

Medical Oncology Nursing Workforce Forecast Modelling

*Prepared for the Cancer Programme, Ministry of
Health by DHBNZ*

EXECUTIVE SUMMARY

In 2010 the National Cancer Programme, Ministry of Health, commissioned District Health Boards New Zealand (DHBNZ) to undertake a medical oncology nursing workforce forecast modelling project. The project was conducted in tandem with Cranleigh Health who developed models of care for medical oncology services. The focus of the Cranleigh Health project was on the entire model of medical oncology service delivery including referral and assessment, chemotherapy administration, medical oncology follow-up and methods to improve effectiveness and efficiency of service delivery. The nursing workforce forecasting model development was completed by DHBNZ.

The medical nursing workforce forecast modelling project was designed according to the DHBNZ health workforce forecasting framework, which was based on the analysis of current supply of medical oncology nurses and demand for medical oncology nursing services now and into the future. The resulting model will enable planning for oncology nursing according to estimated need. The model is aligned to the Cranleigh Health model of care project

The medical oncology nursing workforce is a subgroup of cancer nursing. Whereas medical oncology nurses treat patients with cancer by giving them intravenous chemotherapy and other drug related treatment such as monoclonal antibodies therapy, there are other nurses within generic cancer nursing who do not treat patients. Furthermore, nurses who treat cancer patients are not confined to the task of administering chemotherapy treatment. The range of practice for medical oncology nurses also includes using their nursing knowledge and skills to expertly assess, monitor and co-ordinate the care of patients with cancer who are undergoing treatment.

Supply of medical oncology nurses

The supply of medical oncology nurses concerns nurses who treat people with cancer with intravenous chemotherapy and associated drug related treatment, such as monoclonal antibody therapy. Treating patients with intravenous oncology pharmaceuticals is specific to the medical oncology nursing service.

The collection of supply data was fraught with difficulty. Fundamental to supply based workforce planning is the need to measure three basic variables:

- Total number of specifically medical oncology nurses including age and gender aggregates
- Inflow patterns to the specific workforce over time including new graduates, immigration, and returns to the workforce
- Outflow patterns from the specific workforce including leaving (this maybe to another job within nursing or leaving nursing completely), retirements from and deaths within the workforce.

The variables for this specific workforce had not been collected over time by any national organisation and so could not be tracked. Further, survey-based requests for nurse numbers resulted in varied response rates. Therefore any analytical profile of the supply of medical oncology nurses, especially with regard to the churn of nurses within the workforce, was precluded.

As supply data was limited the model is based on extraction and analysis of DHB costing systems.

Modelling future supply and demand

Many workforce studies focus on supply growth of a workforce over time as it relates to demand brought about by population growth and increased disease incidence rates¹. In the case of a medical oncology workforce analysis such calculations will only describe part of the situation. Cancer probability increases with age, which means that the demand for treatment will increase within the 65+ age groups, more than in other age groups. The 65+ age group also has the highest projected growth rates over the next 20 years. The older people become the more likely they are to have co-morbid conditions, which increases the likelihood of adverse pharmaceutical reactions.

Furthermore technology development, especially pharmaceuticals, which have already resulted in greater numbers of life extension, survivorship and better quality of life outcomes, will continue to increase demand for medical oncology nurses, especially in the outpatient environment. People will require to be treated for longer. More patients will need return treatment regimes, and increased numbers of people having prophylactic treatment such as monoclonal antibodies therapy, boosted by greater use of palliative chemotherapy. This forecasting model offers three demand calculations as one is based on population growth and incidence alone (65 percent), the second is based upon the application of a weighting to accommodate technology development, resulting in increased treatment rates and extended treatment regimes over 15 years. The third extrapolates the 15 year projection to 20 years (up to 240 percent over 20 years based upon 130-150 percent over 15 years').

The Cranleigh Health workforce study has considered the medical oncologist supply, which is currently stretched and mostly based on outpatient functions. A one-off search of advertised jobs for medical oncologists revealed active recruitment processes for seven consultant positions in DHBs. Subsequent medical oncology modelling to address the medical shortfall has resulted in a model that devolves some of the tasks that have historically been medical to nursing. The model also refines existing patient pathway processes. This has significant impact for the associated nursing workforce forecast model. The projection can no longer assume that current day medical oncology nursing roles and functions will continue into the future. The scope of practice of medical oncology nurses will need to extend and expand to accommodate increasing demand with a climate of medical oncologist scarcity. No formula is available to calculate the difference this will make.

Adding to the complexities of this forecasting model is the distribution of the nursing services within the medical oncology service configuration. There is currently a 'hub and spoke' model of care in place, whereby the regional centre is the hub and the other DHBs operate as satellite services closely aligned to the regional centres. The six regional oncology centres that are the main providers of medical oncology services include Auckland, Hamilton, Palmerston North, Wellington, Christchurch and Dunedin. Currently 77 percent of all intravenous and related drug therapy is delivered by nurses at the regional centres.

In Chart 1 (overleaf) the Auckland regional cancer centre is used as an example. Oncology patients from Waitemata and Counties Manukau DHBs are treated at Auckland DHB services (except for some haematology patients who are treated at their home DHB) Northland provides a chemotherapy service in Whangarei, with Auckland based consultants travelling to provide medical oncology services. In this way Northland functions as a satellite centre in close association with the Auckland regional centre. Patients from Northland also travel to the Auckland services, especially if they are too unstable to wait for a visiting consultant or if they require concomitant treatment that is not available in Whangarei or if they require overnight administration of chemotherapy. Therefore most intravenous oncology treatment in that region is given in Auckland, regardless of where people may live.

¹ Erikson, C., Salsberg, E., Forte, G., Bruinose, S. & Goldstein, M. (2007) Future supply and demand for oncologists: challenges to assuring access to oncology services. *J Oncol Pract*, 3, 79-86.

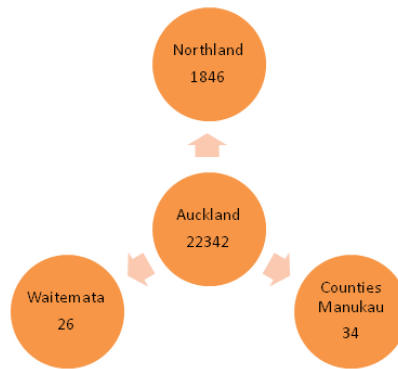


Chart 1: Auckland Regional Cancer Hub and Spoke model with chemotherapy events 2007

The largest regional centre is Auckland, which accounts for 37 percent of the total intravenous chemotherapy events. In figure two the distribution of chemotherapy administration across the DHBs demonstrates that not only does Auckland deliver the most chemotherapy, but also that the next five biggest administrators of chemotherapy are the other regional centres.

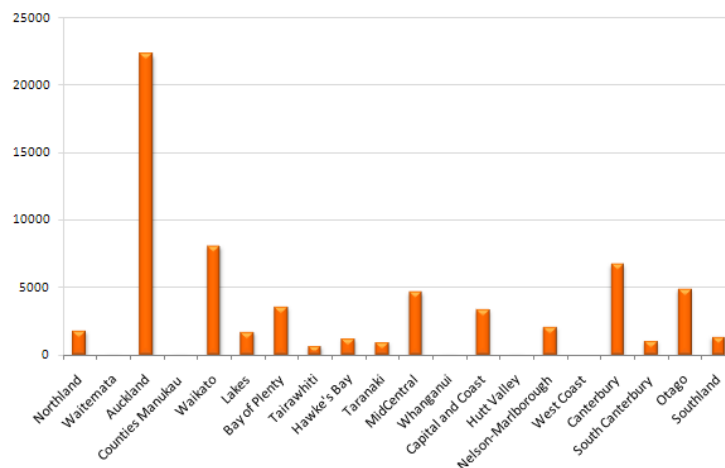


Chart 2: Chemotherapy events 2007 per DHB

Baseline demand

The DHBNZ forecasting framework goes beyond analysis of population projections and incidence rates as determining demand. Further variables include technology development including pharmaceuticals, which in the case of cancer pharmaceutical treatment have brought increasing rates of lives saved and life extension for patients and will continue to do so in the future. Included alongside these variables are the ways the medical oncology services are configured, in particular how nurses may be distributed within and throughout the service as the current model of care changes.

Together these demand variables enabled a weighting estimate that was applied to the supply growth figures. The weighting that was applied allows for increased treatment regimes and life extension/survival variables. A projection model was generated.

Most health workforce forecast modelling is based on the assumption that practice patterns will remain unchanged over the forecast period. This model however, is based upon the assumption that the scope and patterns of practice across medical oncology nursing will change. Due to the lack of

available formula to calculate numbers for new roles and functions the forecast model presented in this report focuses on describing the changing patterns that will enable a new model of care for medical oncology nursing practice as a specialty nursing workforce.

Baseline supply

As the supply variables of age, gender, inflow and outflow could not be measured the baseline supply model is based upon costing and case mix data. At best, based upon DHB responses to a survey about funded full-time equivalent (FTE) positions there were at least 325 nursing FTE associated with treating oncology patients in 2008. The same survey revealed that as many as 360 FTE oncology nurse positions had been budgeted for in 2011.

The distribution of the 2008 funding for oncology nursing resources was not further defined. As the funding was for nurses associated with treatment and as medical oncology nurses are the main group associated with treating oncology patients it is assumed that these nurses make up the bulk of the medical oncology nursing workforce. However, this cannot be guaranteed as the funds may be for nurses, who do not give intravenous oncology pharmaceutical treatment such as radiotherapy nurses. Budgeted dollars do not always equal expenditure in the area intended.

There is no clarification of whether or not the funding for budgeted positions in 2011 has been allocated to medical oncology nurses, to specifically administer intravenous chemotherapy and other drug regimes, or the environment in which it was actually delivered. A confounding issue is that most patients receiving chemotherapy do so in the outpatient setting. Mostly chemotherapy takes more than three hours. Patients who are in a DHB environment more than three hours are recorded as in-patients, although the treatments are given by outpatient nurses in an outpatient environment.

Although most intravenous chemotherapy is delivered within the outpatient environment (up to 80-90 percent)² only 23 percent of the allocated funding was for medical oncology nurses in the outpatient setting. As the reconfiguration of the distribution of medical oncology nurses concerns the outpatient environment the baseline supply model is about that 23 percent, a current supply of 92.7 nurse FTEs.

Forecast model

Supply of medical oncology nurses in the outpatient environment is estimated as needing to increase by up to as much a three and one half times over the next 15 years, to an upper limit of 321 FTE. Any FTE estimation for a nursing group needs to account for the reality that more than one half of all nurses work part-time. This means that a headcount calculation of medical oncology nurses within an outpatient environment in the next 15 years will be much greater than the 321 FTE estimate.

This has not been extrapolated to 20 years as the variables concerning growth are dependent upon assumptions concerning life extension and pharmaceutical change. While these demand variables provide estimates for 15 years increased variances reduce reliability when based on assumption based extrapolations.

1. Current supply of 92.7 medical oncology outpatient nurses.
2. Projected numbers with growth at 65 percent growth based on population increases and cancer incidence growth, over 20 years – 153.3 FTE
3. Projected numbers with growth at 130 percent, weighted for technology development, treatment changes and life extension – 213 FTE, over 15 years
4. Projected numbers with growth at 150 percent, weighted for technology development, treatment changes and life extension. - 321 FTE

² Personal communication from Cranleigh Health

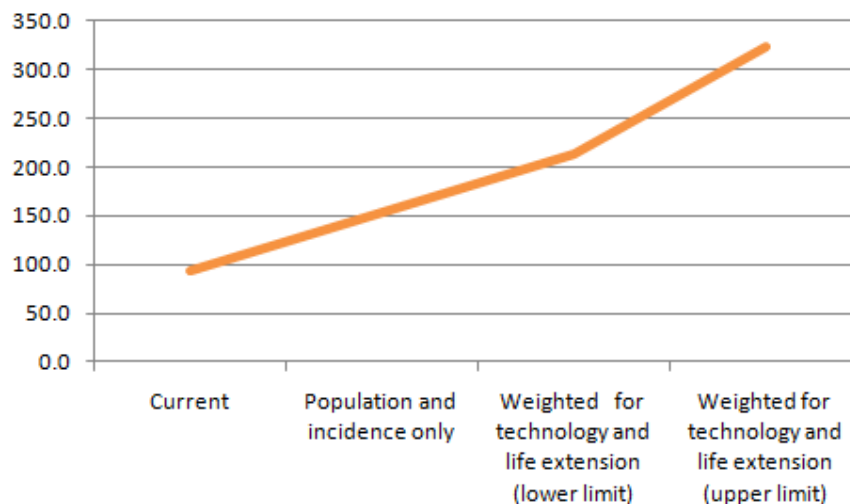


Chart 3: Supply forecast for medical oncology nurses

This supply growth estimate has not accounted for changing practice patterns that are recommended as a new model of care. The 'step-up' role for nurses within the multi-disciplinary team will enable consultants to better manage increase demand for medical oncology care delivery, but it will also affect the nursing supply growth. The adoption of new roles for nurses will require greater numbers than those projected. That is, in the event of widespread implementation of the model, even the upper limit of the supply projection will be light.

This is because the supply forecast growth model is based on the assumption that nurses will continue to do what they are doing now. However, the new model of care outlines nurses 'stepping up' to accommodate some medical tasks that are not necessarily part of their current role and function. This is driven by the certainty that medical oncologists will not be able to meet expected demand without changing practice to enable consultation with increased numbers of patients. In turn this will require more nurses across the scopes of nursing practice.

The 'step-up' model for medical oncology nursing

The 'step-up' model for medical oncology nursing has two major components.

- Introduction of medical oncology nursing specialisation across the scopes of practice and levels of nursing, with task allocation commensurate with knowledge and skills
- Refinement of processes including referrals, clinic administration and appointments, treatment follow-up, case management, care based on standardised clinical pathways, and collaborative cohesive multi-disciplinary teams.

Introduction of medical oncology nursing specialisation across scopes of practice and levels of nursing

Specialisation in nursing in New Zealand is seen as a way forward to manage increasing demand and service delivery. Historically nursing has tended to be more general than specialisedⁱⁱ. Like other countries service requirements have changed, with rising co-morbid conditions, greater expectation of the health service, more complex technological options for patients and higher acuity patients requiring care. In turn this has brought about a need for a broader range of skills and knowledge across the discipline, especially in some areas of nursing such as medical oncology.

Rather than an approach that focuses on specialist skills, specialisation of a nursing workforce such as medical oncology will enable greater efficiency and effectiveness across the whole team, including Nurse Practitioners, levels of Registered Nurses, some with expanded and extended scopes of practice and Enrolled Nurses.

The nursing team within a new model of medical oncology nursing care will differ in role and function to the current team. As historical medical tasks and functions devolve to 'specialist' nurses, some Registered Nurse tasks and functions will devolve to the emergent Enrolled Nurse according to scope of practice. In turn Registered Nurses will 'step-up' to undertake complex assessments, treatment prescriptions and minimally invasive procedures. Precedents for nurses stepping up to like roles have been set for this type of role and function change. For example, diabetes related prescribing and colposcopy procedures.

Not only will medical oncology nurses work with patient undergoing chemotherapy, but they will be able to 'step-up' to manage cancer patients through the cancer pathway, including diagnosis confirmation, test ordering and follow-up, and treatment prescription, especially with low-risk patients. They will act as the first point of contact for patients within the pathway. Nurses will need to have the knowledge and skills to detect and deal with clinical pathway variances, including knowing when to embrace other members of the multi-disciplinary team.

	Scope of practice	Contribution to team	Training requirement
Nurse Practitioner	<ul style="list-style-type: none"> – First specialist appointments – Holistic treatment prescription – Treatment follow-up – Supervision for nurses – Consultancy to satellite centres – Nurse led clinics – Referral as appropriate – Collaboration with consultants 	Independent practice Clinical leadership Central to multi-disciplinary team	Clinical masters degree and approved by Nursing Council of New Zealand (NCNZ).
Registered Nurse (level 4) (is this a nurse specialist)?	Extended and expanded to include: <ul style="list-style-type: none"> – First specialist appointment in collaboration with consultant – Patient triage at satellite centres – Chemotherapy prescription according to standardised pathways (low risk patients) – Clinical leadership – Team co-ordination – Point of contact for patients 	Clinical leadership Support and supervision	Extended and expanded scope of practice through the PDRP process and approved by NCNZ Expert on PDRP Post-graduate study completion including oncology and pharmacology courses. Masters/PG diploma level study.
Registered nurse (levels two and three)	Oncology pharmaceutical administration Holistic assessment throughout treatment regime Patient education Care according to procedure and	Skills and knowledge of medical oncology care delivery	Engaged with post-graduate study that includes oncology specific courses and advanced clinical assessment at PG diploma/masters

	Scope of practice	Contribution to team	Training requirement
	protocols – clinical guidelines and pathways		level.
Registered Nurse (level one)	Nursing care as beginning practitioner	Succession and career planning	In-house orientation on entry, DHB PDRP programmes
Enrolled Nurse (experienced)	Protocol-based assessment using assessment tool and reporting results to Registered Nurse Tasks as delegated by Registered Nurses Clinic coordination	Supporting roles for Registered Nurses Directed and delegated by Registered Nurse	In-house orientation on entry and mentored by Registered Nurses
Enrolled Nurse (beginning)	Clinic administration, basic patient care, housekeeping role	Succession planning Directed and delegated by Registered Nurse	In house orientation
Under graduate students	Work alongside and supervised by Registered Nurses	Opportunity for specialisation early in nursing career	In house orientation

Table 1: Nursing roles and functions within a new model of medical oncology care delivery

The step-up model offers nurses new opportunities for practice. As such, it is a generic reconfiguration of nursing roles and function in the medical oncology nursing specialisation. Team structures however will differ between centres. For instance a regional centre will have the breadth of service to facilitate the ideal team configuration. Satellite centre needs may differ. The need for Nurse Practitioners may lie in satellite centres, where consultants and registrars are not so readily available. Some Nurse Practitioners will be needed to travel between regional centres and satellite centres, thereby freeing up consultants to remain at regional centres. Likewise Nurse Practitioners may become Primary Care oncology specialists to manage patients whose care is transferred back to the primary sector post treatment for ongoing monitoring and management.

Refinement of processes

The 'step-up' model for nurses is not intended to occur in isolation of other team changes. Success is contingent upon multiple changes within the team in order to function as a cohesive specialisation. For instance the adoption of greater clinical decision-making and autonomy of practice relies upon the development of national standardised clinical pathways, based upon evidence, which will support nurses to identify variances and know what to do about them. Support for nurse-led clinics and case management roles will need to be enabled.

Clear clinical pathways will need to include the circumstances under which patients have their care transferred back to the primary sector, onto palliative services or another service when appropriate, freeing up space within the specialised service for those who most need it.

The model relies upon greater numbers of nurses within the oncology workforce as well as better integration between primary, secondary and tertiary service delivery. In turn this is contingent upon better patient referral to and transfer between services, including the potential for private sector entry to service delivery.

Changes and constraints

One of the major changes associated with the 'step-up' model for oncology nursing concerns the definition. Fundamental to medical oncology nursing has been the administration of intravenous oncology pharmaceuticals including chemotherapy and other related drugs. The model introduces the notion of nurses functioning as first point of contact in secondary and tertiary care. Associated is the capacity for nurses to co-ordinate patient care through the cancer journey working within a multi-disciplinary team. The focus for medical oncology nursing will shift from revolving around treatment and associated issues to case management and care co-ordination. This will change the face of medical oncology nursing and will be central to a more holistic team approach to cancer care.

This forecasting model project has been constrained by lack of robust data about the specified workforce. This has resulted in a model for nursing that has been based more on demand factors than measurable variables of both supply and demand.

It would be usual in forecasting modelling to apply weightings from scenarios, which would result in adjusted numbers to better identify a gap between future supply and anticipated demand increases. In this case those scenarios could not be quantified to enable usual weighting procedures. These include:

1. Greater participation by nurses for first specialist appointments (FSA) has been explicated within the model. Although FSA data is kept, a projected ratio for nurse participation based on existing data could not be modelled. This is a professional issue.
2. One way of measuring medical oncology nurse patient ratios would be to measure chemotherapy events and nurses per DHB. The most current chemotherapy events data available was 2006/2007. It was considered that calculations based on 2007 demand data would be unreliable due to changes over the last five years. In particular increased use of monoclonal antibodies therapies. For instance, the approval of 12 months for prophylactic Herceptin became a reality in 2008³. This resulted in increased numbers of women being treated by medical oncology nurses. More current chemotherapy events data would provide reliable results.
3. The suggested changes to patterns of nursing practice and distribution of nurses across the sector is not possible to measure reliably. As each DHB has its own distribution of nurses and model of care across the specialty, a scenario that may apply to one would not necessarily apply to others. For instance in some places nurses who give chemotherapy may also organise consultants' clinics. In another the functions are separate. Likewise in one DHB nurses may play a role in acting as the point for patient contact, between visits, in another contact may be minimal.
4. Nurse Practitioners in medical oncology are not a current reality. Balance of numbers between Nurse Practitioners, consultants and specialist Registered Nurses, and any timeframe

³ Ministry Of Health (2010) Cancer Control: Herceptin. Available at:
<http://www.moh.govt.nz/moh.nsf/indexmh/cancercontrol-treatment-herceptin>

for implementation are professional issues. Time and decision making by professional bodies will determine the parameters for each scope of nursing practice.

5. It is unlikely that Nurse Practitioners will emerge in large numbers. It is likely that Registered Nurse specialists will look toward extension and expansion of scopes of practice. This forecast does not prescribe the balance and patterns of practice between scopes of nursing practice.
6. In an ideal model firm training numbers would be identified, time framed across the period of forecasting. This relies on identifying the churn of nurses within the specialty. Due to the lack of supply data about age, gender, historical patterns of entries and exits, and reasons for leaving a particular role, a half-life for medical oncology nurses could not be calculated. The half-life would have enabled estimation of turnover and training numbers calculations accordingly.
7. Many of the changes inherent within the model are contingent upon the development of national frameworks and protocols. In particular, standardised clinical pathways, which will outline the protocols underpinning cancer care delivery. Cancer care differs between major tumours groups, each with different protocols due to type, grading, staging and location. Nursing roles and capacity to on-refer or seek further medical in-put will depend upon cross discipline agreed national clinical pathways including variances implementation. Clinical pathways may depend upon clinical information system implementation.
8. In turn, clinical information systems will capture and collate the data that will provide robust workforce forecast modelling.

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BACKGROUND

As with any workforce modelling process this project began with a specific definition of the group for analysis. The definition determines the group of nurses specific to the particular workforce and relies upon the availability of data about the specific group. In this case the workforce group for analysis was medical oncology nurses.

Medical Oncology Nurses (MON) are cancer nurses who administer anti cancer drug therapy in inpatient/outpatient areas. Medical oncology nurses are Registered Nurses with specialist education and training, who care for patients from diagnosis to treatment and beyond, utilising nursing knowledge and skills to expertly assess, monitor and treat patients undergoing treatment. This includes, but is not limited to, chemotherapy and drug related treatments.

The project excluded paediatric, surgical and radiation oncology EXCEPT where medical oncology nurses are administering chemotherapy within a paediatric setting.

A next step includes identifying the data sources from which information can be extracted to give an accurate picture of the workforce including historical data about nurses' entry and exit rates from the defined workforce and length of time nurses remain within the specific workforce. In an ideal forecast the post-graduate education patterns of the nurses over time is used as a basis for estimating training needs for the future.

In this case specific data about medical oncology nurses over time could not be extracted from usual sources such as the Nursing Council of New Zealand (NCNZ), the DHB national base data collection or from surveys circulated as part of the concurrent Medical Oncology Model of Care project.

Medical oncology nurses are immersed within the broader group of cancer nurses, which in turn appear within the generic group of 'medical' in both NCNZ and national DHB base data collection (based on the Australian and New Zealand Standard Classification of Occupations) data collections.

FORECASTS

Main findings

A growth rate that is based upon anticipated population demographic change and on trends in incidence rates alone, show patients requiring medical oncology treatment are estimated to increase by 65 percent over the next 20 years to 2031. This estimate does not account for an increasing prevalence in New Zealand where patients will live longer with cancer requiring ongoing medical oncology treatment over the life span.

When allowing for changes in technology and increased prevalence of cancer within the population, this estimate climbs to between 200 and 240 percent.

This project has encountered a lack of nursing data on which to base and predict reliable medical oncology nursing supply numbers. However, in light of reports of already over-stretched medical oncology nurses, particularly in regional cancer centres, it is highly unlikely that continuing with current models of medical oncology nursing care will meet the almost twofold increase in demand for medical oncology nursing service.

This report includes a medical oncology nursing forecast over the next two decades including discussion about a new model of care proposed by Cranleigh Health as relevant to planning future oncology nursing services and the preparation of specialist level nurses that may go some way to meeting this demand.

Demand

The demand for medical oncology specialist nursing over the next 20 years is primarily determined by considering the need for cancer specialist care within the whole population (past and present) as well as the expected population projection for the future. Age and population increase are taken into account as are possible changes in incidence rates and risk effects. Incidence rates (numbers of new cases) are of more significance than mortality rates, as increased incidence will impose a higher workload, whereas increased mortality may not affect workload. Some factors such as screening programmes may reduce mortality but increase incidence. The result of screening for disease means that cancers are reported earlier in the disease pathway as they are discovered sooner and so are more likely to be treatable which in turn increases workload.

The factors that impact upon future demand for medical oncology services include:

- increasing incidence of cancer
- aging population (morbidity increase with age)
- increasing survival, which means that more people are living longer with the cancers as chronic conditions, are receiving treatment for longer
- disproportionately higher rates amongst Māori and Pacific Island peoples,
- new pharmaceuticals and technologies that will alter the disease pathway, especially monoclonal antibody therapy, hormonal manipulation, and new oral chemotherapy advances
- breakthrough discoveries for the use of stem cell transplant that are as yet unknown

Of these the two major factors that underpin these projections are grouped as demographic factors of age, population and ethnicity as well as cancer incidence. Projections that are based on one factor alone give different pictures. Therefore the demographic differences are considered first in this demand section, followed by incidence changes over time. Further commentary considers both.

Demographic factors

Age related increases

Most of New Zealand's population growth is in age groups over 55 years, with the fastest growth rate in the 85+ year age band. This 85 + year population group will more than double in size in the next 20 years. However the population of less than 55 years will remain almost static over the same period (chart 5).

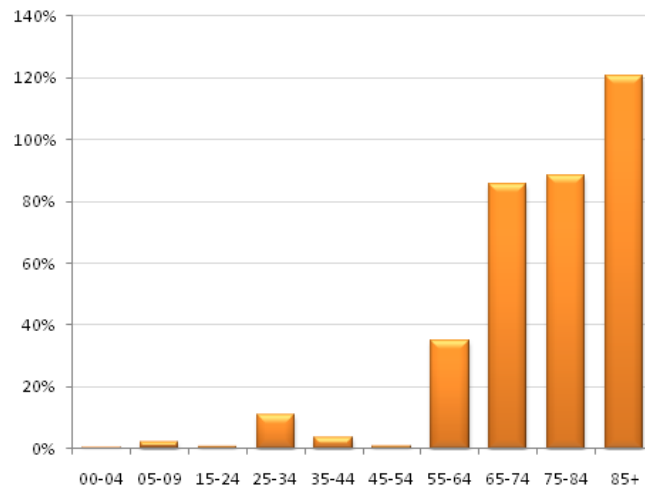


Chart 4: Population growth 2008-2029

An aging population can be expected to increase the rates of all types of cancer, however, some cancers are more prevalent in older populations, and these cancers will consequently experience more rapid growth as the population ages. Prostate cancer will become the most numerous type of cancer with numbers of breast cancers being relegated to second most common. Numbers of colon and lung cancer will overtake numbers of malignant melanoma to become the third and fourth most common cancer types (chart 6).

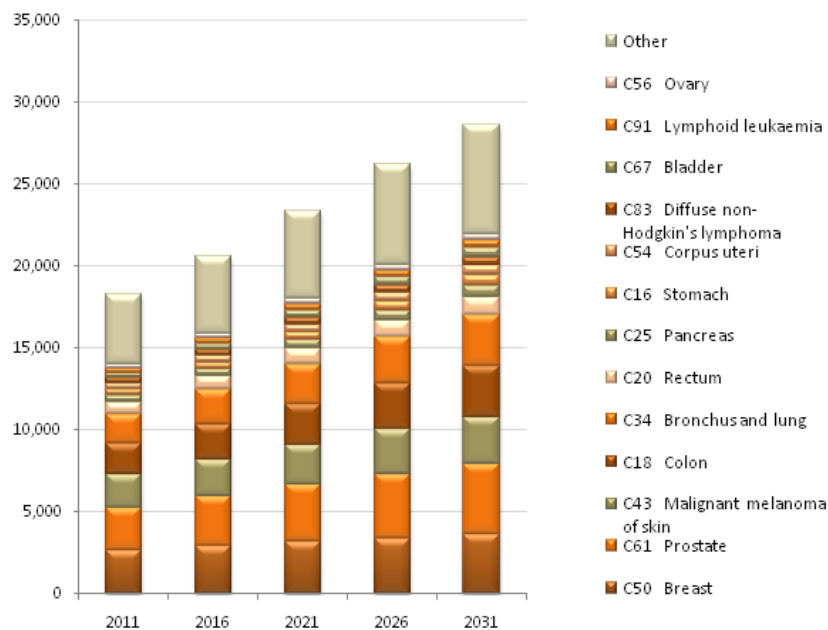


Chart 5: Effects of Demographic Growth on Cancer Registrations

Total registrations of cancer incidence will increase by 56.7 percent between 2011 and 2031 (chart 7). Cancer registrations for males will grow 61.2 percent, while registrations for females will grow 50.5 percent.

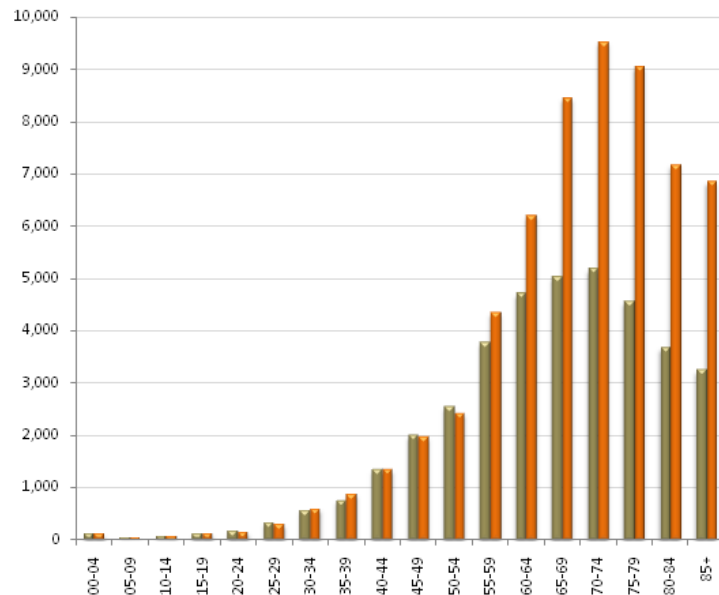


Chart 6: All Cancer Registrations by Age, 2011 and 2031

Ethnicity related increases

The percentage share of European within the population is expected to decrease over the next 20 years as other ethnicities increase.

- Māori population will increase by 1.7 percent of the total population by 2029³
- Pacific population will increase by 1.4 percent of the total population by 2029
- Asian population will remain reasonably constant based upon current immigration policy

Coupled with this projected proportional increase in Māori and Pasifika there are also notable ethnic differences in cancer growth rates. Not only are Māori and Pasifika populations 'aging' more rapidly than other ethnic groups but the distribution of cancer amongst their populations is also greater. There will be a correspondingly rapid increase in cancers in those ethnic groups as shown in chart eight.

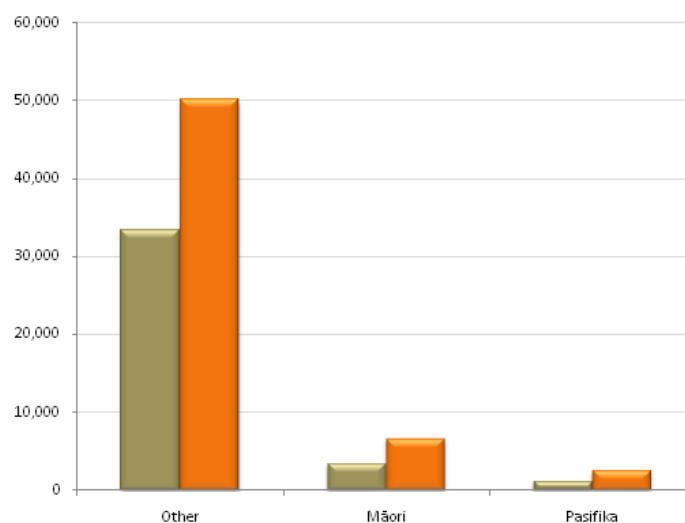


Chart 7: Cancer Registrations by Ethnicity, 2011 and 2031

In chart nine these ethnicity differences in projected cancer growth over the next twenty years is further broken down and presented per ethnicity.

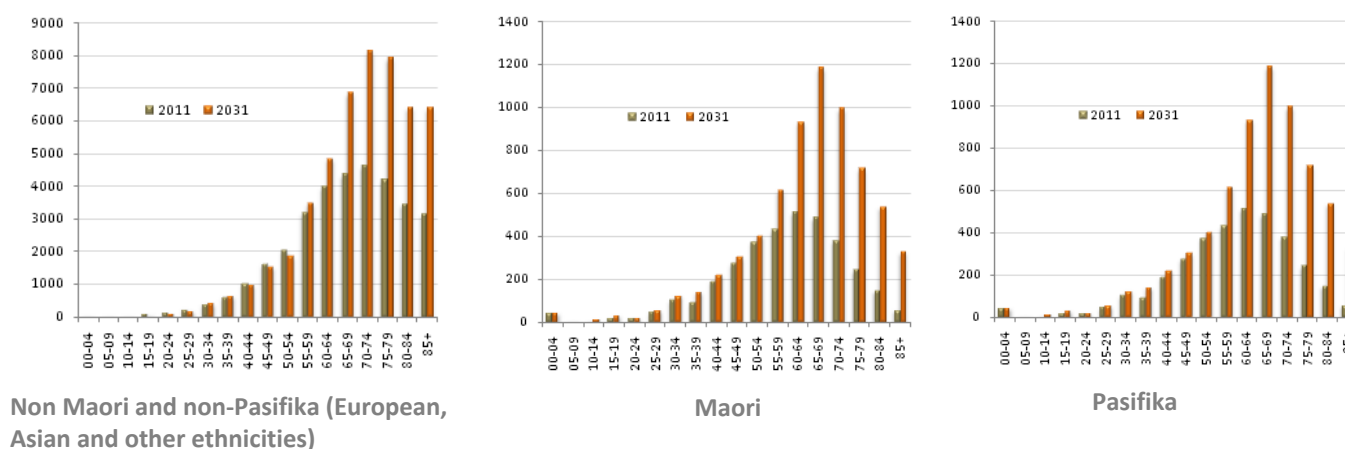


Chart 8: Projected cancer growth in Maori and Pasifika compared with non-Maori and non-Pasifika

The future medical oncology nursing workforce needs to reflect the projected differences

Cancer incidence increases

Changes in incidence rates are extrapolated^{iv} for the most common types of cancer (breast, prostate, melanoma, colorectal, bronchial/lung, pancreatic and stomach), which together account for most cancer registrations in New Zealand (table 1).

	Breast	Prostate	Melanoma	Melanoma	Colorectal	Colorectal	Bronchus and Lung	Bronchus and Lung	Pancreas	Pancreas	Stomach	Stomach
Age Group	Female	Male	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
25-44	1.11	0.00	-1.31	-3.68	-1.64	0.00	0.00	0.00	-1.56	0.00	0.00	0.00
45-64	0.13	2.12	0.45	-1.39	-3.57	-4.39	-3.79	-0.07	-1.48	-0.92	-1.00	-1.16
65+	1.55	3.10	2.07	0.13	0.94	0.45	-2.83	0.64	-1.08	0.26	-1.90	-1.64

Table 2: Projected Changes in Cancer Incidence Rates (expressed in percentages per annum)

Increases are projected in incidence rates of breast cancer, prostate cancer, and pancreatic cancer, while decreases are expected in rates of melanoma, lung cancer, and colorectal cancer.

Demography and incidence

The net effect of the above incidence projection is a small rise in overall cancer incidence – total registrations rise by 65.4 percent, compared to 56.2 percent when allowing for demographic growth alone. In chart six the 2011 incidence rates are compared to the 2031 projections for demographic changes alone and combined demographic and incidence projections.

^{iv} Ministry of Health (2010) Cancer in New Zealand: Trends and Projections. Available at: <http://www.moh.govt.nz/moh.nsf/pagesmh/1780>

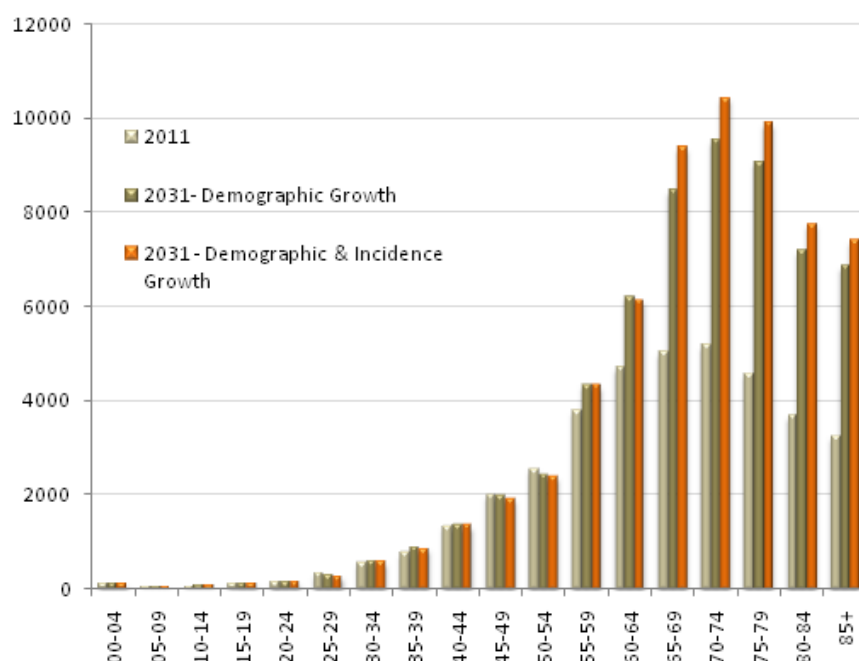


Chart 9: Incidence 2011 compared to incidence and demographic projections 2031

Clearly the effect of an aging population will have a far more dramatic effect on the rise in numbers of cancers than changes in incidence rates. Even where incidence rates of cancer are declining – such as for lung cancer – the total numbers of cancer are expected to grow (chart 10). In the case of lung cancer, registrations are forecast to grow by 80.4 percent, in spite of the decline in incidence rates as the effect of age on the probability of developing lung cancer is quite high.

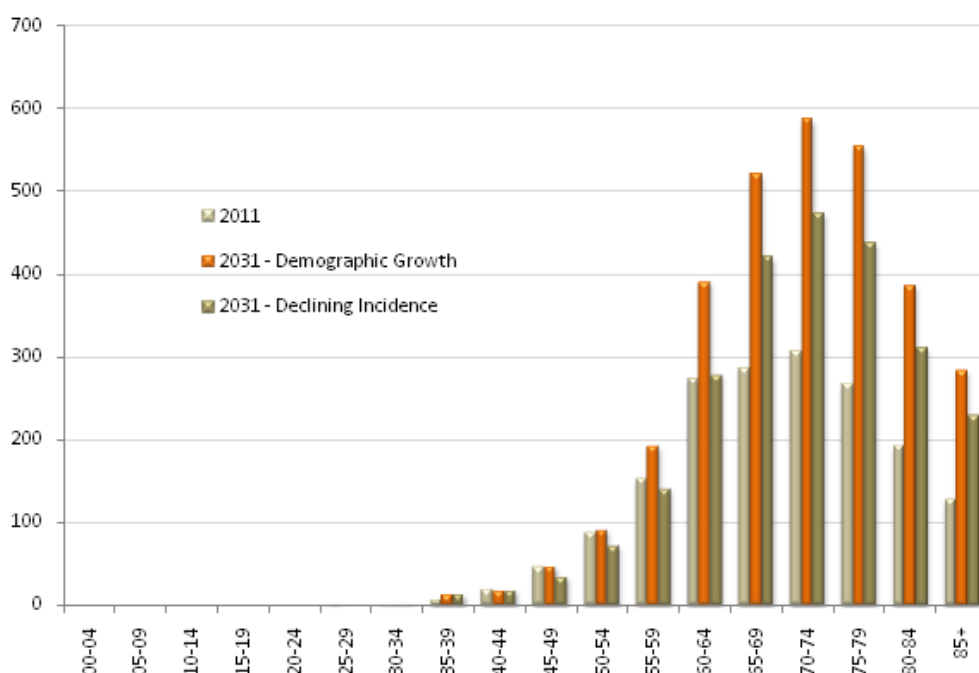


Chart 10: Forecast Registrations of Lung Cancer by Age

Changes in Treatment

Factors in this increase include increased registrations due to demographic growth and changes in incidence rates, as well as increases in treatment rates, and lengthening treatment regimes. Treatment rates are posited to increase 24 to 28 percent due to new treatment options, including new drugs. Extended treatment of patients is likely to occur as treatments become more successful, survival rates improve and average life-spans increase^v.

The chart below (chart 11) illustrates the increase in workload in excess of the increase in registrations. When applying either the 150 percent or 130 percent increase, most of the workload increase is due to increases in treatment rates and extended treatment regimes, with increases in registrations being a smaller (but not insignificant) part of overall growth.

Growth has been presented here as a geometric⁴ increase at between 5.7 and 6.3 percent per annum. In contrast, the growth rate due to demographics and changing incidence rates averages 2.5 percent over the forecast period. Extrapolating the same (130 percent to 150 percent) growth rates to 2031 would see a 200 percent to 240 percent increase in demand over 20 years.

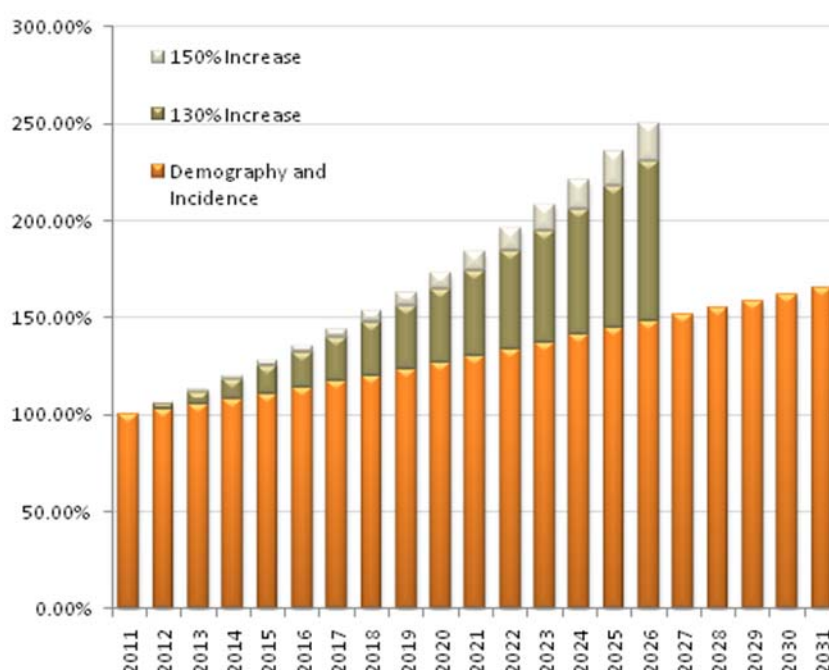


Chart 11: Projected Increases in cancer registrations and service demand

Service configuration

The Regional Cancer Services concept has been in place for about a decade. This has consolidated tertiary cancer services at six regional hospitals (Auckland, Hamilton, Wellington, Palmerston North, Christchurch and Dunedin). Each of the regional centres has a number of satellite hospitals with a mix of specialist staff. Regional specialist services are available to satellite services.

The configuration of medical oncology nursing services within the six regional cancer centres and the way each regional service interacts with satellite services depends on how each regional centre offers the service. Each centre distributes medical oncology nurses throughout their services differently, with a mix of roles and functions, as well as knowledge and skills. Although this precludes reliable measurement of nursing supply, some assumptions about the services can be made.

^v Cranleigh Health (2011), Presentation to Medical Oncology Working Group, 24 May 2011.

Generally patients who are having their cancer treated at a regional cancer centre are higher acuity, more complex, less stable and sicker than those receiving treatment outside the regional centres such as in satellite centres. It is policy that unstable oncology patients are referred to the regional centres and are sent back to satellite centres when they are stable. The treatment at regional centres also tends to be more complex, and more likely to have serious side effects for unstable patients. This means that medical oncology nurses in the regional centres need to have higher and/or a different skill set to enable them to maximise team function in the complexities of a tertiary cancer service.

In regional cancer centres, nurses work alongside medical oncology consultants on a day-to-day basis. In satellite centres medical oncology consultants visit on an outreach basis and work with local nurse specialists, who may or may not be involved in treating cancer patients. A satellite centre at a secondary care centre may or may not have access to an oncology consultant or a physician with a special interest in oncology.

Confounding this, is that although regional cancer centres offer tertiary cancer treatment they also function as a secondary cancer service for the people living within the area serviced by the particular DHB.

The patient journey through regional and satellite centres has the potential to be quite clear, with initial assessment and treatment being undertaken at regional centralised centres depending upon acuity of the patient, with patients returning to secondary services in satellite centres closer to work and home once stable (figure 1). This means that most cancer patients are assessed and treated initially at the regional centres but followed up with subsequent treatment and monitoring at satellite services, except where treatment other than chemotherapy is indicated and is only available at the regional centres (such as concomitant radiotherapy). Medical oncology nursing services are configured within both secondary and tertiary cancer services accordingly with medical oncology nurses in regional services needing a high level of assessment and initial treatment skills and nurses in satellite centres needing high-level cancer specific monitoring skills and the capacity to give prescribed chemotherapy.

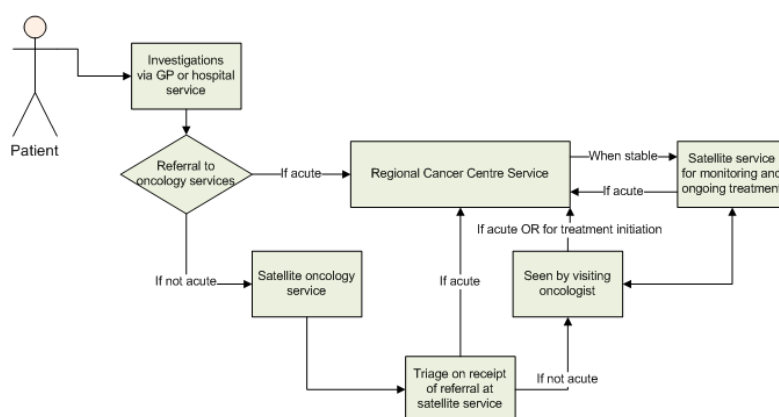


Figure 1: Circular journey through regional and satellite services.

In reality in some areas some patients are seen by medical oncology services initially at satellite services and may thereafter be treated at that satellite service, especially if they do not require concomitant therapy. In other areas all patients are seen and treated at regional centres due to workforce shortages and workload increases that preclude medical oncology consultancy outreach services. This has an impact upon how both regional and satellite centres construct medical oncology nursing services as services are contingent upon numbers and treatment option differences between the centres.

What this model does not allow for is the transfer of care of oncology patients receiving treatment to community services for both treatment and ongoing monitoring and assessment of cancer status. Patients tend to stay within the DHB regional and satellite services for intermittent monitoring.

Medical oncology nursing services span the private and public sectors and are integrated throughout the primary, secondary and tertiary sectors of health care delivery in New Zealand. Prior to 2008 cancer treatment was mostly the domain of DHBs. In 2008 several private hospitals began to offer cancer treatment, especially chemotherapy on a user-pays basis. Presumably these patients have been referred to a regional

cancer centre for initial cancer assessment and treatment decision making, and have chosen to receive treatment within the private sector. Should this, in the face of growing waiting lists for assessment and treatment initiation in the DHB system become more common, the way the private sector medical oncology nursing services are configured will need to be considered.

Other nursing specialty forecasts have concluded that nurses enter the private sector from DHBs. An increase in private medical oncology services would therefore increase the attrition rate (and lower the half life further) in DHB medical oncology services, especially the regional centres as most of the private sector is within these main cities.

Technology Developments

Over the past two decades new technology has changed the face of cancer care, resulting in new cures and more effective treatments. This has resulted in increased numbers of people living with cancer as a chronic disorder receiving lifelong and/or intermittent treatment as well as greater numbers of cancer survivors^{vi}. Cancer survivors, like those who go on living with cancer as a chronic disorder, have an ongoing demand for cancer nursing service delivery as they will require life-long cancer monitoring and treatment for recurrences and relapses should they occur.

Some of the pharmaceutical developments have expanded treatment options to include monoclonal antibody therapy and hormonal manipulation, which along with stem cell transplantation appear to have revolutionised cancer outcomes^{vii}. There is no reason to believe that pharmaceutical and technological breakthroughs such as these developments will not further change options for cancer treatment, possibly exponentially.

To date readily available figures on the prevalence of cancer as a chronic disorder in New Zealand directly related to pharmaceutical development and implementation is lacking. Therefore scenarios relating to expected pharmaceutical successes in survivorship or longevity and quantitative measures of any impact on predicted demand for medical oncology nursing service could not be calculated.

Although medical oncology nursing refers to the giving of chemotherapy treatment as well as monitoring, supporting and care co-ordination for patients with cancer, the inference is that the chemotherapy is intravenous. Whereas historically this has been the case, oral forms of chemotherapy are being developed. This is expected to continue and may well have significant impact on enabling chemotherapy administration outside the hospital and within community settings, including the home. Although these patients will require monitoring over time, chemotherapy administration may become less of a demand on medical oncology nurses

The electronic personal health record, tele-health and other technologies are tools that will enable better sharing of information, and clinical decision making without the need for patients to travel long distances. These technologies are supported by the Better, Sooner, More Convenient paper released by the Minister of Health, 2010.

Realising the potential for such technology requires careful service planning and allocation of resources. To date information and communication technologies that could benefit nursing have been applied erratically, often funded only for a pilot as a seeding innovative grant by a major commercial systems or software developer/vendor. Funding following such successful pilots for sustainable development has not been forthcoming from health service providers in the past.

^{vi} Ministry of Health (2010) *Cancer patient survival covering the period 1994 to 2007*. Wellington. Available at: <http://www.moh.govt.nz/moh.nsf/indexmh/cancer-patient-survival-1994-2001-dec2010>

^{vii} Ministry of Research, Science and Technology (2007) *Stem Cell Research in New Zealand: Challenges and Opportunities for the Research Sector*. Available at: <http://www.morst.govt.nz/publications/a-z/s/stem-cell-research/>

At the moment broadband capability in the some areas is well below the standard required to enable adequate ICT implementation. However, the Government has approved implementation of fibre networks that will supply high speed broadband access. This will enable capability for these technologies. Once enabled medical oncology nurse-led clinics, from a community or satellite cancer centre, communicating in real-time with consultancy services may become a reality. This will require specialist medical oncology nursing preparation to ensure nurses using the technology have oncology specific skill levels commensurate with monitoring and managing oncology patients who are, or have been, receiving cancer treatment possibly outside the hospital setting. It will also enable higher acuity patients to be assessed and have treatment initiated from a clinic closer to home and so relieve regional centre and consultant pressure. Consultants will be able to consult from afar in audio and video in real-time. Overseas this includes remote monitoring of vital signs, e-prescribing and digital imagery.

Model of care

Models of nursing care delivery describe the purpose and shape of nursing care in a particular context^{viii}. In this case the context is medical oncology. There are three current national directions that will impact upon the future model of care for medical oncology nursing. These include:

- The re-design of health care service delivery brought about by the instigation of the National Health Board (NHB), including the development of the Integrated Family Health Care Centre concept to actively promote some secondary services into the community, including clinical nursing specialists and medical specialists. This will be in conjunction with a move toward consolidation of specialist/tertiary services into a smaller number of centres (regionally and nationally) that offer greater specialisation with better communication and shared information by electronic interaction within the sector^{ix}
- The current project being undertaken by Cranleigh Health, concerning changes to models of medical oncology care, many of which impact demand for nurses, will have an impact beyond those modelled above. This work is ongoing, and while it is difficult to put numbers on the impact these changes may have, it is clear that an increase in nurse specialist positions and numbers of nurse practitioners will need to be increased. Most of the increase in outpatient nursing demand is likely to be for specialist oncology nursing positions.
- The emergent Whānau Ora^x model, which is based upon integrated service delivery, will be particularly relevant considering the rapid increases of cancer within the Maori and Pasifika populations.

In particular the Cranleigh Health study has found that all medical oncology services are currently stretched. The sector is already facing several key challenges including constrained funding, workforce shortages, significant growth in options for chemotherapy and associated costs within a rapidly increasing and aging population. Advances in cancer care have resulted in greater demand for specialty cancer services in a public health sector that is constrained. Concurrently, cancer specific treatments are requiring a greater degree of sub-specialisation, there is greater emphasis for targeted therapies which further increases costs and patients have become more aware of possibilities and so have rising expectations of an oncology workforce.

As a result of these findings a new model of care is being formulated. This emergent model of care for medical oncology has major implications for medical oncology nursing. In particular, the new model is based upon the devolution of medical roles to Nurse Practitioners and Registered Nurses at the coalface of care

^{viii} Walsh, K. & Moss, C. (2007). Blending practice development methods with social science research: An example of pushing new practice research boundaries. *Journal of Research in Nursing*.

^{ix} National Health Board (2010) *Trends in Service Design and New Models of Care: A review*. Available at: <http://www.nationalhealthboard.govt.nz/sites/all/files/trends-service-design-new-models-care-jul2010.pdf>

^x Te Puni Kokiri (2010) *Whānau Ora*. Available at: <http://www.tpk.govt.nz/en/in-focus/whanau-ora/>

delivery. There are implications for nurse responsibility in managing treatment delivery and a need to engage with possibilities for Enrolled Nurses to participate more in the workforce.

This has led to the formulation of the model for medical oncology nursing. The 'step-up' model offers opportunities for nurse clinicians to undertake new roles and procedures. In particular the 'step-up' model is based upon a focus of care co-ordination and case management across the patient cancer journey and across the scopes of nursing practice. Suggestions within the model include:

- Nurse Practitioners practice roles include:
 - First specialist appointments
 - Holistic treatment prescribing
 - Pathology and radiology requests and follow-up
 - Supervision and mentoring
 - Consultant services to satellite centres
 - Nurse-led clinics
 - Referrals to and from the multi-disciplinary team
 - Case management
 - Collaboration with consultant
- Registered Nurses with expanded and extended scopes of practice
 - First specialist appointment in collaboration with consultant
 - Patient triage at satellite centres
 - Chemotherapy prescription according to national standardised clinical pathways for low-risk patients
 - Case management
 - Clinical leadership
 - Team co-ordination
 - Point of contact for patients
- Registered Nurses
 - Oncology pharmaceuticals administration
 - Holistic assessment throughout treatment regime
 - Patient education
 - Care delivery according to procedures and protocols – standardised clinical guidelines and pathways
- New Graduate Registered Nurses

- Medical oncology as career choice
- Intravenous therapy as daily practice
- Clinical assessment and findings reporting
- Care consistent with beginning practitioner role
- Enrolled Nurse (experienced)
 - Protocol-based assessment using assessment tools and reporting results to Registered Nurse
 - Tasks as delegated by Registered Nurse
 - Patient scheduling
 - Clinic co-ordination
- Beginning Enrolled Nurse
 - Clinic and patient administration
 - Patient care as delegated
 - Housekeeping role

The reintroduction of Enrolled Nurse training brings a skill set to the workforce that has been missing over the past decade. Enrolled Nurses are being prepared with skills that will enable them to function in a generic or specialised area according to set protocols and under the direction and delegation of Registered Nurses. For example they will be able to undertake assessments using an assessment framework/tool and report findings to the Registered Nurse. They will be able to learn and undertake tasks of daily practice that may be specific to a specialty area. The reintroduction will be a way to free up specialist nursing time for the more complex and sophisticated tasks of minimally invasive procedures and charting prescribed medications as either Nurse Practitioners or as specialist nurses working with a greater degree of delegated authority and autonomous decision making according to defined standardised care pathways.

Refinement of referral pathways is also part of the new model. Anecdotal opinion suggests that patients, once referred to regional oncology services, tend to remain within the service past the time that they could receive the same care by another service. This leads to suggestions of better guidelines for discharge back to the primary health care for ongoing monitoring and for some treatment options. Whether this would be shared care options or complete transfer of care between the sectors is not yet decided and may include both options.

Other changes include increased post-treatment monitoring and reviews of patients by nurses, increasing the ratio of nurses to clinicians, nurse practitioner-led specialist assessments and treatment initiation and changes in the protocols and policies for the transfer of patients into community care for care coordination.

These models of care changes are consistent with both the emergent Integrated Family Health Centre and Whanau Ora models

Supply

Based upon DHB responses to a survey about funded full-time equivalent (FTE) positions there were at least 325 nursing FTE associated with treating oncology patients in 2008, with as many as 360 budgeted for in 2011. These numbers are estimates of nursing equivalents and are concerned with delivery of oncology related treatments. It is not possible to draw dividing lines between these nurses, cancer nurses who do not deliver treatment and non-oncology nurses.

Most of the nursing FTEs associated with treating oncology patients is attached to inpatient attendances. However this does not necessarily mean that more medical oncology nurses are within the in-patient setting. The reality that many outpatients are allocated inpatient status but are treated by outpatient nurses in outpatient environments is due to chemotherapy regimes exceeding three hours and rules that demand admission for patients exceeding that. Inpatient care is also more expensive than outpatient care and requires 24 hour nursing allocation. Many of the nurses involved in treating oncology inpatients will not be medical oncology nurses, and will not be working full time with oncology patients.

Approximately 23 percent of nationwide nursing FTEs were allocated to delivery of chemotherapy to oncology patients⁵ in an outpatient setting.

Estimating from 2008 costing data suggests around 326 nursing FTEs were allocated to caring for oncology patients⁶ (this is in addition to medical oncology nurses caring for haematology patients). Data requested from DHBs in 2011 indicates that there were 360 budgeted FTEs for nursing oncology. The differences are likely to be due to growth in the intervening period, differences in scope, and differences between budgeted and actual costs.

At a DHB level there are significant differences between reported budgeted FTEs for oncology and the FTEs estimated from costs allocated to nursing labour. The biggest differences were in Auckland (including Starship with 109 budgeted FTEs, compared to 89 estimated) and Canterbury (27 budgeted FTEs compared to 67 estimated). Some difference is to be expected. The estimated FTEs is based on an estimate of which nursing costs were attached to oncology patients (the method of this estimation will vary between DHBs), and the FTE is derived from an estimated cost per FTE (this will vary between DHBs).

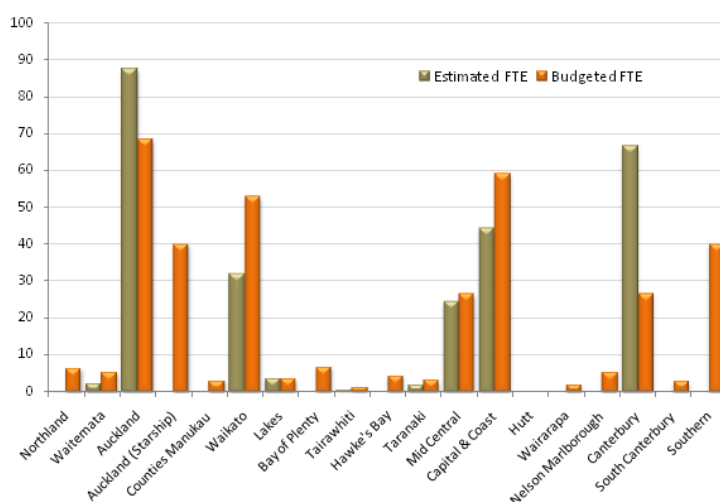


Chart 12: Comparison of Budgeted FTE and Estimated FTE by DHB

Nearly two thirds of oncology nursing labour costs related to inpatient episodes. Nursing labour costs make up 13 percent of total oncology costs; over 26 percent of inpatient oncology costs, but only five percent of oncology outpatient costs.

Overall, oncology costs are dominated by the costs of pharmaceuticals (including chemotherapy), followed by medical labour, infrastructure and then nursing labour.

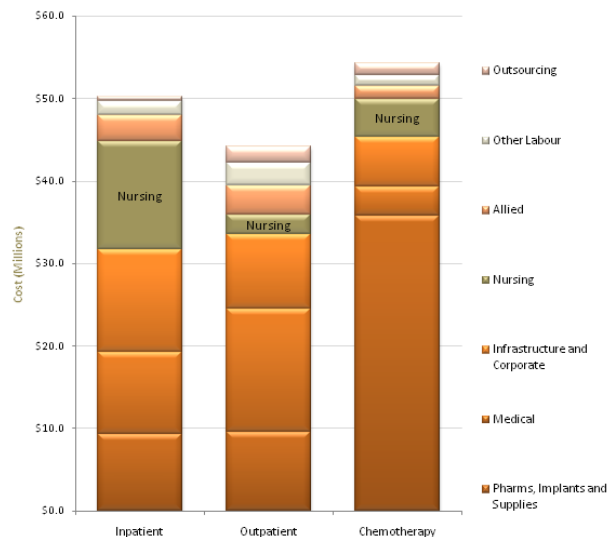


Chart 13: Oncology Costs by Patient Attendance Type

There are also significant variances between the proportion of nursing labour costs allocated to different patient attendance types (inpatient/outpatient/chemotherapy) at the different DHBs. This might reflect different allocations of nursing resources and different models of care, but could easily be due to differences in the allocation methods of the costing systems. More investigation would be needed to account for these differences.

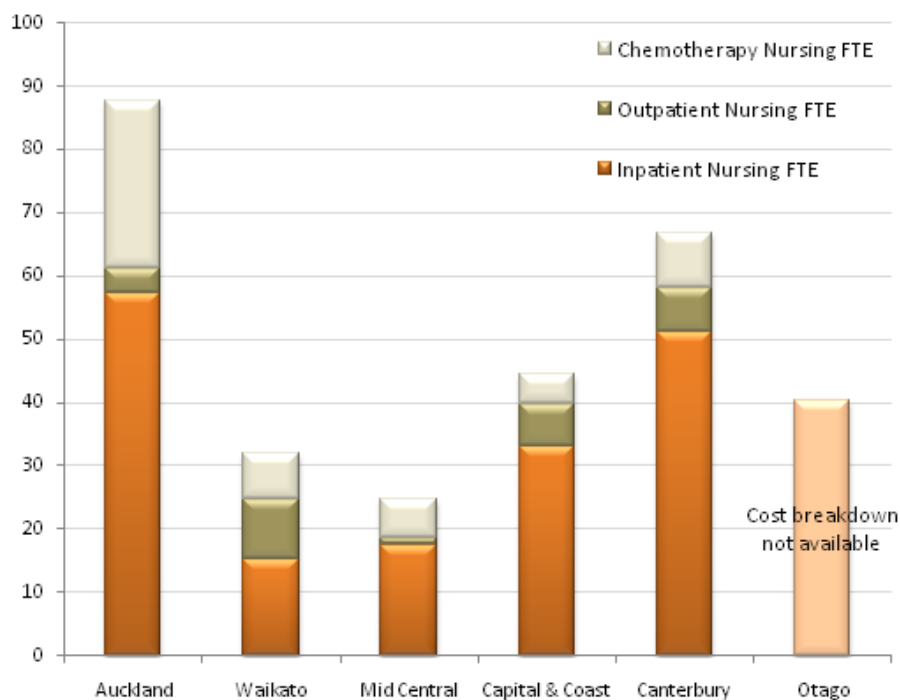


Chart 14: Estimated FTE by DHB and Patient Attendance Type

Age of medical oncology nurses

Oncology nurses tend to be older than New Zealand nurses in general as recruits are drawn from experienced nurses. The chart below shows that this aging of the workforce is not new and that the process will continue to the point where attrition of older nurses begins to offset the aging of the existing workforce (chart 15).

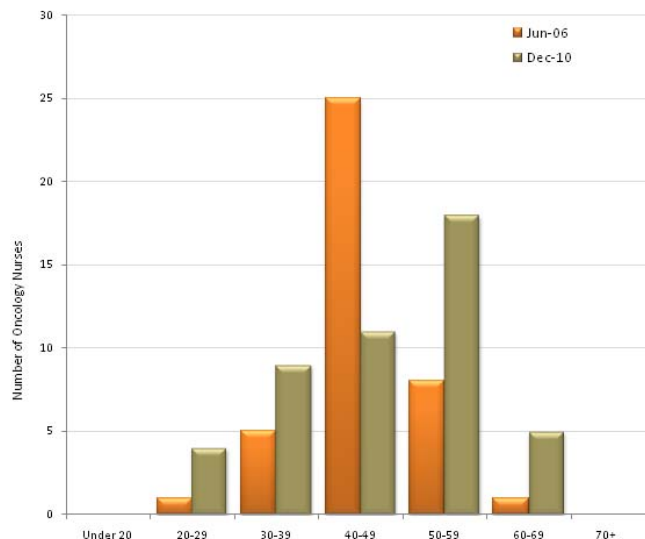


Chart 15: Oncology Nurse Age Distribution – drawn from a sample of nurses who identified as oncology or cancer nurses within the national DHB base data collection

While the data on oncology nurses is sparse it does appear that there are significantly fewer new specialist oncology nurses under 40 years when compared to medical nurses, while new specialist oncology nurses are more likely to be over 40 years.

Entries to and exits from the workforce

Usually workforce forecasting would include using historical data to establish the flows, in-and-out of the defined workforce and mean measurement of length of stay over time. This provides a half-life measurement of a particular cohort of nurses within the nursing specialty. A half-life measure gives an indication of the period of time in which half the workforce will leave the specialty, necessitating recruitment to replace and leaving the other half to continue in the field. This has implications for establishing training requirements to meet the future demand.

In this case historical data was not available. At best a small sample of nurses who were designated as oncology nurses were analysed for the probability of leaving the medical oncology nursing specialty from within a small sample from the national DHB base data collection from DHBs, in particular the DHBs where there are regional cancer centres.

There are too few nurses listed as oncology and cancer nurses within the national DHB base data collection that have exited the workforce in recent years to give an accurate estimate of attrition. The data suggests that cancer nurse exit rates follow the same pattern as nurses in general, with an overall higher exit rate. However, this higher exit rate includes nurses changing positions, rather than leaving nursing. While job changes are known to be common in the nursing workforce as a whole, there was no way of tracking this information within the national DHB base data collection as nurses cannot be tracked between jobs in this data.

Medical oncology nurses are predicted to reduce in the age brackets that have lower than average turnover. In particular cancer nurses have fewer nurses in the 27- 40 year age range, which see large rates of exits of nurses in the overall nursing workforce. In chart 16 the likelihood of oncology nurses exiting the medical oncology workforce is compared to the exit of nurses from the overall nursing workforce. The sample from which this was drawn however is too small on which to base actual predictions.

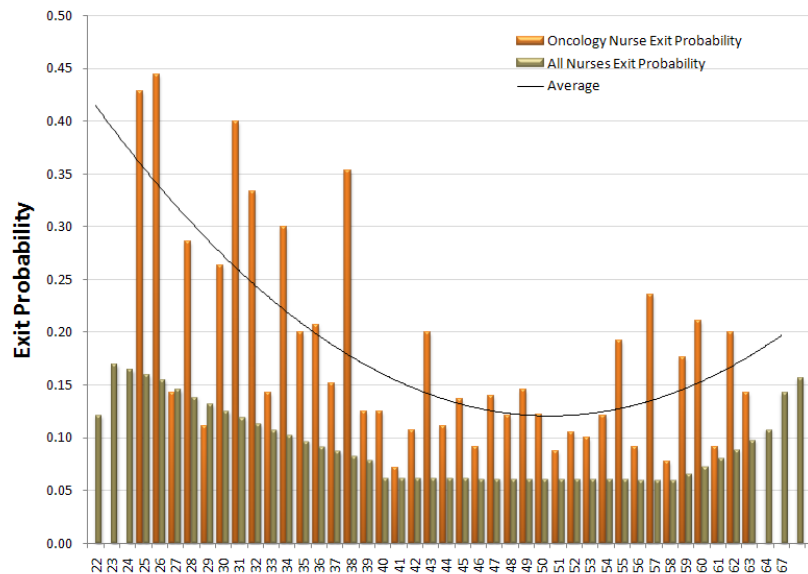


Chart 16: The likelihood of oncology nurses exiting by age compared to the overall nursing workforce.

Likewise, although from a sample too small to inform reliable entry to the workforce predictions, analysis revealed a peak of nurses aged 36 years entering the oncology and cancer nursing workforce when compared to the DHB medical nursing workforce. Once nurses are over 40 however they appear to enter the oncology and cancer workforces at a greater rate than nurses entering the medical nursing workforce (chart 17).

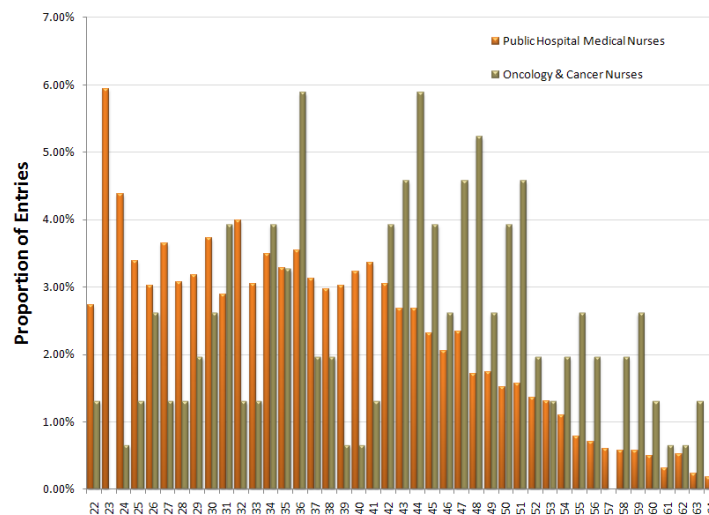


Chart 17: Oncology Nurse Entry Distribution

Education

The undergraduate pre-registration programme for nurses in New Zealand provides graduate nurses with a comprehensive set of beginning practice skills. Beginning Registered Nurses, who have been trained in the New Zealand tertiary education sector, have not gained experience of medical oncology as the giving of chemotherapy is beyond the knowledge and skills requirements of a new graduate. Therefore nurses tend not to enter the oncology field of nursing without first having gone through post-registration medical skills acquisition upgrading including intravenous therapy.

Conversely non-exposure of student nurses to medical oncology clinical experiences may detract from identification of the specialty as a career pathway. Although student nurses may be unable to administer chemotherapy they have some skills that would add value to the role of the medical oncology nurse as well as provide rich learning clinical experience and perhaps sow the seeds for later career development.

Enrolled Nurses and Nurse Assistants currently comprise seven percent of the overall regulated nursing workforce^{xi}. To date the oncology nursing workforce has been a specialised field of Registered Nurse practice with little or no scope for Enrolled Nurses. However, Enrolled Nurses are being reintroduced. The NCNZ has released education programme standards for the new Enrolled Nurse scope of practice. The structure of the programme provides for an 18-month diploma in Enrolled Nursing at level five on the New Zealand Qualification Authority – National Qualification Framework. Inclusion in this workforce, under the direction of Registered Nurses, performing tasks according to set protocols and tools in a supportive role will free up the Registered Nurses for greater focus on high-level skills-based care delivery, first specialist appointments and minimally invasive procedures.

In-house, on-the-job training may or may not be supported by formal education for oncology nurses. Historically, nurses have had to pay for their studies, secure external scholarships or have their employer's support in order to study. It is not possible to measure how many oncology nurses have undertaken post-graduate study in a post-operative related course funded by these means.

From 2011 post-graduate education will be supported by Health Workforce New Zealand (HWNZ). Cancer training for health practitioners is a government priority. Available funding has not been specifically identified as available for cancer nursing. Although a priority, cancer nursing funding for post-graduate education, is allocated according to HWNZ specifications under limited funding).The new HWNZ regime expects nurses applying for specialty education funding to provide a career plan. Likewise DHBs are expecting career plans as performance indicators and in professional portfolios.

A usual pathway for specific skill level acquisition in a nursing specialty is on entry to the sub-specialty orientation programmes, which develop the new entry to a stage of usefulness (advanced beginner). Clinical experience and ongoing education within a professional development and recognition programme (PDRP)⁷ provide skill level acquisition to the recognised level of 'competence'⁸. Due to the low half-life of medical oncology nurses, entry of new nurses to the medical oncology workforce who require this type of education is quite high.

Formal post-graduate sub-specialty specific education is crucial to the provision of optimal patient care delivered by a workforce with skills that match the complexity of demand. Each sub-specialty expects that some of the workforce will have completed post-graduate clinically-based study at level eight. Opinion from the Expert Advisory Group (EAG) indicates across the sector that about two years experience plus a completed specific post-graduate course is desirable for development to the stage of advanced practitioner or the level of a 'proficient' medical oncology nurse. However, there is a gap between what is perceived as desirable and the reality in a climate of scarce resources to support study.

The 'step-up' model of care for medical oncology nursing calls for greater numbers of Nurse Practitioners and specialist nurses working within extended and expanded scopes of practice. In particular, Nurse Practitioners with prescribing rights would be able to offer nurse-led clinics, undertake initial assessments, prescribe and initiate treatment in accordance with pre-determined care pathways in the absence of doctors. This training needs to be supported in a way commensurate with the expected added value that more specialised nursing will bring to the team. At the moment a nurse can study to become a Nurse Practitioner within a defined scope of practice. As part of that they are required to undergo a supervised internship. The supervised internship for medical oncology needs to be within a DHB medical oncology specialty. To do this, positions need to be available for these nurses. Resourcing Nurse Practitioner internship positions is currently a challenge for DHBs.

^{xi} DHBNZ Macro view

There are no medical oncology Nurse Practitioners in New Zealand. The impact of Nurse Practitioners in this field has the capacity to reconstruct oncology nursing. The benefit of Nurse Practitioners within this workforce is the capacity for overall case management, independent treatment prescribing and independent specialist functions such as conducting consultant clinics in satellite centres and undertaking minimally invasive procedures. However, if post graduate course availability and concurrent funding opportunities including internship are compromised the potential to develop Nurse Practitioners for this workforce is at risk.

The National Framework for Nursing Professional Development and Recognition Programmes and Designated Role Titles Report (2005) recommends that a pre-requisite to becoming an expert nurse is the need to be engaged in post-graduate study.

One of the objectives of workforce forecast modelling is to identify future training needs for each of the workforce sub-specialties that are undergoing predictive forecasting. A key question then is how many nurses will require post-graduate education to sustain nursing service provision in each nursing subspecialty in the future?

In most health workforces this can be predicted as when people make a career change between sub-specialties, it is likely to be for a lengthy period of their remaining career time. That is, the flow between sub-specialties is slow. For instance, when doctors decide to enter a sub-specialty, such as medical oncology or haematology, they do the required training and are likely to remain in that specialty for a long time, often a life-time. Consequently one can predict how many trainees need to be trained for medical oncology based on historical averages and predicted supply to meet predicted demand for the services. The same concept can be applied to other health practice areas such as physiotherapy, and pharmacy.

In nursing, the picture is different. The median career length in the nursing workforce is 12 years, unlike other professional groups who may have a life span in the same profession. This means that half of all nurses in the current cohort⁹ of nurses will spend more than 12 years in the nursing workforce and half will not, regardless of specialty nurses changing their jobs within nursing several times over the course of their careers. This is referred to as the half-life of nursing^{xii}.

Consistently a specialty nursing workforce has a lower half life than the overall nursing workforce. Due to lack of historical work patterns for medical oncology nurses the half life of this workgroup could not be calculated. Despite this, based on the assumptions that it would be lower than the half life of medical nursing and probably about the same as other nursing sub-specialties that have been measured (critical care, peri-operative, and neonatal) a conservative estimate would be about three to four years. This means that after that period only half the number of nurses from the current cohort of medical oncology nursing workforce will remain in this particular nursing workforce. This does not mean that these nurses will have exited nursing but may well have left medical oncology nursing and be working in another field of nursing.

The nurses who have been in the workforce for the least amount of time need to be engaging with post graduate study to ensure adequate skills mix for the future. However, those with the least experience also need to complete in-house and experience based skills acquisition programmes. If all the nurses who have been in this specific workforce for less than three to four years obtained a post graduate certificate in the next two years, only half of them would still be in the specialty nursing workforce at the end of that time. Added to this would be the training needs of new entries to the workforce each year until 2031, which rises exponentially in comparison with supply numbers.

The complexities of the nursing oncology workforce highlighted in this report suggest that there is a need for a strategic approach toward reducing attrition. Nurses need to be encouraged to specialise in oncology nursing earlier with the intention of remaining within the workforce. Provision of education including short courses, on-the-job support and post graduate education as well as a defined career pathway may be the lever to grow the required expertise.

These suggestions are from analysis of the DHB medical oncology nursing workforce. With the expansion of medical oncology services within the private sector, training needs within the DHB sector may be increased even further. Analysis of the flow of peri-operative nurses between the private and public sector revealed that nurses tended to undergo the upgrades in the DHB sector and then enter the private sector taking their skills and knowledge with them. Should this pathway be repeated in the medical oncology field a similar pattern may emerge which would mean that greater attrition would occur from DHBs and greater numbers would need to be trained for the sector.

There are considerable barriers to the provision and uptake of education for oncology nurses including:

- Internship opportunities,
- Inflow to medical oncology nursing. Entry to medical oncology nursing tends to be through medical nursing practice, so that nurses have increasingly cumulative skill acquisition as they progress from the general nursing workforce to medical oncology nursing. Much of the orientation, knowledge and skills acquisition is on-the-job,
- Time to complete study. Because the workforce is already constrained study is primarily completed on top of job requirements. Backfill to enable study appears not to be a current reality,
- Funding constraints for study. Nurses need to be funded appropriately to enable achievement of skills and knowledge that will be needed for roles. In particular enabling resources for Nurse Practitioner internships and roles,
- Although new nurses are provided with orientation and PDRP programmes there is a level of supervision required in practice on entry. This is likely to impact more upon specialist nurses' time that could otherwise be spent on study,
- Expense. Nurses are less likely to study when self-funded. Although funding may come from scholarships, employers and Health Workforce New Zealand, some nurses may see self-funding as the only option. When self funded, questions arise about the potential for increased remuneration and to what extent this will offset the costs of study. The issue of expense is particularly pertinent during the current economic climate,
- Recognition of added value. Completion of study that will enable nurses to 'step-up' to what have been historically medical roles raises questions about recompense in line with the added-value brought to the team,
- Backfill. The supply of nurses is often insufficient to provide backfill for nurses to gain leave for post-graduate study,
- High proportion of nurses working part-time in multiple jobs,
- Travel distance to post-graduate courses in main urban areas with compulsory on-campus attendance is an issue,
- Existing heavy workloads may preclude choice to study,
- Capacity for tertiary educational facilities to provide courses. Most tertiary educators require a minimum number of nurses to establish a financially viable cohort for specific education that is sustainable,

One of the major issues facing nursing is the overall supply of new nurses to the workforce. In 2009 nurses entering from overseas outweighed the number of new graduates emerging from nursing schools in New

Zealand^{xiii}. Operating in an environment of capped numbers for undergraduate study and rising demand for specialist nursing services suggests that new nurses from overseas will continue to gain momentum. From a labour perspective, new nurses from overseas who are already prepared to work as specialist nurses may go some way toward filling the gap between supply and demand for the medical oncology nursing workforce, rather than focusing on a long pathway for graduate nurses to become specialist nurses in the field.

Although nurses emerging from New Zealand based undergraduate programmes have some cancer nursing as part of their course work, medical oncology is beyond the scope of practice for new graduates. As new technologies are discovered nurses with specialist skills are becoming progressively more-and-more in demand. Encouraging undergraduates to consider long term careers within the specialist workforce will, in time assist with supply issues.

^{xiii} Ministry of Health (2009), Current status of the national regulated nursing workforce. Available at [http://www.moh.govt.nz/moh.nsf/pagesmh/6795/\\$File/current-state-nursing.pdf](http://www.moh.govt.nz/moh.nsf/pagesmh/6795/$File/current-state-nursing.pdf)

Methodology

The medical oncology nursing forecasted model has been developed from the DHBNZ Forecasting framework (chart 18). The DHBNZ Forecasting framework is a type of supply - demand framework and is based on a number of assumptions from the compilation of scenarios about likely circumstances. The model predicts 20 years into the future consistent with the Ministry of Health population prediction data.

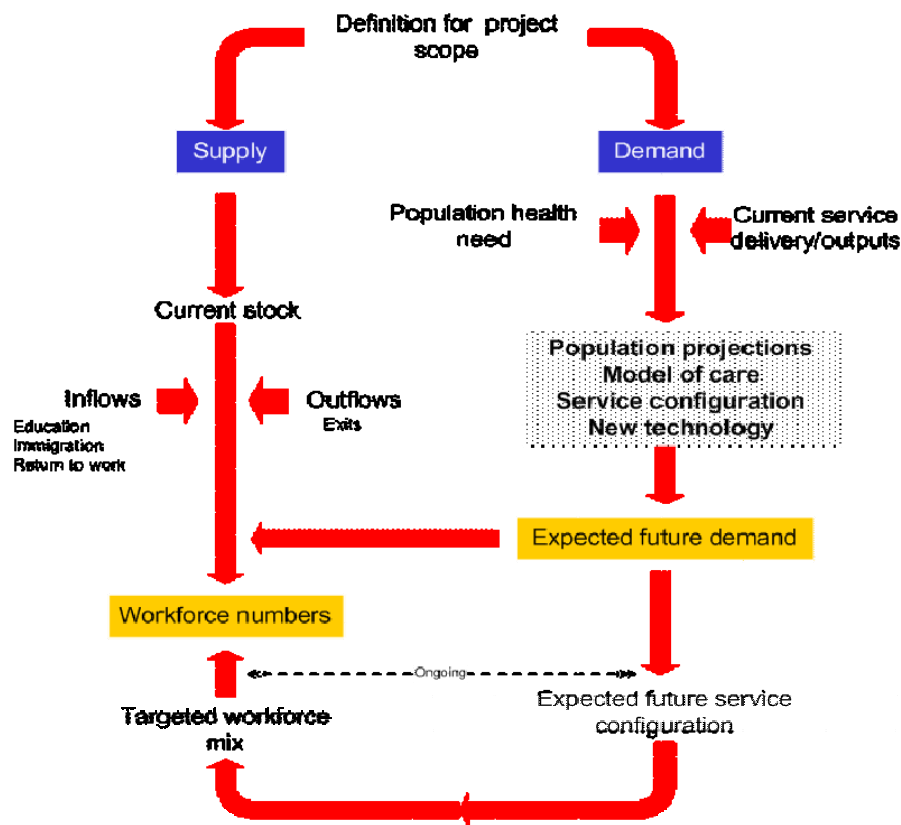


Chart 18: DHBNZ forecasting framework (simplified)

Using the DHBNZ Forecasting Framework, the first step in forecasting model development is to define and decide on the scope of the workforce group for analysis. Thereafter in basic terms the model has two main components – supply and demand.

Supply methodology

Supply of nurses is the headcount plus net inflow (inflow less outflow) calculated iteratively. More than one inflow scenario is calculated based on past inflows and alternately on graduation and immigration. In this case inflows could not be accurately established. Consequently calculations could not be made.

Inflows are allocated to workforce areas (employer and occupation) in proportion to past data, while outflow is a proportion of the existing workforce, based on known numbers of exits in previous years, and taking into account age, gender, ethnicity and occupation. The proportion of nurses that will return to the workforce is estimated from past data, and this estimate is added to the inflow. As for inflow measurement past data was not available. Therefore accurate exits models could not be calculated.

Instead these are expressed as probabilities based on a sample that is too small to enable predictive analysis.

Demand methodology

Demand indicators for analysis include:

- Population growth projections further determined by age, gender, and ethnicity
- Historical, current and future changes to the way surgical services are configured
- Anticipated changes to the way medical oncology nursing will be offered as models for medical oncology nursing care delivery
- The impact of current and emerging technologies

Analysis of these supply and demand factors, including trend analyses, leads to estimates of predicted workforce numbers and patterns.

Future demand considerations applied to current demand and production models lead to predicted future workforce needs. When compared with a workforce supply baseline, estimates of future shortfalls or over-supply can be obtained and training and recruitment plans can usually be made accordingly. Unfortunately training number predictions were not possible due to insufficient supply evidence.


Expert Advisory Group

This forecasting report is the last in a suite of nursing sub-specialities projections. The overall project was a national initiative comprising a series of forecasting and workforce modelling exercises on the nursing workforce in New Zealand. The project has developed in response to the widespread need to understand nursing workforce demand, supply and training requirements. This project will help us understand our national nursing workforce picture now and into the future.

The projection is intended to underpin future planning, as accurate workforce information is fundamental to the effective management and planning of health and disability services. It is also essential to plan adequately for undergraduate, post-graduate and post-entry clinical training.

The medical oncology nursing sub-specialty that has been forecasted had an Expert Advisory Group (EAG), who liaised between DHBNZ and the medical oncology nursing workforce. The members of the medical oncology nursing workforce EAG included:

Claudia Wyss	Director, Cranleigh Health
Maureen Morris	Nurse Educator, Professional Development, PDRP co-ordinator, Nursing & Midwifery Directorate, Whangarei Hospital
Pieter Rodenburgh	Project Analyst, Cranleigh Health
Sue Wood	Director of Nursing, MidCentral DHB
Trish Clark	Oncology Clinical Nurse Manager, Southern DHB, Invercargill
Wendy Thomas	Charge Nurse Manager Oncology Trials, Regional Cancer Centre, Waikato Hospital, Waikato DHB



Robin Dunningham	Manager, Regional Cancer and Blood Services, Auckland City Hospital
Marilyn Rimmer	Manager, DHBNZ
David Schreiber	Senior Analyst, DHBNZ
Shona Wilson	Health Advisor, DHBNZ

Conclusion

In an environment of shrinking specialty nursing resources coupled with a projected shortage of medical oncologists, allocation of suitably equipped nurses to cope with the increase is of major concern. A reconfiguration of the overall oncology workforce, including medical, nursing and unregulated health workers is presented within the medical oncology workforce model currently being completed. This reconfiguration involves a range of strategies including expanding and extending existing Registered Nurse and Enrolled Nurse scopes of practice, the need for Nurse Practitioners in medical oncology services with oncology prescription rights, and the entry of emergent health workforce groups (such as Physician and Healthcare Assistants) to the medical oncology skill mix.

A dearth of data about nurses and nursing sub-specialties in New Zealand is not unusual. The reports about other nursing sub-specialties undertaken by DHBNZ highlighted the lack of standardised and consistent data about nurses and nursing.

In particular, increased numbers of Nurse Practitioners will be able to function autonomously at satellite/peripheral centres in primary and secondary levels in the sector and so relieve regional centre pressure.

In tandem with the Integrated Family Health Care centre concept there is also a need for emphasis to be on transfer of care from the tertiary and secondary sector, once the need for high level oncology treatment has passed, to the primary health sector. Care delivered within an integrated health care centre will include greater amounts of ongoing cancer status monitoring, palliation services and low risk chemotherapy administration, which will free up regional cancer centres for those requiring the higher level, high-risk, and actively curative services. This will provide practice opportunities for Nurse Practitioners and Registered Nurse specialists within the multi-disciplinary community setting.

The major barriers to the emergent model of care for all oncology services identified within this report include history of high exit rates from specialist nursing positions, lack of clear funded education and training pathways for specialist nurses and a need for new nursing jobs and roles within DHBs, especially for Nurse Practitioners. To date Nurse Practitioners have been faced with limited job opportunity within their defined area of practice. For this workforce job opportunities need to be within a medical oncology DHB setting, yet DHB resource allocation is not readily available for this. A re-alignment of resource allocation according to the need for Nurse Practitioners within the medical oncology workforce will be needed for this to take effect.

NOTES

ⁱ This figure was extrapolated from the 130-150 percent demand increase over 15 years, upon which Cranleigh Health have based the workforce model of care.

ⁱⁱ Specialisation in this context means working in a specific area of practice

ⁱⁱⁱ Greater Maori and Pacific population growth is expected, driven by higher birth rates, more younger females, higher fertility rates and other and natural increases

^{iv} A geometric distribution is either of two discrete probabilities

^v We have not included delivery of chemotherapy to non-cancer patients in these numbers

^{vi} This includes 266 FTE from the DHB that submitted costing data, as well as 62 FTE from DHB that did not have costing data; including 40 FTE in the Southern DHB region.