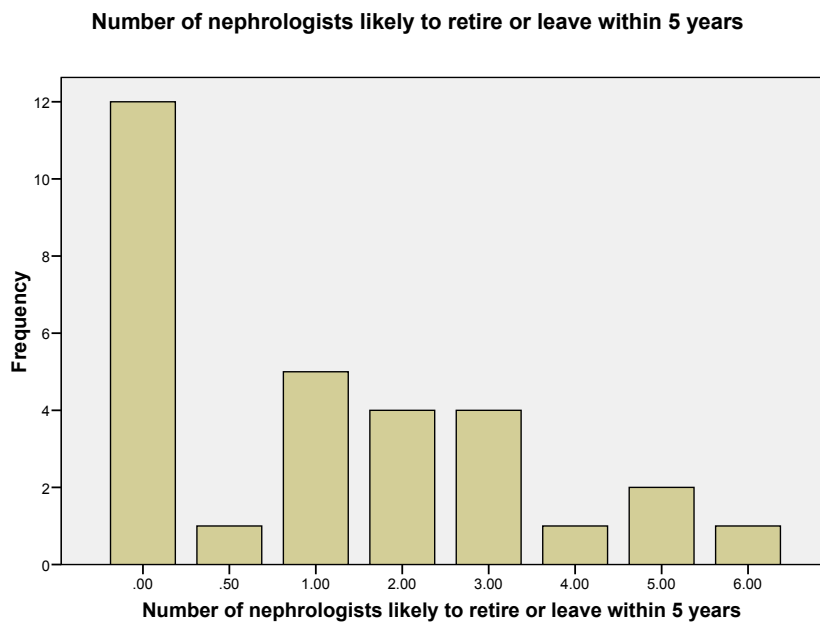
Aging of the workforce is likely to pose short term problems at some sites, but not others. The number of nephrologists per site who will reach age 65 within 5 years is shown in figure 10. The skew here is as expected given the expansion of the nephrology workforce in recent years by recruitment of many new young practitioners.

Figure 10.



A more direct measure is the number of nephrologists likely to retire or leave practice within 5 years by site as shown in figure 11.

Figure 11.



Even without considering the impact of those likely to leave, some sites currently have vacancies for nephrologists as shown in figures 12 (total nephrologists) and 13 (clinical FTE nephrologists).

Figure 12.

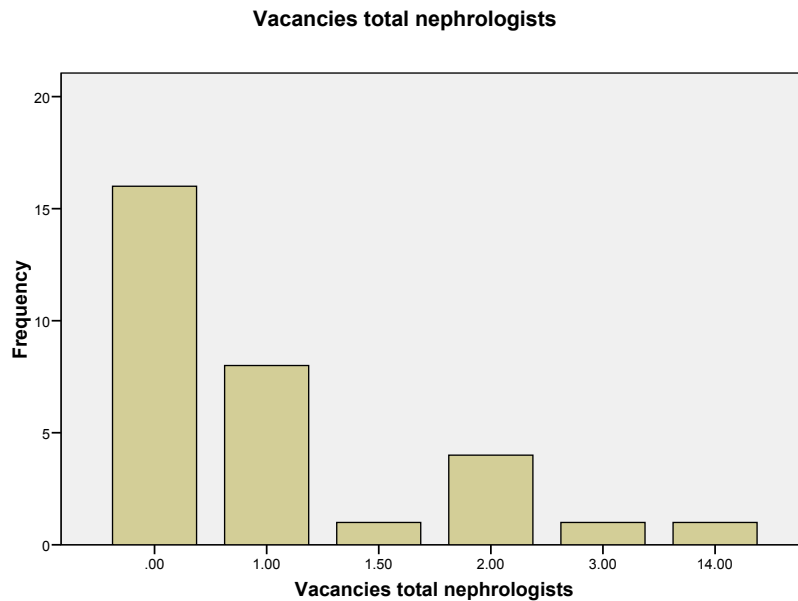
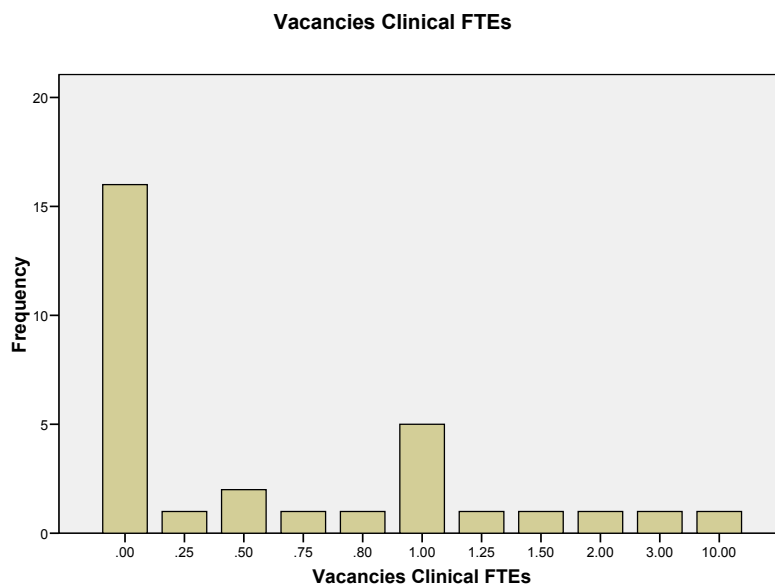


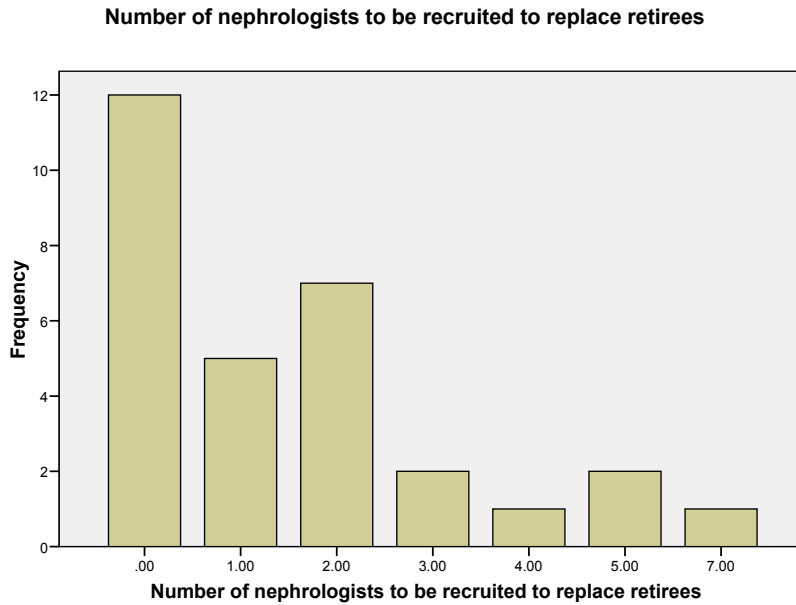
Figure 13.



The reasons for current vacancies vary. In the province of Quebec, the number of nephrologists that can be employed at a given site is determined by central provincial planning, reviewed annually. The number of vacancies reported reflects the wishes of the reporting site, rather than truly available positions. 18 of the 32.5 reported vacancies are within the province of Quebec (14 reported by one group). The remaining vacancies are scattered across the country including Alberta, Nova Scotia/PEI, New Brunswick, Newfoundland, Ontario, Saskatchewan.

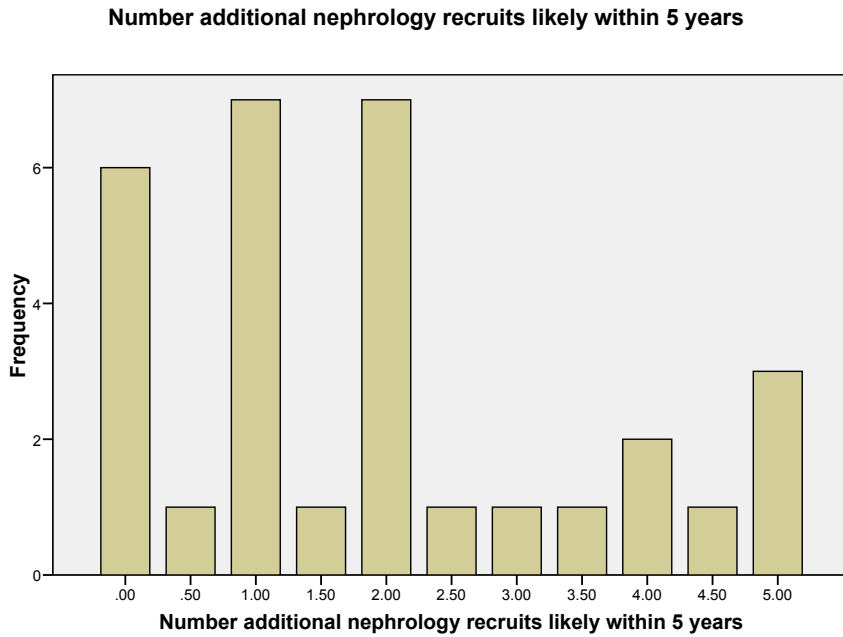
Survey respondents indicated the number of nephrologists likely to be recruited to replace those leaving practice within the next five years. This is shown in figure 14.

Figure 14.



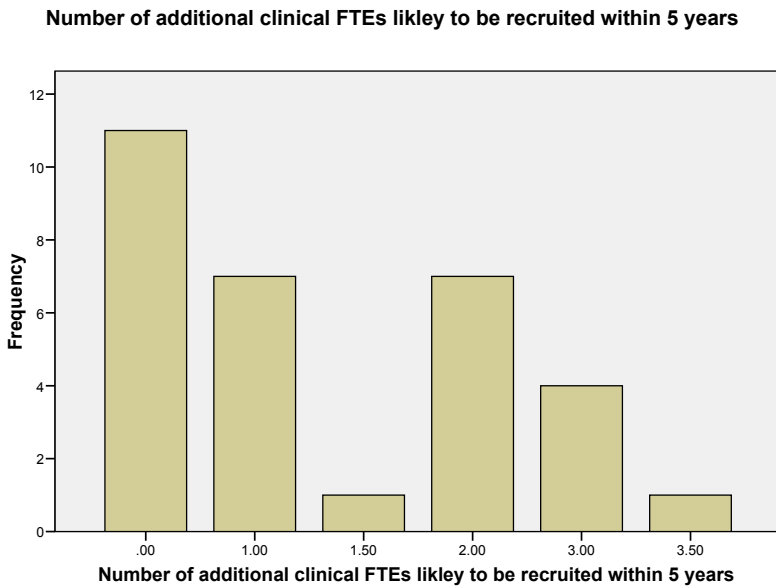
It seems likely that there will be opportunities for employment of additional nephrologists within the next five years. The anticipated number for total (figure 15) and clinical FTE (figure 16) additional nephrologist recruits per site within 5 years are shown.

Figure 15.



This sums to at least 59.5 additional nephrology recruits distributed across the country within 5 years. The corresponding total in terms of clinical FTEs is 38, with the difference reflecting positions associated mainly with an additional academic workload.

Figure 16.



The total number of nephrologists likely to be recruited within 5 years is the sum of the number required to replace those leaving practice and the number of additional recruits required to address increasing workloads and other factors (see figure 17).

Figure 17.

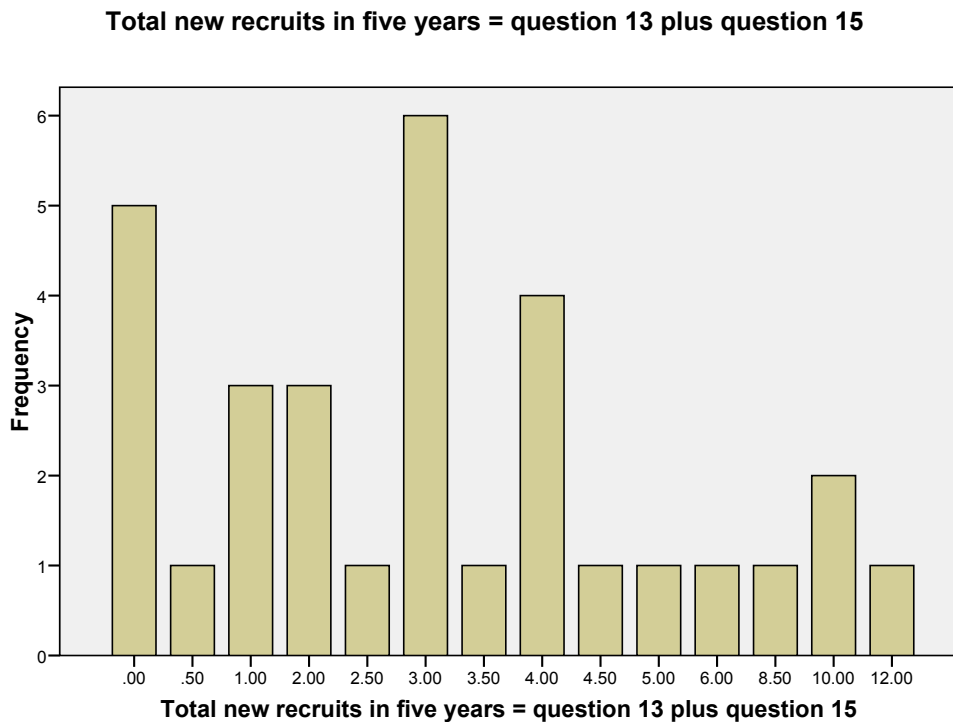


Table 2 shows a breakdown by province of the likely total number of nephrologist recruits within 5 years. Again, caution is needed in interpreting these numbers. The estimates are affected by non-responding sites and it is quite possible that internal movement of established practitioners within the country might affect availability of positions for new recruits in any given jurisdiction.

Table 2.

Province	Likely total number of recruits within 5 years
Alberta	18.5
British Columbia	17
Manitoba	3
New Brunswick	6
Newfoundland & Labrador	0.5
Nova Scotia/PEI	3
Ontario	26
Quebec	24
Saskatchewan	7.5

The type of skill mix likely to be sought by recruiting groups was also addressed by the survey. Approximately 38 clinical FTE positions were identified. Across the country, only 5 positions for nephrologists with basic science research responsibility are thought likely to arise within the next five years. This figure may be an underestimate and should

be interpreted with caution, as several groups with significant basic science academic programs did not provide responses to the survey. A further 30.5 positions are thought likely to involve clinical research in addition to clinical responsibilities. While these absolute numbers are unlikely to be exact, they do point to the desire to recruit a substantial number of both full time clinicians and clinical researchers. Few new recruits for administrative positions were identified, which is not surprising as such roles are likely to be filled by more senior staff.

With regard to recruitment, in most cases (77%), the decision to recruit would be made by existing groups as a whole, commonly with approval by the hospital, region or province also required. Survey respondents anticipated some additional nephrologists beginning practice within their region, while not being recruited by their group (total anticipated = 24.5, with 19.5 of these reported for the province of Quebec). Groups reported they would use the following methods to seek new recruits (Table 3):

Table 3.

Means of Contact with Potential Recruits	Number of Groups Reporting Use
Word of mouth within region	24
Personal contact with potential recruits known to the group	26
Regional advertising	5
National advertising	14
Advertising through CSN or QSN	12
Advertising through training programs	19
Advertising through other group heads	14

Conclusions and interpretation

The survey reflects the views of the respondents, but the data have not been otherwise validated. The response rates were high for many provinces, particularly those with more centralized responsibility for nephrology care. As such the data may be more reliable for those jurisdictions.

Predicting trends in future nephrology workload drivers:

Care for dialysis patients

It remains difficult to quantify the workload demands on nephrologists. CORR data suggest that there has not been any decline in the size of the dialysis population which remains a significant source of work for nephrologists. Survey respondents were asked about factors that might either increase or decrease their workload in the next five years. The factor most commonly identified as likely to increase workload was a rise in the number of dialysis patients and the need to cover dialysis shifts out of regular working hours. Against that, few felt that additional help from other MDs or health professionals was likely to reduce workload over the same period. At present care of patients treated by dialysis generally remains under the direction of nephrologists. If this situation

continues, it is unlikely that there will be any significant reduction of nephrology workload for ESRD care in the coming decade. However, the persistent recent stabilization in the incidence rates for dialysis in the elderly also suggests that the major growth in the dialysis population seen over the past 20 years may not continue at the same inexorable pace either. This might lead to a stabilization of the workload involved in ESRD care for the next decade.

Care for patients with transplants

Care of the patient with a kidney transplant is often shared between nephrologists and others such as transplant surgeons. The relative workload division across specialists likely differs considerably between places. Many of the survey respondents indicated that they do not currently provide care to transplanted patients. Unlike the dispersion of dialysis to multiple sites in recent years, transplantation and apparently follow up care remain more centralized. Although the choices available to prevent rejection and other complications after kidney transplantation are increasing in recent times, given the fairly constant number of patients transplanted annually, it seems unlikely that there will be a significant growth in demand for nephrologists to care for this population in the coming decade.

Care for CKD patients

The emergence of dedicated CKD clinics is a phenomenon of the past fifteen years or so in Canada. These clinics initially arose from the desire to prepare people for ESRD care and a sense that multidisciplinary teams might be useful in managing complex disease manifestations in those with relatively advanced CKD. However, epidemiologic data all point to an enormous number of people in the general population with reduced kidney function as estimated by equations based on serum creatinine. The absolute number of such people would be expected to rise in an ageing population as the majority of those so affected are elderly. More recently it has become clear that most with CKD do not progress to ESRD. Reduced kidney function is associated with cardiovascular disease and earlier death. There are known therapies that may reduce the risk for cardiovascular events in the general population, including blood pressure reduction, and lipid lowering. There are emerging data on the benefits of proteinuria minimization. Although there is considerable debate and uncertainty about the health outcome consequences of treating renal anemia and mineral metabolism problems seen in CKD, these continue to be a focus of nephrology teams caring for CKD. Thus, although nephrologists may now understand that CKD clinics do not necessarily equal pre-dialysis clinics, they may be shifting the focus to include cardiovascular risk reduction.

All survey respondents identified that patients with CKD are being cared for in specialized clinics. In almost half of the responses, the number of such patients under care was >400. Data were not collected on the profile of the patients with regard to stage of CKD, or the organization and focus of the care delivered, but this is likely to vary between centres. As expected, using Spearman rank correlation methods, there is a relationship between the number of clinical FTE nephrologists and the number of patients under care. The association was greatest for the number treated by in-centre hemodialysis (correlation 0.867), followed by the number on home hemodialysis (0.738),

on PD (0.69), or in CKD clinics (0.567). The fact that the correlation is lowest with CKD patient numbers suggests that some centres or groups, but not others, likely choose to concentrate on care for CKD in dedicated clinics. The survey does not establish the reason for this, and there remains uncertainty in general on the best models for care of CKD in general. The demand for consultation and co-management of patients with CKD may change over time and differ between places. Increasing awareness and recognition of reduced kidney function through automatic reporting of eGFR by laboratories has the potential to change these demands. Studies are being done to examine the impact. All of this makes difficult any projections of the likely future workload for nephrologists in delivering care to those with CKD.

Anticipated trends in the nephrology workforce:

The proportion of nephrologists likely to retire or leave practice as a proportion of the total number of nephrologists varied between respondents. In 12 cases (39%), there were no anticipated retirees, while the proportion varied from 6% to 33% in 17 other cases. Across all respondents the proportion of the current workforce thought likely to leave practice within 5 years was 15.5%. The locations at which no retirements are anticipated generally include more recently established sites or groups. Most of the major city based sites reporting do anticipate retirements in the coming five years. Most commonly respondents indicated that they would replace retirees on a one for one basis with new recruits. However, three respondents indicated that they would under-replace, while four thought they would seek to over-replace their retirees.

As described in Figure 15, many respondents indicated a plan to expand their group workforce in the coming five years. For the country as a whole, these estimates are potentially low as the response to the survey was incomplete. However, they might also be inflated by respondents anticipating greater expansion than will actually occur. Factors cited by respondents as likely to influence decisions to recruit included introduction of alternate funding plans, growth in patient numbers, and introduction of new services and expansion of satellites. While all of these might be expected to increase recruitment, others cited lack of appropriately trained candidates (especially those with basic research skills), administrative caps and competition from adjacent centres, and potential effect on income of current practice members as factors that would limit recruitment. It is hard to predict the likely balance between these factors nationally.

Are there enough nephrologists and will there be a shortfall in the future?

The survey respondents indication that vacancies currently exist at several sites might suggest a current shortfall, but there are uncertainties about the accuracy of this. It is very difficult with the data available to know what future needs might be.