

Evaluation of the Physician Assistant Trial

Final report

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Executive Summary

Background

This external summative evaluation of the Physician Assistant Trial at Counties Manukau District Health Board was undertaken to assess the impact two US-trained Physician Assistants had on the theatre efficiency, productivity, speed and continuity of care, adverse outcomes and patient satisfaction in two general acute surgery teams; to determine the suitability and usefulness of the Physician Assistant (PA) role in New Zealand; and to make recommendations for its further development.

Methodology

A program logic approach was used to compile an evaluation framework which informed the evaluation process. The eight evaluation questions provided by HWNZ guided the delineation of the trial outcomes and outputs. Descriptive methods were used for the evaluation questions relating to program implementation and outputs and a quasi-experimental evaluation design was used for questions relating to program outcomes. The data sources for the evaluation included quantitative data obtained from pre-existing hospital systems, program documentation, and face-to-face and telephone interviews with members of the steering group, representatives from key external stakeholder groups, Middlemore hospital staff members and patients.

Key findings/main messages

- Mildly positive effects and no negative effects were observed in teams with PAs on all quantitative indicators of theatre efficiency while indicators worsened in teams without PAs.
- The evidence suggests that PAs had a positive impact on productivity:
 - Staff members who worked with PAs reported that PAs improved their teams' communication, teamwork, organisation, job satisfaction, stress levels, workload and trust, factors which are known to result in improved productivity.
 - The quantitative indicator of productivity showed a moderate improvement in teams who received a PA, while teams without PAs showed marked deteriorations in productivity.
- The PAs had a positive impact on the existing medical workforce:
 - They freed up house surgeons to spend more time in theatre, perform more clinically relevant tasks and receive more education and training.
 - The PAs also played a role in teaching the house officers.
- The PAs improved the speed of treatment by taking on a first-responder role in emergencies and always being available on the ward
- The PAs improved continuity of care due to their constant presence on the ward which allowed them to:
 - plug the service gap created when house officers were pulled away from the ward for training and education;
 - be available to nurses throughout the day to assess patients, provide information on what needed to be done with any patient, and respond to emergencies;
 - orient new house officers to the ward, the team, the processes, the procedures and the patients;
 - be a reliable point of contact for non-surgical consultants when the general surgery consultants were not available; and
 - eliminate the communication issues that were occurring in handovers between the night-shift Patient-at-Risk team and the doctors.
- Patient safety was not compromised and the evidence suggests it was enhanced by the presence of PAs:

- Teams with PAs made 24.5% fewer Patient-at-risk (PAR) calls (calls made by nurses requesting assistance with seriously ill patients) than teams without PAs. The fact that fewer patients “crashed” on teams with PAs suggests that PAs were improving patient safety, possibly by intervening earlier than would otherwise have occurred.
- Staff members who worked with PAs reported that care was made safer by the PA’s who were constantly available, knowledgeable, diligent and vigilant workers who took the time to focus on quality and safety, freed up other workers to do the same, and consistently reviewed unwell patients and passed on their high-level of understanding of the patients’ situation to a consultant
- Staff members also noted that PAs modelled quality safety processes such as putting on gowns and gloves and cleaning their hands and were prepared to pull up nurses, consultants and registrars if their vigilance lapsed. This was thought to have been partially responsible for the fact that the surgical ward has not had an outbreak of resistant bacterial infections since the PAs’ arrival
- The PAs took the time to explain procedures, conditions, outcomes and prognoses in a manner that patients and their families understood, and this was felt to build trust and rapport and reduce stress which all increased patient satisfaction
- The positive outcomes of this trial can be largely attributed to the PAs’ training, and would not have been seen with the addition of another house officer, nurse or nurse practitioner:
 - Their training in the medical model enabled them to:
 - understand and work well with doctors;
 - be proactive,
 - act as effective intermediaries between medical staff, nursing staff and patients; and
 - earn the respect and support of medical staff.
 - Their training in communication and interpersonal skills led to:
 - improved patient satisfaction;
 - improved team communication, teamwork, organisation and trust - factors which are known to increase productivity; and
 - improved patient safety and care (for example, they eliminated the communication issues that were occurring in handovers between the night-shift Patient-at-Risk team and the doctors).
- The PAs adopted a range of roles and activities which extended beyond what was formally agreed at the start of the trial; however their role was constrained by the lack of prescribing and sign off rights which were thought to reduce the PAs’ full potential impact on theatre efficiency and team productivity
- The process of introducing PAs could have been improved by communicating more effectively with Middlemore staff to alert them to the commencement date of the PAs and providing them with a handbook containing detailed information of the scope of their role.
- It was the view of the majority of interviewees that the findings of this trial could not be reliably extended to dissimilar sites and settings. However, some of the positive outcomes outlined above could be expected to occur in other sites and settings as they were the result of PA training and were not dependent on the nature of the context or site:
 - The improvements in team cohesion, communication, teamwork, organisation, trust, stress levels, and risk of burnout and the resultant improvements in team productivity and patient care/safety would be likely to occur in any other site and context in which multidisciplinary teams were involved in the delivery of healthcare services;
 - The improvements in the continuity of care would be likely to occur in any site or setting where house officers are regularly removed from the ward for training and education; and



- The observed improvements in patient satisfaction could also be expected to extend to other sites and settings where house officers lack the time and required interpersonal skills to put patients at ease, explain complex procedures in simple terms and attend to their requests.

Recommendations

Based on the results of this trial and those conducted overseas, and the long-term international experience of PAs in private and public sector settings (forty-three years in the US health system, seven years in the NHS, and ten years in the Netherlands), it would appear that there is no need to further test the role as useful, safe and appropriate for New Zealand. However, several stakeholder groups are concerned that the trial was in fact a demonstration, not a trial, and that proper trials are required in any site or setting that differs from acute surgery at Middlemore Hospital. The decision whether or not to conduct further trials is therefore more about stakeholder management than it is about the need to conclusively test the usefulness and suitability of the role in New Zealand. The first step in progressing the PA role should therefore be to invest in robust stakeholder engagement, strong leadership and competent change management with the goal of eliminating misinformation and overcoming residual concerns about the new role. In particular we suggest HWNZ work with the Royal New Zealand College of General Practitioners and other stakeholders in the primary care practice setting (such as nurse practitioners) to look at the nursing and medical workforce supply for primary care relative to demand, reach agreement on the workforce issues such as training capacity, retention, and workforce distribution and determine if there is a workforce need for the PA role in the primary care setting. If it emerges through this thinking that the role is needed in primary care, a study tour could be organised in which key thought leaders (doctors, nurse practitioners, and union representatives) in New Zealand primary care would be invited to visit sites in Scotland and England, for short placements in established practices where physician assistants are employed, to observe the role in action and prepare a report for HWNZ on their professional view of the usefulness of the role.

Provided stakeholder concerns can be productively addressed we recommend that HWNZ consider taking the following actions (listed in order of priority):

- 1) work towards removing the regulatory barriers to PAs practicing to the top of their license;
- 2) recruit experienced PAs from the US on a contractual basis as an interim solution for whatever period of time the workforce data indicates is appropriate – these PAs could be given the opportunity to work as educators and mentors of those going through a new Zealand PA program if that eventuates;
- 3) assess the level of demand for PAs in the District Health Boards and, if it is deemed to be sufficient, establish PA training programs at New Zealand’s health workforce educational institutions and universities – in the interim, NZ students could be supported to train as PAs in overseas universities;
- 4) maintain connections with Australian PA training programs to encourage the sharing of experience and conduct scoping and planning studies on the establishment and accreditation of trans-Tasman training programs to maximise economies of scale; and
- 5) consider the recruitment of graduates of the University of Queensland PA program to compliment the US PAs – this would require the establishment of a supervisor workforce of experienced overseas PAs

Given the level of global experience with PAs, this new role could be confidently introduced in a range of hospital settings including emergency departments, general medicine, acute and elective surgery, paediatrics, orthopaedics, and preoperative assessment clinics. Provided the PAs are allowed to work within their full scope of practice and based on the experience at Middlemore and the results noted in evaluations of other sites and settings, HWNZ could expect this to result in significant gains in continuity of care, productivity, quality and safety, patient satisfaction, training

capacity, team morale; and a reduction in costs, adverse patient outcomes and staff stress and burnout.

If stakeholder concerns remain at a level that precludes taking the course of action outlined above, an alternative could be to conduct several short demonstrations in hospital and or primary care sites throughout New Zealand in a range of settings using imported experienced PAs. These demonstrations would be of a much shorter duration than the Middlemore trial and would be designed specifically to address concerns about the role by directly exposing stakeholders to the benefits of working with experienced PAs.

We do not advise pursuing the “upskilling” of nurses to fill a “PA-like” role or using nurse practitioners to fill the role. To have the same impact on productivity, efficiency, continuity of care, patient satisfaction and adverse outcomes, nurses would have to do a full two-year postgraduate PA course where they would receive training in the medical model; the factor thought to be largely responsible for the improvements noted at Middlemore. The nurse practitioner role is an agreed, valuable and different role and should be the subject of parallel but different efforts to support its uptake by nurses and its roll out and acceptance and support in the health system.

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Evaluation of the Physician Assistant Trial

Section 1: Introduction and background

1.1 An introduction to the role of the physician assistant

New Zealand's health workforce is being placed under increasing pressure by an aging population, the growing prevalence of chronic illness, increasing community expectations and a worsening shortage of medical practitioners. Among the measures proposed to reduce the pressure on the workforce are: distributing clinical tasks in a more efficient manner; expanding the supply of health workers, providing multidisciplinary care, and introducing innovative workforce roles. The physician assistant (PA) is one such role that has been the subject of growing global interest over the past decade thanks to its long history of success in the American health system.

The role of a physician assistant is to supplement the work of doctors, extend their medical practices, and substitute for them in an expanding number of clinical tasks. The key attribute of the PA role is delegated practice under the supervision of a doctor; however this does not preclude some degree of autonomous decision making.

There is good evidence that the PA role can improve health care productivity, reduce physician stress, expand clinical education opportunities, allow doctors to practice to the top of their license, act as a conduit between different parts of the health care team and improve the continuity of care. There are consistent reports that PA care is safe, effective and satisfying to patients. The PA role offers a career pathway for civilian and military paramedics and other health workers, including nurses, allied health practitioners, and indigenous health workers, who seek to work in a medical model of care.

Several health systems around the world have recently introduced this role as a licensed profession (The Netherlands, South Africa, and some Canadian provinces), or have trialed US trained Physician Assistants in a range of health services (England, Scotland, and Australia).

Some concerns are expressed about the potential effect of the introduction of PAs on the availability of student clinical placements and early career training opportunities. There is no evidence from the literature that acceptance of a PA role in the New Zealand health system will have a negative effect on other education and training opportunities.

1.2 The PA trial at Counties Manukau District Health Board

1.2.1 Aims and objectives of the PA trial

Counties Manukau District Health Board (CMDHB) was funded by Health Workforce New Zealand (HWNZ) to undertake a 12 month trial of the PA role in the area of general surgery from September 2010 to the end of August 2011. This was to be the first of several PA trial sites in New Zealand. The aim of the PA trial was to determine whether the PA role could be introduced to New Zealand as one solution to the rising pressures placed on the New Zealand workforce and whether the benefits observed in other health systems would occur in the New Zealand system. The key objectives of the trial were:

- (a) To determine whether the role is:
 - relevant;
 - accepted; and
 - of value within the New Zealand health workforce
- (b) To determine if efficiencies in service delivery are achievable through the use of PAs without compromising quality and safety.

1.2.2 Formative evaluation

In January 2011, a formative evaluation report assessing the trial's implementation and compliance with objectives was submitted to HWNZ. The data sources for the formative evaluation were a

review of evidence and relevant pilot documentation, ninety-five informant interviews, and observation of the pilot.

The formative evaluation reported the trial had been carried out effectively in the first three months. Planning, governance and management were all seen as well executed. Taking into account that the pilot structure and processes were also being developed *de novo*, the evaluator noted some specific achievements, including the early management of regulatory issues, ensuring the feasibility of employing US-trained personnel, agreement of CMDHB to host the trial, and effective governance by the two steering groups. Consultation processes, and the development of detailed strategy and an action plan were also regarded as notable achievements, as were the development of a range of structures and systems to support the trial, and effective recruitment and employment of the PAs.

The formative evaluations also recommended some improvements to the trial: development of clear goals; improved strategic communication about the trial; expanding the scope of consultation with stakeholders; better induction for the PAs; structured supervision and mentoring; expanding the PAs' scope of practice to test their full value; and improved project management and governance.

Initial stakeholder feedback on the trial was positive. PAs were seen to be high performing, knowledgeable and professional, and had an observable positive effect on the flow and quality of work in their teams. PAs were also able to offer effective solutions to identified gaps in their surgical teams' processes. The positive effects were not only observed by staff, but were also identified by patients. The PAs were accepted by patients and improved patient satisfaction. Qualitative data suggests that the two PAs were also fully accepted and highly valued by colleagues, and that their introduction had improved team performance, increased job satisfaction, and helped reduce staff stress levels. The PAs were also credited with improving the availability and quality of supervision and teaching for house officers and registrars. Anticipated negative impacts of the trial did not eventuate in the first three months of the trial.

With respect to the PA role itself, informants thought the position would be suited to the New Zealand health workforce; however, some concerns were also raised about the effect PAs might have in different settings, and in different working conditions. Because the PAs in this trial were regarded as high performing, and were assigned to teams and a hospital that were also high performing, some reservations exist about how other PAs might perform. Further it was stated that until PAs are given prescribing rights it will be difficult to gauge the true value of their role. Lastly, many positive outcomes that were initially reported were attributed to the exceptional personal qualities of the PAs themselves. Such qualities included the ability to advocate on behalf of PAs, relevant experience, communication skills, and a work ethic that valued both team and individual performance.

1.3 The current evaluation

Health Workforce New Zealand commissioned Siggins Miller to develop a summative evaluation of the implementation and impact of the Physician Assistant demonstration project conducted at Counties Manukau District Health Board between September 2010 and August 2011.

1.3.1 Purposes of the evaluation

The purposes of this summative evaluation are:

1. To determine the overall impact of the PA positions in the CMDHB environment, including both positive and negative effects and any unforeseen costs and benefits.
2. To determine the productivity benefits or costs of using PAs in the roles adopted in this trial.
3. To identify processes that either facilitated or hindered the successful integration of the roles into the workforce.

4. To identify how processes around the trialling of the position from CMDHB, the Northern Region DHB group, HWNZ and the Ministry of Health could be improved to provide the best possible information from future trials.
5. To suggest how the trialling of PA positions could be progressed in future.

1.3.2 Evaluation questions

Specific questions which the evaluation will answer include:

1. What was the impact of the PA positions on operating theatre throughput and utilisation and how was this achieved? What was the overall impact of the PA positions on the productivity of the teams that they worked with?
2. What impacts did the PA positions have on patient outcomes, including speed and continuity of treatment, adverse outcomes or their avoidance and patient satisfaction? How were these impacts achieved?
3. To what extent are these findings likely to be generalisable to other sites?
4. How effectively was the process of introducing PA positions managed?
5. To what extent can the outcomes be attributed specifically to PA training (for example would similar outcomes have been seen with an additional nurse joining the team)?
6. What roles did the PAs adopt? To what extent were these roles constrained by external factors such as regulations or the need to fit in with other positions in the teams?
7. What factors should HWNZ take into consideration for the development of this role in New Zealand?

Section 2: Methodology

2.1 General approach and methods for evaluation

The first step in this summative evaluation was a literature and document review. This covered literature on the PA role, reports on previous PA trials, the formative evaluation report, and other project-related documents. From this review process, a program logic model, a list of outcomes and associated key performance indicators, and a list of program and non-program enablers and barriers were developed. These were updated and refined in subsequent meetings with the steering group and a Senior Analyst from HWNZ. The meetings also facilitated the identification of qualitative and quantitative data sources for the measurement of key performance indicators. Agreement was reached with the hospital about the best mechanism to retrieve, clean and present the data from the hospital clinical information management system to the evaluation in line with the research questions and methodology that follows. An evaluation framework was then developed and approved by HWNZ and hospital-based senior stakeholders on the trial's steering group.

The key components of the evaluation framework were:

1. a description of the project to a common framework via program logic models;
2. the specification of outcomes, performance indicators and data sources that flow from the program logic model; and
3. a data strategy and an evaluation implementation plan.

Taken together, the program logic model, evaluation matrix and contribution analysis enabled a systematic and thorough examination of the progress and expected outcomes of the PA trial. These well-established approaches to evaluation are outlined in the following sections.

2.2 Developing the evaluation framework: Program logic approach

Following discussions with the Senior Analyst and the Chief Medical Officer at Middlemore Hospital, it was agreed that the program logic approach would provide an appropriate means to develop the evaluation framework for the PA trial. A full description of this approach can be found in Appendix A.

2.2.1 Evaluation framework workshop

On the 30th of May 2011, an evaluation framework workshop was conducted at Middlemore Hospital with members of the steering group (Director of Nursing, Chief Medical Officer, Clinical Head of Surgery, Health Intelligence Unit Manager, and Clinical Director of Surgical Services) and a Senior Analyst from HWNZ. During the workshop, attendees were presented with the draft program logic model and were asked to make a full analysis of the program logic. This process was designed to ensure that both the evaluators and the attendees had a shared understanding of the range of inputs, processes, expected outputs and intermediate outcomes of the PA trial. The program logic model was further refined with the input of the attendees (the final version can be found at the end of Appendix A). It is a linear representation of a recognised non-linear process; however this form layout is used for the sake of simplicity.

The evaluation questions provided in the introduction to this report informed the short-term and intermediate outcomes of the trial. Due to the high performance of the acute surgical unit and the fact that the consultants set the number of patients that are operated on in a day, which dictates the teams' behaviour, it was agreed during the evaluation framework workshop that a focus on throughput and utilisation would not paint an accurate picture of the impact of PAs as there are too many other factors that can influence how many patients are operated on such as bed space, patient complexity, patient transport, the need for intra-operative radiology services, time taken to clean theatre. It was therefore agreed that the appropriate question would address efficiency and the first evaluation question was reworded accordingly as:

What was the impact of the PA positions on operating theatre efficiency?

Based on the short-term and intermediate outcomes specified by the evaluation questions, evaluation matrices (see Appendix B) were developed in the workshop in partnership with the Senior Analyst and members of the steering group. Specifically, these short-term and intermediate outcomes were analysed to define the performance indicators on which the success of each outcome could be determined. The group was also asked to identify program and non-program factors that they thought might have affected the expected outcomes either positively or negatively and these were combined with information obtained from a review of the existing trial documentation to form the contribution analysis (see Appendix C). Through this process relevant data sources were identified (see the evaluation matrices in Appendix B) and a meeting was held with the Health Intelligence Unit Manager and the Team Leader of Decision Support Services to agree on the retrieval and delivery of the available data. Following the workshop, the completed evaluation matrices, program logic model and contribution analysis were circulated to a Senior Analyst from HWNZ and members of the steering group for feedback and approval.

2.2.2 Evaluation design

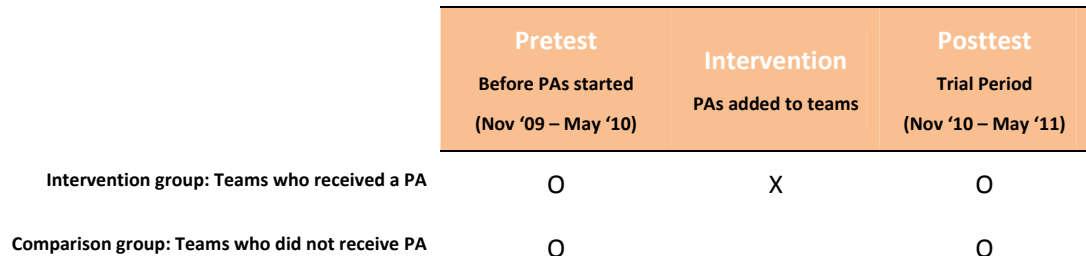
Having articulated the evaluation questions and considered the performance indicators and data sources that can contribute information to answer those questions, the appropriate evaluation approach was determined to be descriptive methods for the evaluation questions relating to program implementation and outputs and a quasi-experimental evaluation design for questions relating to program outcomes (see Appendix D for more details on quasi-experimental design). The data sources for these different methods are outlined below.

Table 1. Methodology and main data sources

Evaluation focus	Methodology	Main data sources
Program Implementation & Outputs (Evaluation Questions #4 - 8)	Descriptive	Key informant interviews Program documentation
Outcomes (Evaluation Questions #1-3)	Quasi-experimental	Data obtained from existing hospital information systems Key informant interviews

The quasi-experimental design used was a non-equivalent control groups pretest-posttest design (see Figure 1).

Figure 1. Diagram of quasi-experimental design



This design answers the following question:

Does the addition of physician assistants to elective surgery teams significantly improve outcomes as measured by key performance indicators (e.g. time of discharge, length of time from time on acute theatre list to operating time, patient, day of surgery cancellations) both when compared to the teams' performance before the addition of PAs and when compared to teams without physician assistants?

The scope and methodology of this evaluation were established in consultation with the Senior Analyst and members of the trial's steering group and were constrained by: the decision not to build evaluation into the trial from the beginning which limited the availability of quantitative data; the unavailability of some Middlemore staff members for interview; and advice that literacy levels within the patient group would rule out the appropriateness of a written survey of patient views.

At all stages of the evaluation, the Senior Analyst from HWNZ and the Chief Medical Officer or the Acting Chief Medical Officer were consulted and all the tools used and developed as part of this evaluation were approved by these individuals.

2.2.2.1 Limitations of the design

As data collection continued, a number of limitations and constraints became apparent to the evaluation team. Firstly, due to their vigilance and work ethic, PAs worked across all teams, spending approximately 10% to 15% of their time providing support to the teams they were not allocated to. This lack of mutual exclusivity between the "comparison" group (teams without PAs) and "intervention" group (teams with PAs) may have resulted in the strength of differences in outcomes between the groups being less than could have been seen had the PAs worked solely in the team they were allocated to.

Secondly, the PAs were added as supernumerary team members but no additional staff were added to the comparison teams. Judgment based on all available data sources was therefore required to determine the impact of the PAs' skills and experience over and above that which would have been realised with just the addition of more staff.

2.3 Data sources and analysis

2.3.1 Quantitative hospital data

Due to the timing of the commissioning of the summative evaluation (eight months into the trial), the data sources used for this evaluation had to be selected after the fact. They were not built into the original design of the pilot and the evaluators were therefore limited to the data that was available in the existing hospital data systems. Of the data sources that were agreed upon in the meeting on May 31st with the Operations Manager and Team Leader of Decision Support Services several were found to be either unavailable or impossible to interpret (see Appendix B for details). The hospital data that was available and complete was provided by the Operations Manager and the Team Leader of Decision Support Services in August and September 2011 and included:

- Volume of Patient at Risk calls (The number of calls made by nurses requesting assistance with seriously ill patients)
- Emergency Department presentations by hospital site
- General surgery house officer and registrar vacancies
- Number of patient complaints in general surgery
- Number of general surgery cases
- Time spent in theatre by general surgery registrars
- Time on acute list to theatre
- Pre-op length of stay
- Time of discharge
- Re-admit rate

2.3.2 Program documentation

Program documentation was requested and provided by the Senior Analyst from HWNZ and the Chief Medical Officer and included:

- Physician Assistant Discussion Document developed (written by Lynley Pritchard, Mark Barrow, Anne Kolbe, Allison Enright, and Peter Guthrie)
- Formative evaluation report prepared by Pam Oliver and Associates
- Four governance documents prepared by the steering group:
 - the scope of practice of the PAs ;
 - the recruitment and induction process;
 - the standards for the supervision and management of the PAs; and
 - the position description used in the recruitment of the PAs.
- Brochure circulated to Middlemore hospital staff introducing them to the PA role

2.3.3 Informant interviews

Face-to-face and telephone interviews were conducted with members of the steering group, representatives from key external stakeholder groups, and Middlemore hospital staff members and patients to complement existing data sources and to provide additional information to enable a thorough and accurate evaluation of the quantitative data (see Appendix E for the full list of interviewees). Some external stakeholder groups and one staff member chose to provide a written submission instead of participating in an interview.

Draft interview protocols were developed for the four types of interviewees (external stakeholders, staff, steering group members, and patients) based on the approved program logic model and outcome matrices. The interview protocols (see Appendix F) were circulated to the Senior Analyst and Acting Chief Medical Officer for comment and approval prior to the commencement of the interviews.

A list of external stakeholders to be interviewed was compiled by the Senior analyst from HWNZ and included representatives from: Royal Australian and New Zealand College of Obstetricians and Gynaecologists, Association of Salaried Medical Specialists, New Zealand Resident Doctors' Association, New Zealand Medical Association, Auckland Clinical School, General Practitioners' Council, Auckland City Hospital, James Cook University, Auckland District Health Board, Medical Students' Association, Medical Council of New Zealand, New Zealand Nurses Organisation, and Nursing Council. A list of key program staff to be interviewed was compiled by the Acting Chief Medical Officer and included the two PAs, house officers, registrars, general surgery consultants, radiology consultants, charge nurses, a Patient-At-Risk (PAR) team coordinator and a gastroenterology research fellow. All of the Middlemore staff members identified for interviewing had direct experience working with one or both of the PAs. Due to the transient nature of the ward, the list of patients to be interviewed could not be determined until the day of the interviews and was compiled by the PAs and nursing staff based on fitness, capacity to participate and capacity to provide informed consent. It must be noted that the PAs involvement in the selection of patients for interview may have resulted in some selection bias which might have skewed the results.

These lists were provided to the evaluators and interview appointments were arranged. Face-to-face and telephone interviews were conducted over a three-day period in the last week of August. Interview responses were transcribed and collated for content analysis.

In total, 27 informant interviews (eighteen face-to-face and nine telephone interviews) were conducted and four written submissions were collected.

2.3.3.1 Informant interview limitations

It was not possible to interview a registrar who worked with the PAs. Although appointments were scheduled with registrars, they were prevented from attending by unusually high workloads in an already busy hospital. Rescheduling was attempted but the individuals were not available.

Due to several patients becoming too unwell to be interviewed the number of patients available to be interviewed was lower than was planned. The evaluators had intended to interview ten patients but were restricted to four.

2.3.4 Patient satisfaction survey

It was originally intended that a modified version of the Royal College of Surgeons' "Satisfaction With the Interpersonal Aspects of Care" instrument would be circulated among patients who had been cared for by a PA and those who had not, the results of which would be compared to determine whether PA care improved patient satisfaction. However, it was decided that the response rate for the paper-based survey would be so poor due to the low literacy levels in the population serviced by the hospital that the sample would have inadequate power to detect a significant difference between the two groups. The decision was therefore made to interview patients face-to-face.

Section 3: Evaluation findings

“There are two overarching questions for us to answer. The first is- ‘Do these non-doctors have a place in the medical workforce?’ The answer there is ‘absolutely’. And then, ‘what is the acceptance by existing health workers, particularly nurses and doctors?’ The answer there is ‘overwhelmingly positive’.”

(Clinical Head of Surgery)

This section presents the findings of the evaluation by addressing the extent to which the PA trial was successfully implemented, produced the desired outputs, and achieved the short-term and intermediate outcomes identified in the evaluation questions and specified in the program logic model. The findings are presented below grouped under the eight short-term and intermediate outcomes. To improve the ease of reading, quotes from interviewees have been removed from the body of the report and placed in Appendix G listed under the outcomes they relate to.

3.1 Outcomes

3.1.1 Improved operating theatre efficiency

Qualitative evidence provided by interviewees suggests that the presence of PAs improved operating theatre efficiency. According to the Clinical Head of Surgery, the hospital saw an improvement in the transit of patients (a reduction in time to theatre) in general surgery which was not mirrored in other specialties and it was his opinion that PAs played a role in this. He believed the reason for this improvement in efficiency was that the PAs were either improving the management of problems that were preventing patients from getting to theatre or freeing the junior doctors up to manage the issues by doing some of the junior doctors’ work. He also believed this improvement in efficiency was due to how well the house surgeons and PAs worked together.

Charge nurses believed the improvements in efficiency were due to the fact that the PAs were a constant on the ward. They knew the processes, the patients and the team intimately whereas house surgeons rotated every three months and therefore had to “muddle through” never achieving the same level of efficiency and effectiveness in their job as the PAs.

The Clinical Head of Surgery also mentioned that charge nurses had been reporting to him that patients were being discharged earlier in the day. He put this down largely to the PAs doing a moderate number of the electronic discharge summaries. However, he qualified this with the statement that the introduction of PAs coincided with the introduction of discharge lounges designed to speed up the discharge process.

The quantitative data retrieved from Middlemore hospital records supported the anecdotal evidence presented above; however it must be interpreted in light of the following findings:

- Middlemore experienced the highest acute volumes that have ever been seen over the period November 2010 to May 2011 with occupancy rising to 105% and exceeding the Ministry’s recommended limit of 85%. Acute volumes over the period November 2010 to May 2011 were 6% higher overall than the same period the previous year with volumes 23% higher in December 2010 than December 2009.
- Middlemore has the highest yearly acute admissions in the country (see Table 2 below).
- The vacancy rate for house officer positions in general surgery at Middlemore over the period December 2010 to June 2011 has averaged 11.7% (down from 25% for the period December 2009 to June 2010) and rose as high as 25% in the last measurement taken in June of this year. Furthermore, the vacancy rate is an underestimate of the extent of the RMO vacancy issue facing Middlemore as it does not take account of vacancies caused by holidays, nights, and conference leave, nor does it incorporate Middlemore’s high rate of vacancies in rotator/reliever positions (specific junior doctor runs that are not attached to a single team).

- Middlemore hospital is a high-performing institution. It was the only hospital in the Auckland region to continue to meet the six-hour emergency department target in the April-June quarter despite recording the highest volumes in the region over the same quarter. The fact that the Middlemore surgical teams were already performing at a high level means that it is likely a ceiling effect limited the ability to detect the extent of the impact PAs had on their teams' performance.

Table 2. Yearly ED presentations by hospital site

Hospital	Yearly Presentations
Middlemore	96154
Christchurch	82713
Waikato	59719
Auckland City Hospital	58870
North Shore	56640
Wellington	46241
Hutt	42453
Tauranga	38926
Waitakere	38893
Palmerston North	38878
Hastings Memorial	37668
Dunedin	34047
Southland	32837
Whangarei Area Hospital	32317
Taranaki Base	31009
Rotorua	29310
Starship Hospital	27826
Nelson	24738
Wanganui	19597
Whakatane	19588

Under such conditions, a finding that theatre efficiency did not decrease would be a strong outcome. Despite having an inadequate number of RMOs to cover shifts, and increasingly high acute volumes, the teams with PAs not only held theatre efficiency steady, they improved it.

3.1.1.1 Time to theatre

Some members of the steering committee believed that time to theatre (the time it takes from when a patient is added to the acute theatre list to when they arrive in theatre) is not an appropriate indicator of theatre efficiency because it is strongly impacted on by acute volumes. It was stated that if the theatre block is full due to excess volume, improvements in efficiency on the ward will have very little impact on time to theatre. However, this data is presented here in the interest of completeness. Even with the previously mentioned ceiling effect, in teams with PAs the average

time between when patients were added to the acute list and when they arrived in theatre decreased by 7 minutes (a 1% decrease) between the study periods (without PA/with PA) and reached its lowest point in May of 2011 of 600 minutes, down from 650 minutes in the same month of the previous year. In contrast, in teams without PAs, the average time to theatre increased by 32 minutes between the two study periods (an increase of 3.3%).

3.1.1.2 Early discharges

Teams with PAs increased the proportion of patients discharged by midday by 5% over the previous year. A similar improvement was not noted in teams without PAs. Had PAs been given sign-off rights and not had to wait for a house officer to sign the discharge papers, it is likely that the percentage of patients discharged earlier in the day would have been higher. However, these findings must be viewed in light of two confounding variables. Firstly the introduction of PAs coincided with the introduction of discharge lounges designed to speed up the discharge process. Secondly with the higher patient volumes experienced during the trial period compared to the pre-trial period, it is likely that there was added pressure to discharge patients earlier which may have contributed to the differences noted. Both of these confounding variables would have affected all teams equally and can therefore not account for the improvement noted in PA teams that was absent from teams without PAs.

3.1.1.3 Pre-operation length of stay

The final indicator of theatre efficiency, pre-operation length of stay, showed no improvement as a result of PAs being introduced. Teams with PAs showed an increase in pre-op length of stay of 22 minutes (1.6%) while the teams without PAs showed an increase of 87 minutes (6.7%) over the previous year. It would appear that although this indicator of throughput did not improve, the PA teams held relatively steady compared to the teams without PAs.

However, all of these findings must be considered in light of the previously mentioned limitations (see section 2.2.2.2 – Limitations of the design). The fact that the teams without PAs were not provided with supernumerary staff to match the addition of PAs to the intervention group reduces the strength of claims that can be made about the improvements in efficiency as they could be due at least in part by the access to an extra worker, and not necessarily the presence of a PA. Conversely, the lack of mutual exclusivity between the “comparison” group (teams without PAs) and “intervention” group (teams with PAs) due to PAs spending 10-15% of their time working in in the comparison teams may have resulted in the strength of differences in outcomes between the groups being less than could have been seen had the PAs worked solely in the team they were allocated to.

3.1.2 Improved productivity of teams with PAs

It was the view of most informants interviewed that the PAs had a very positive impact on the productivity of the staff members and teams they worked with. They developed excellent relationships with other staff and were highly valued team members who were widely respected by nurses, house officers, registrars, consultants and administrative staff. According to one informant, they were so valued that new house officers often requested to be placed on a team with a PA.

The PAs were most valued by staff members for their positive impact on communication, organisation, and teamwork which they believed had a strong impact on their productivity. When mentioning PAs, staff often referred to them as “the glue”, “the backbone”, “the gel” or “the link” between nurses and doctors who made sure everything was communicated clearly and understood by all.

PAs were also valued by informants for the positive effect they had on the job satisfaction and the reduction of stress levels, workload, and risk of burnout of staff working at the peak of their performance and capacity and placed under extraordinary pressure by workforce shortages and increasing volumes. In teaching hospitals such as Middlemore which need to rotate house officers

regularly to provide adequate training, nurses, registrars and consultants are often stressed because they know nothing about the competency and trustworthiness of the new house officers and the new house officers are often stressed because they know nothing about the ward processes. The PAs helped reduce this stress which impacted positively on all team members' productivity. The reduction in the stress levels of consultants, nurses and registrars was put down to the high level of trust built up between the PAs and their team members which was facilitated by the consistency of the PA's presence on the ward and their consequent familiarity with ward process, staff and patients. The reduction in new house surgeons' stress levels was due to the PAs taking time to orient them to the ward processes, offer extra support, and fill in gaps in knowledge and experience.

The improvement in the productivity of teams with PAs was further evidenced by first-hand and second-hand reports from house officers, the Acting Chief Medical Officer, the Clinical Head of Surgery and members of the Association of Salaried Medical Specialists and Medical Council that PAs enabled house surgeons to spend more time in theatre than they otherwise would have and freed them up to perform more clinically-relevant tasks and receive more education and training. It was also reported that the PAs freed up the registrars to train the house officers. This was the result of the PAs taking on the more time consuming and repetitive tasks which were of little educational value to house surgeons such as doing bloods and ordering x-rays and scans.

The opinion of those not directly involved with the PAs is in contrast to that of the New Zealand Resident Doctors' Association (NZRDA) who believe that the PAs created more administrative burden for the house officers because they required house officers to sign off all of their discharge summaries, fluids and medication prescription and that this administrative burden was preventing house surgeons from performing medically relevant work, receiving training and attending theatre. However, it is difficult to see how this is creating additional work, when the house officers would have been required to do the work themselves in the absence of PAs.

Similarly, concerns were raised by two radiology consultants at Middlemore who felt that giving PAs the more menial tasks meant the house surgeons were prevented from "learning the complete job". For example, having PAs ordering radiological tests meant house surgeons were missing out on the opportunity to learn the diagnostic pathway. They were also concerned that PAs were reducing the amount of contact house surgeons had with radiology consultants and that PAs were attending multidisciplinary meetings instead of house officers which were both reducing the opportunity for teaching and learning.

When these concerns were raised with subsequent interviewees including charge nurses, house officers, the Clinical Head of Surgery, a general surgery consultant and the Acting CMO, the informants were unanimous in their rejection of them. These other respondents with direct contact with PAs did not believe this resulted in the loss of an educational opportunity. They believed that very little teaching occurs when tests are ordered as it is simply a case of delivering a request from the consultant or registrar and if clarification is required the radiologist will speak to the consultant or registrar, not the house officer. House officers also reported that they were taking care of approximately half of the scan-requesting load which they felt provided ample learning experience. The concern that PAs were reducing the amount of contact between consultants and house officers was also rejected by senior clinical informants who stated that there was so much work around that this hadn't happened. The concern that PAs were attending multi-disciplinary meetings instead of house surgeons was also considered to be unfounded. House officers were welcome to attend these meetings. The PAs attended the meetings because they knew the patients well and consequently prioritised attending and made time for it. Finally, in speaking about the radiology consultants' general concern that taking away menial tasks from house officers would result in lost educational opportunities, the house officers had the following to say:

“We do some very, very, very menial tasks. There is no reason a house surgeon needs to be doing them. You don’t have to be qualified you just have to be skilled; it is something you learn. So I think taking away some of the more menial tasks is not going to detract from our training it is only going to further our opportunities to do things that will contribute to our training.”

(House Officers)

“By offloading some of that service burden they gave us more opportunity to think about what we were doing and to enjoy it and maybe go to theatre one extra time compared to being inundated with people.”

(House Officers)

In addition to discussing factors that led to improved productivity, two informants gave specific examples of how PAs improved their productivity directly. The Patient-At-Risk (PAR) team coordinator noted that the PAs enabled the PAR team to handover patients earlier because they didn’t have to wait for the team which meant they could carry on with their patient rounds which she felt greatly improved their productivity. The Clinical Head of Surgery gave the following account of how the PA on his team improved his productivity:

“She [the PA] has been down to my outpatient clinic on three or four occasions and we finished those clinics earlier than we normally would with her seeing a proportion of the patients, me seeing every patient but her sort of triaging them, taking history etc. There is no doubt that if her working week allowed her to spend more time with me in the outpatient clinic we could see a greater volume of patients per clinic.”

(Clinical Head of Surgery)

The quantitative data retrieved from Middlemore hospital records and detailed below supports the qualitative information provided by informants that PAs improved the productivity of their teams.

3.1.2.1 Registrar time in theatre

One member of the steering committee believed that the amount of time spent in theatre by registrars is not an appropriate indicator of productivity because registrars are expected to be in theatre “come what may” and therefore, improvements in productivity on the ward would have very little impact on this indicator. However, this indicator was included in the interest of completeness. Registrars on teams with PAs spent an extra 2,804 minutes in theatre when compared to the previous period (an increase of 4.5%), while registrars on teams that did not receive a PA spent 17,031 minutes less in theatre than the previous period (a decrease of 26%). This finding suggests that registrars on teams with PAs received more training than registrars on teams without PAs.

3.1.3 Improved patient outcomes

3.1.3.1 Speed of treatment

The PAs adopted a first-responder role and became the first port of call for immediate assistance in emergency situations. They increased the speed at which help was available to nurses because unlike house surgeons they were never occupied in theatre or on another ward and were always ready to help regardless of whether it was their team or patient. In addition to this, one respondent reported that they increased the speed of treatment by organising diagnostics and booking occupational therapy time that may have waited until much later without their input.

3.1.3.2 Continuity of treatment

The most common comment by interviewees was that the PAs significantly improved continuity of care. It was felt that the PA role eased the tension present in the conflicting remit of teaching hospitals to provide training to junior medical staff whilst providing safe high quality patient care. As a result of the need to provide adequate training to junior medical staff, house surgeons rotate

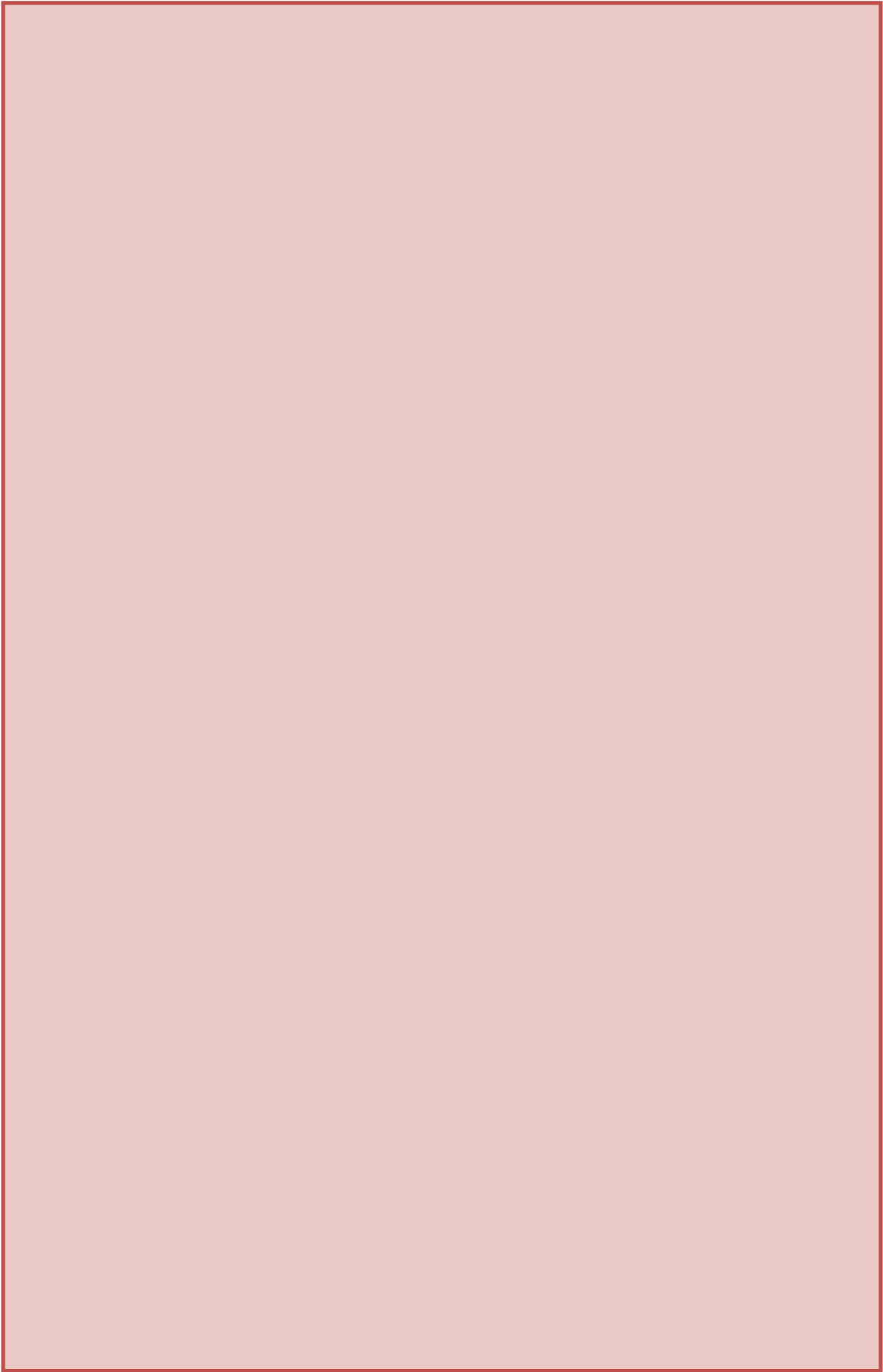
every three months, go on study leave, and are often off the ward in clinics, admissions and theatre. They also work a variety of shifts including nights and weekends. In contrast the PAs were consistently on the same ward for the whole year; Monday to Friday, 7AM to 6PM, reliably plugging any service gap left vacant by house surgeons taken away from the ward for training or education. This constant availability meant nurses could always get hold of someone to assess a patient or assist in an emergency situation. It also allowed them to develop strong working relationship with the consultants, nurses, and registrars on their teams, and become familiar with the ward processes and the long-term patients. As a result they were able to orient new house officers to the ward, the team and its structure and functioning, the processes, the procedures and the patients.

The PAs' constant availability also resulted in them becoming a reliable point of contact for nurses and house officers seeking to find out what needed to be done with all of the patients. This ensured that the plans for the day (such as who would be getting scans, who was going to theatre and who needed to be observed) were reliably followed through. Their consistency on the wards also provided consultants from non-surgical specialties (such as ICU and GI) with a single reliable point of contact when the general surgery consultants were not available. Finally, they improved handovers between the night-shift PAR team and the house surgeons and registrars. Prior to the PAs arriving, the PAR team was handing over information on which patients had been at-risk that night to junior doctors and often the information was not transmitted to the rest of the team. Once the PAs took over the responsibility of receiving the handovers the communication issue was resolved and the patients were reliably reviewed earlier in the round.

3.1.3.3 Adverse outcomes

The view of the majority of interviewees was that PAs led to safer patient care. Although few could think of particular instances where PA intervention had prevented an adverse outcome, informants agreed that PAs were a quality of care stop-gap offering an extra pair of knowledgeable eyes on quality and safety which reduced the likelihood of adverse outcomes occurring. Charge nurses reported that the PAs consistently reviewed sick patients, and passed on their high-level understanding of what was going on with these patients regularly to the consultants which ensured treatment plans were adhered to where appropriate and modified where inappropriate. This was thought to lead to fewer adverse outcomes for these patients. It was also noted that the surgical ward has not had an outbreak of resistant bacterial infections since the PAs' arrival. The Clinical Head of Surgery put this down to the PAs being good role models who gown, glove, clean their hands and were prepared to pull up the consultants and registrars if their vigilance lapsed. He also noted that, as a result of the PAs' presence, all the staff who were caring for the patients had a little bit more time to be careful.

Only two respondents had concerns around the potential negative impact PAs might have had on patient outcomes. The radiology consultants interviewed were concerned that, just as administering the wrong drug can harm patients, administering X-rays and submitting patients to MRI scans can also result in harm and therefore, PAs should not have been allowed to order X-rays or MRI scans. NZRDA felt that having house officers signing off on discharge summaries, fluids, and medication prescriptions for the PAs instead of Registrars or SMOs, as was originally agreed upon in the trial setup, posed a risk to sign off and the assessment of unwell patients. The information obtained from the interviews with respondents who had contact with the PAs did not substantiate this concern. Case-studies were provided by staff members to illustrate the impact PAs had on the reduction in adverse outcomes for patients in their care. These are shown over the page.



In addition to case studies, the readmit rate and the number of Patient at Risk (PAR) calls made were obtained from the Hospital data systems to determine whether the presence of a PA reduced the level of adverse outcomes. The readmit rate (over 28 days) for teams with PAs was 0.6% higher in the trial period than in the pre-trial period, which is just slightly less than that found for teams without PAs which increased by 0.9%. It therefore appears that the PAs had little positive or negative impact on the readmit rate.

However, the PAs did have an impact on the number of PAR calls made by their teams. The database which provided the PAR calls data was instated in January 2011 and it was therefore not possible to compare the teams' pre-trial performance with their trial performance; however, teams with PAs made 187 fewer calls between January and May 2011 than teams without PAs (a difference of 24.5%). A graph of the number of PAR calls made by the two groups of teams can be seen below. It appears that PAs played a role in reducing PAR calls, and although it must be noted that the absence of pre-trial baseline data precludes eliminating the possibility that the difference between the groups is due to teams without PAs being responsible for more challenging and high-risk patients, the fact that the groups are reported by senior medical staff interviewed as fairly comparable in terms of the complexity of their cases makes this unlikely.

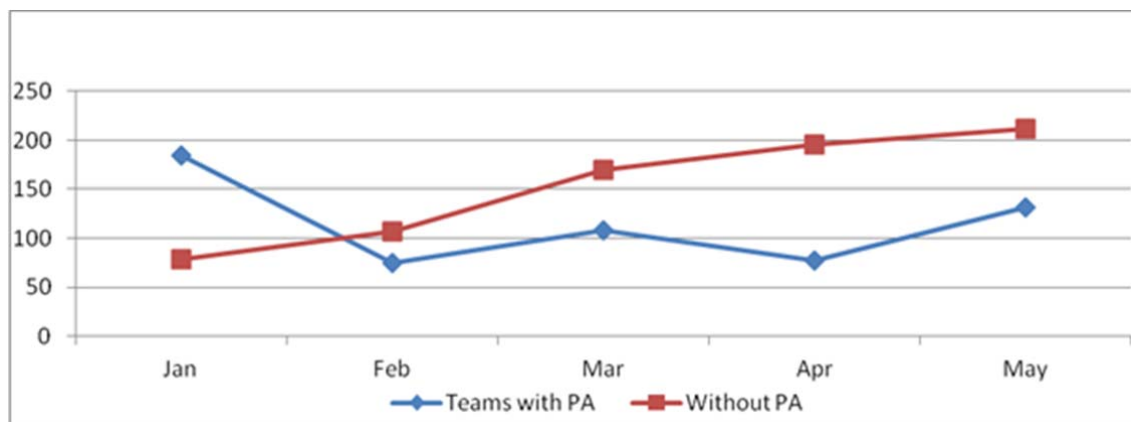


Figure 2. Total number of PAR calls by month broken into teams with PAs and teams without PAs

3.1.3.4 Patient satisfaction

According to staff, PAs have had a major impact on the satisfaction of patients in their care. Staff reported that the PAs built rapport with their patients and earned their trust which reduced their stress levels. They believed this was primarily due to the PAs' constant and familiar presence on the ward, as well as their high level of competence, well developed interpersonal skills, and caring nature. Staff reported that PAs would often take the time to talk with patients or their families about the patients' condition which also built trust and rapport, reduced stress and increased patient satisfaction. It was reported that house surgeons lacked the time to provide this extra care to patients and it was not one of their priorities. The overriding opinion of staff interviewed was that patients looked after by teams with PAs received better care than those cared for by teams without PAs. One charge nurse reported receiving very positive feedback from family members of patients cared for by the PAs and another staff member was so impressed with the PAs that she stated:

“Their patient contact is ten times better than the senior Reg on any given team”.

Patients' opinions of the PAs were overwhelmingly positive. They referred to them as helpful, friendly, kind, understanding, and in possession of an approachable bed-side manner which put them at ease.

According to the patients, the PAs took the time to ensure patients understood the impending procedures, conditions, outcomes of procedures and prognoses by explaining them in a manner that was catered to their level of comprehension. It was noted that this was not the case with other medical staff, whose explanations were perceived to be brief and difficult to follow. One patient reported that the PA on his care team spoke to her Senior Medical Officer to get him a more comfortable room. The PA also took the time to organise a meeting with the consultant and the patient's family to sort out issues around his wife going on a religious pilgrimage that had been causing him and his family some distress. See Appendix G for quotes from patients which further illustrate the substantial improvements in patient satisfaction that occurred as a result of the presence of PAs.

Aside from interviews, the level of patient satisfaction was also gauged by retrieving the number of formal complaints registered by general surgery patients. There was little difference in the number of complaints registered in the pre-trial and trial periods. Between November 2009 and May 2010, 32 complaints were registered and in the same period the following year, 30 complaints were registered.

3.1.4 Generalisability of the findings

It was the view of interviewees that extrapolating beyond the Middlemore site to other workforce sites and settings other than acute surgery would be difficult. The reasons given for this view were:

- Only two PAs were employed in one hospital and they were limited to two acute surgery teams – no other sites or clinical settings were used
- The PAs only worked day shifts and were not trialled in night shifts or weekend work
- The PAs were largely involved in what one interviewee referred to as the “elective” workload – controlled, definable and expected work such as clerking patients, getting them ready for surgery and caring for them after surgery. They were not overly involved in what the interviewee referred to as the “emergency” workload (unexpected and uncontrolled work such as an aneurysm or plummeting blood pressure) and it is therefore not possible to determine whether they would be effective in this work.
- The clinical circumstances at Middlemore Hospital were peculiar – the teams the PAs were placed in are two of the highest performing surgical teams in the highest performing hospital in the country, the hospital regularly exceeded capacity during the trial period, and there was an extreme shortage of junior doctors
- The PAs were carefully selected and imported workers considered to be exceptional individuals who may not be representative of the US PA workforce or the still-to-be-developed home-grown New Zealand PA workforce
- The PAs were supernumerary and it is doubtful that this will be the case in other sites
- The PAs received strong backing from the consultants and an interviewee doubted whether this would occur at other sites

The view of these interviewees was also explicitly stated in the Pilot Proposal compiled by the Northern Region DHBs to the CTA¹ in which the authors suggested that the PAs and/or the role and the pilot site will not necessarily be representative and the findings may not be readily generalisable. However, some of the positive outcomes outlined above could be expected to occur in other sites and settings as they are the result of PA training and were not dependent on the nature of the context or site. The improvements in team cohesion, communication, teamwork, organisation, trust, stress levels, and risk of burnout and the resultant improvements in team productivity and patient care/safety would be likely to occur in any other site and context in which multidisciplinary teams were involved in the delivery of healthcare services. Similarly the improvements in the continuity of

¹ Northern Region DHBs. (Undated). *PROPOSAL: Workforce Innovations - Pilot of Physician Assistants in Elective Surgery*.

care would be likely to occur in any site or setting where house officers are regularly removed from the ward for training and education. Finally, the observed improvements in patient satisfaction could also be expected to extend to other sites and settings where house officers lack the time and required interpersonal skills to put patients at ease, explain complex procedures in simple terms and attend to their requests.

3.1.5 Pilot program establishment, setup and implementation

On the whole, the process of introducing the PAs was handled well. The steering group reported that the process went so smoothly they felt they were largely superfluous within two weeks of the PAs commencing work. However, a common comment by nurses and doctors was that it was not made clear to them before the trial commenced when the PAs were commencing, what their role would be, or what they were legally allowed to do. It was noted that some consultants didn't know PAs were being introduced to the hospital until after the PAs had started working and this created some resistance from these individuals towards the PAs. Insufficient education was provided to staff members in other services such as the Obstetrics & Gynaecology department on what the PAs were capable of and this also led to some resistance. A brief presentation and pamphlets explaining the role were given to staff but these were felt to lack detail and it was only through working with the PAs and through the PAs explaining their scope of practice to each individual staff member that people became comfortable with the new role. If future trials are held the process of introducing the PAs and their role to the teams could be better coordinated.

Nurses in particular were reported to have concerns about the PA role in the early stages of the trial; however these concerns were apparently addressed by briefings provided by Associate Professor Ruth Ballweg, a leading international expert on Physician Assistants, who came to speak with them about the PA role. The radiologists at Middlemore felt they were inadequately consulted in the lead up to the trial which appears to have contributed to their long-term concerns around the role. The NZRDA also felt the trial was set up before any consultation had occurred as to what the problem was, what options existed to resolve it, whether a PA trial was necessary or what the goal of the trial should be.

3.1.6 Alternative explanations for the findings

As mentioned in the introduction to this report, the addition of PAs as supernumerary team members makes it difficult to determine the extent to which the improvements noted in the PA teams were the result of the PAs skills and experience or simply the presence of an additional set of hands. However, with the exception of those not directly involved with the PAs such as the New Zealand Nurses Organisation, the New Zealand Resident Doctors Association, the Association of Salaried Medical Specialists, the Medical Council and the Director of Clinical Training at Auckland DHB, the consistent view of all those directly involved that the positive outcomes of this trial could be attributed specifically to the training of the PAs.

The following summarises the concerns of those who have reservations about the PA role and or its place in the health system in New Zealand:

- The majority of work performed by the PAs was of an administrative level and could have been done just as effectively and more cheaply by medical secretaries or ward clerks;
- Experienced nurses put through a one year post-registration program would have the same impact and would cost much less to train;
- In the context of severe shortages in junior doctors, any spare set of hands would have improved outcomes; and
- It was the Physician Assistants' exemplary personal qualities and high level of experience rather than their training that made the difference and that similar outcomes would not have been seen had the PAs come straight from a training program.

All the respondents who had direct involvement with the PAs, with the exception of the Radiology consultants, unanimously rejected these stakeholders' objections. They suggested that ward clerks, medical secretaries, and nurses lack the depth of medical knowledge and grounding in the medical diagnostic approach possessed by PAs which allowed them to earn the respect of doctors, work well with them due to a shared understanding, be proactive rather than simply operating under direction or following protocols, and act as effective intermediaries capable of bridging the knowledge and culture gaps between medical and nursing staff, three factors considered essential in producing the positive outcomes noted in this trial.

Nurses interviewed reported that they could step into the PA role if they were provided with similar training (they believed it was a very different role to that of nurse or nurse practitioner) but they doubted they would receive the same level of support from the medical profession. The example was given of nurse practitioners who struggled for a long time in New Zealand to step up into extended roles and gain respect and credibility because of resistance from the medical profession. PAs were thought to be more likely to succeed because they were seen as less challenging to the medical profession and were considered to be "one of us" whereas nurses were seen to be "pushing upwards". Interviewees also agreed that nurse practitioners would not have produced the same outcomes because their independence and lack of direct accountability to medical teams does not allow for the same quality of working relationship, ease and trust. They also mentioned that, with the exception of emergency department nurses, nurses lack the PA's strong ability to identify acutely unwell patients.

The interviewees doubted whether additional house officers would have produced similarly positive outcomes. PAs were thought to have an advantage over house officers due to their training which provided them with communication and interpersonal skills and taught them how to relate to patients, help them understand their situation and become comfortable with them. It was thought that these communication skills also allowed them to interact more effectively with nursing staff. Interviewees felt house officers do not receive the same level of training in communication skills and lack the time to sit with patients and develop these skills. Similar to nurses, PAs were also taught to take more detailed notes than house surgeons which was thought to improve continuity of care. Interviewees also noted that the house surgeon role is limited by the fact that they are on a progressive career path and are always looking for opportunities to move forward into different areas whereas PAs do not tend to progress to other areas or higher positions and consequently have the time to become highly competent and skilled in their area of expertise.

Finally, when asked about stakeholders' concerns that the positive outcomes were due to the PAs being exceptional individuals with high levels of experience, the PAs replied that they were not exceptional in their US cohort and that only one of them was highly experienced (one had 14 years of experience while the other had only been out of training for 4 years). They also believed that the PA training program's strong focus on the clinical portion of their skills prepares PAs to be more effective workers straight out of training than house officers.

The Middlemore staff interviewed all agreed that although they were outstanding individuals with a fantastic work ethic and high levels of empathy, and it was possible that two other individuals may not have performed as well as they did, there is absolutely no reason why a good training program could not produce PAs of a similarly high caliber.

3.1.7 PA role development during the trial

3.1.7.1 Roles and activities

3.1.7.1.1 Authorised activities

The PAs took on a range of activities, the majority of which are traditionally performed by house officers. Detailed below are a summary of the activities the PAs were formally authorised to perform.

The following activities were performed under different levels of supervision:

- Obtain comprehensive case histories
- Undertake physical examinations of specified areas.
- Collect blood samples, insert luers, catheters
- Order simple radiology
- Interpret results of investigations
- Formulate a working diagnosis
- Develop a treatment plan
- Perform procedures as designated by supervisor
- Attend ward rounds/patient reviews
- Present patients on ward rounds
- Record notes/instructions from the supervisor or other designated medical practitioner approved by the supervisor
- Order investigations requested by the supervisor or other designated medical practitioner approved by the supervisor
- Follow up investigations
- Assist with documentation, including discharge summaries, operating lists
- Attend clinics or operating lists at the direction of the supervisor
- Undertake other duties as delegated by the supervisor

3.1.7.1.2 Other activities and roles

In addition to their formal authorised activities, the PAs took on a number of other roles and tasks. These included:

- receiving handovers from the overnight potentially-at-risk team and ensuring these patients were reviewed early in the round;
- orienting new house surgeons to the area, ward processes and patient care;
- explaining procedures, tests results and prognoses to patients and their families;
- following up on everything to make sure everything that was supposed to have been done was indeed done;
- performing every step of the consenting process (explain the procedure and the risks and benefits) except for obtaining the patient's signature;
- acting as the team coordinator;
 - laying out the plan for the day with the charge nurses after the rounds and telling them which patients were going to theatre on that day, who would be getting scans and who would need to be observed;
 - laying out the plan for the day with the house officers and training interns (organising who would do which jobs) and orienting them to it;
- providing support, role-modelling and teaching to house surgeons to fill in gaps in knowledge and experience
- being the first-responders to triple-8 emergency situations on the ward and supporting the nurses and emergency team through the situation;
- being the first port-of-call for nurses when patients required assessment;
- writing up fluid charts;
- assisting with multidisciplinary care involving general practitioners, oncologists, surgeons and occupational therapists;
- faxing referrals
- arranging follow up appointments

There were several additional roles that the Clinical Head of Surgery was very confident the PAs were capable of performing as well, if not better than house surgeons; however, due to insufficient time the PAs were not tested in these roles. The roles included:

- running the post-operative elective unit with some limited medical cover
- placing them in charge of the infection control process
- surgical pre-admissions
- working as a second after-hours ward call person and/or supporting the house surgeon and the PAR team in the evenings

3.1.7.2 Constraints on their roles and activities

3.1.7.2.1 Supervision

The PAs worked under the delegation and supervision of a vocationally registered medical practitioner (SMO in DHB setting). The supervising medical practitioner was responsible for the overall management of the patient, and for their decision to delegate and the level and nature of the supervision they provide. In this regard they determined the scope of duties and responsibilities of the PAs.

3.1.7.2.2 Immediate consultation

The PAs had to seek consultation immediately where there was:

- uncertain diagnosis;
- the condition exceeded their ability;
- the patient failed to respond to therapy; and
- the patient desired to see a doctor.

3.1.7.2.3 Prescribing/supplying/administering medication

The PAs were working as unregulated professionals who were not covered by the Health Practitioner Competence Assurance Act (HPCCA) 2003 and as such they were not authorised to prescribe medication; however they were permitted to write up the medication chart provided it was signed off on by a house officer or registrar. They were also permitted to administer medications under standing orders or at the direction of a medical practitioner, according to specified protocols. The PAs were not permitted to administer controlled drugs under any circumstances.

3.1.7.2.4 Radiology

The PAs were permitted to request simple radiology such as chest and abdominal x-rays, according to specified protocols. More complex radiology such as CT/MRI and USS were to be ordered under the authorisation of a member of the medical team (SMO, registrar); however it was claimed by radiology consultants that PAs were requesting these tests without authorisation and that this contravened the Radiation Protection Act 1985. The radiologists felt the PAs lacked the clinical knowledge required to request these complex tests and that this was putting patients at risk and creating more work for them as they had to chase up the consultant to confirm the tests were warranted.

3.1.7.2.5 Blood and blood products

The PAs were permitted to order blood and blood products under the authorisation of a member of the medical team (SMO, registrar).

3.1.7.2.6 Additional Constraints

In addition to the excluded activities noted above, the PAs were not permitted to:

- sign a death certificate, however, PAs were able to declare “life extinct” in lieu of the supervising medical practitioner;
- sign ACC and Medical Certificate forms;
- sign off on discharge summaries
- sign off on fluid charts
- obtain patients’ signatures of consent



- perform any activities which are restricted to registered health professionals under the Health Practitioners Competence Assurance Act 2006 (Health Practitioners Competence Assurance (Restricted Activities) Order 2005); and
- perform any medical service, procedure, function or activity which is outside of the assigned role.

The lack of prescribing and sign off rights (charting fluids, signing discharge summaries, and obtaining patient consent) was felt by all staff interviewed to be the biggest constraint on the PA role. It was thought to have reduced the PAs' impact on theatre efficiency and team productivity as it created more work for the PAs who had to chase after House Surgeons for signatures and inconvenienced the House Surgeons who had to check and sign off on the PAs' work. One of the House Surgeons interviewed stated she was very confident in the PAs' ability to chart fluids, prescribe, prepare discharges and obtain consent and that the right to sign off on these activities should be granted to them as soon as possible. These views were shared by the steering group who felt they should have worked on overcoming these constraints earlier; however a lack of momentum and time prevented this from occurring. It was only when the PAs decided they were not going to stay on at Middlemore at the completion of the trial due to these constraints that the steering group became sufficiently motivated to act on the issue; however, by this stage it was too late. The PAs believed they would become deskilled if they remained at Middlemore any longer and felt they were left with choice but to leave.

3.1.8 Possible future directions

3.1.8.1 Stakeholder concerns about the PA role

A factor in need of urgent consideration by HWNZ are the residual concerns held by stakeholders not directly involved with the PAs about the new role. The driving forces behind the skepticism (some of which have already been addressed in earlier sections of this report) are:

- concerns around patient safety and quality of care;
- the questionable economic feasibility of training and regulating an additional professional group in a country with a population as small as New Zealand's;
- the perception that the problem HWNZ is attempting to resolve by the introduction of PAs has never been clearly articulated;
- concerns around possible labour market ramifications of introducing a new and highly qualified workforce to the health system;
- concerns that PAs are an expensive "band-aid" workforce option (a salary of \$100,000 per year is considerably more than a house officer receives and the cost of a three year tertiary program is significant) and that more cost effective ways to improve efficiency, productivity and patient outcomes have not been adequately considered such as:
 - improving the recruitment and retention of existing health professionals;
 - using nurse practitioners to fill the role;
 - providing nurses with a one-year post-registration program to train them to perform a role similar to that performed by the PAs at Middlemore;
 - reducing theatre down-time by speeding up changeovers and the retrieval of patients from the wards, using weekends, and introducing longer 'two part' working days;
 - using industrial engineers to investigate the processes and practices of medicine and find ways to improve the efficiency of the existing workforce by ensuring all staff are working to the top of their licence and the system is getting the most out of the roles that currently exist;
 - reassessing the traditional structuring of teams;
 - introducing electronic patient records; and
 - improving primary and secondary care integration.

- the potential reduction in junior doctors', nurses' and midwives' access to patients and supervisors and the repercussions this may have on education and training;
- the perceived lack of consultation with consumer groups;
- the protection of professional silos and scopes of practice (particularly extended nursing roles); and
- the perception that the Middlemore trial was a demonstration rather than an evidence-based trial.

3.1.8.1.1 Overcoming stakeholder concerns

Experience in trials internationally, the broader literature on physician assistants, and the findings of this trial suggest that most of the above concerns are overstated. However there will still be a need to manage these concerns and a few suggestions were made by interviewees towards this end. The overriding theme was that nursing and medical bodies, senior doctors and nurses, Chief Medical Officers, Directors of Nursing and all health care providers across the country should be provided with detailed information on the roles filled by PAs in New Zealand and overseas, the results of previous international trials, the success of the Middlemore trial, and positive comments from those involved in it. For example, to help overcome the belief that PA roles would be better filled by nurse practitioners, comments could be obtained from the charge nurses who worked directly with the PAs and observed the clear differences between PAs and nurse practitioners and noted that there is a need for both roles. It was felt that this information should be accompanied by a strong message that PAs will not be taking anything away from the professions as there is no shortage of work to go around. One interviewee suggested that the information should also be accompanied by a survey to identify what aspects of the PA role would be of use to providers. Finally, it was recommended that further robust engagement and consultation occur with key stakeholder groups including the CMOs of the DHBs to provide them with the opportunity to contribute to the further development of the scope of the role and identify and resolve any remaining industrial barriers.

3.1.8.2 Regulatory Barriers

As mentioned in section 3.1.7.2 of this report, the restriction of prescribing and sign off rights was thought to have reduced the impact of PAs on theatre efficiency and productivity and was largely responsible for the PAs' decision to return to the US despite being offered ongoing employment at Middlemore. One possible solution is to introduce protocol-based prescribing. Permission to go ahead with this was recently granted by the Medical Council; however, the PAs indicated that even this would be too limiting for individuals with their depth of knowledge and experience. To grant PAs full prescribing and sign off rights would require the establishment of a regulatory body to oversee the national registration of physician assistants under the Health Practitioners' Competence Assurance (HPCA) Act 2003. Allowing PAs to become registered under the HPCA act would also eliminate the need for US-trained PAs working in New Zealand to return home every 5-6 years to recertify which would overcome a major barrier to building a sustainable PA workforce. However, setting up a regulatory body was considered by interviewees to be a highly challenging, costly, and convoluted process which is only economically viable once a sufficient number of professionals are work-ready. An alternative suggestion was that an amendment could be made to the HPCA act to allow PAs to prescribe.

One of the interviewees suggested the PA role offers an alternative pathway that draws on the extensive skills and experience of allied health workers and nurses who have become frustrated with their roles. However, at present there are broad regulatory barriers to this occurring. If nurses and allied health workers decide to pursue a career as a PA, their registration will expire before they are qualified to work as a PA. Preventing ideal candidates from working in their profession whilst still in training will be a major hindrance to developing a cohort of work-ready PAs.

A final regulatory barrier to extending the PA role is the inability of PAs to order more complex radiology such as CT/MRI and USS without the authorisation of a member of the medical team

(SMO, registrar). It was advised that to be authorised, future PAs would need to complete a 3-hour course on the effects of radiation. This could be included as part of the orientation process.

3.1.8.3 PA Training Program

The majority of Middlemore employees and steering group members interviewed believed that establishing a PA training program in NZ should be a high priority if HWNZ decides to introduce the role to the workforce. Two interviewees noted that there are hundreds of young, bright and ambitious health science students who graduate each year and don't receive the grades required to enter medical school but still wish to work in health. It was considered unethical to put these students through this training without offering them opportunities when they graduate and a 2-year postgraduate PA course could be one such opportunity. As PAs are instructed in the medical model, the logical sites to host such a program are the existing medical schools at the University of Otago and The University of Auckland. One interviewee was under the impression that the Faculty of Medical and Health Sciences at the University of Auckland had developed a two-year postgraduate PA training program; however according to a stakeholder from the faculty, this is not the case. The faculty has indeed invested some time and energy into thinking about how to establish a PA program, including meeting with a leading expert in PA training programs, Associate Professor Ruth Ballweg; however it has not progressed beyond the initial planning stage at this point in time. According to the stakeholder interviewed, developing the curriculum for new programs is relatively straightforward and inexpensive; however it is a very expensive process to get academic approval of a new program and the nature of education funding is such that there would be no money available to recoup these expenses until the first cohort of students were enrolled in the program (approved courses are funded by a tuition grant based on the number of enrolled students in each course and the amount of study time each course requires). Consequently, without some sort of guarantee from the DHBs that there will be sufficient demand for graduates of the PA program, establishing it represents a significant financial risk, one that the faculty is currently unwilling to take. Unlike the education system, the health system has access to front-end funding and the stakeholder pointed out that perhaps HWNZ could work towards directing some of this funding towards the establishment of the PA training program. It was also suggested that HWNZ could communicate with the DHBs to assess the true level of demand for PAs and relay this information to the faculty. The stakeholder was also concerned about the implications of the recent closure of the PA program at the University of Queensland and stated that until the motivations behind this closure were fully understood they would be reticent to proceed with a program in Auckland. Finally, concerns around the financial cost of setting up a PA program were expressed by external stakeholders who felt the cost may outweigh the benefit of the "small number of PAs that would be produced by the program".

3.1.8.4 Importing PAs from the US

It was noted by an interviewee that the workforce shortages and increasing service demand cannot be addressed in the short term by a PA training program as it would take too long to train the first cohort of graduates. One house surgeon interviewed stated that she and several other house surgeons she knew intended to head to Australia to escape what they perceive to be an unsafe system that is pushing its staff to the limit. However, the interviewee noted that she and her associates would consider staying if PAs were introduced immediately.

It was suggested therefore that a possible solution could be to import overseas trained PAs from the US and spread them throughout the system. It was noted by several interviewees that such an initiative is likely to be well supported by the DHBs as some are considering progressing with this independently having heard of the successes at Middlemore. It was stressed by interviewees that this should be viewed strictly as a short-term intervention to tide the system over until new PA graduates are produced by the New Zealand training program. Their reasoning behind this was that overseas-trained PAs:

- are expensive due to:
 - the high cost of recruiting international staff;
 - relocation costs; and
 - the obligation to pay them a salary on-par with that paid in the US which is very close to a senior doctor's salary and potentially much higher than what a locally trained PA might be paid.
- are challenging to retain because:
 - they have to recertify in the US and will therefore be forced to leave New Zealand after a maximum of 5-6 years;
 - a high percentage of international health workers leave within the first year; and
 - they are likely to feel frustrated by the previously outlined regulatory constraints which prevent them from practicing to the top of their licence and may result in de-skilling.

It was suggested by interviewees that the imported PAs could assist in setting up the PA training program and that this might improve the likelihood of retaining them. This was supported by one of the PA's who stated that she would have stayed in New Zealand if she could have been involved in establishing the program. One interviewee suggested that if this initiative proved successful, publicity could be spread to the public to educate them on the role and to attract people to the new PA training course.

3.1.8.5 Upskilling nurses

An alternative interim solution being considered at Middlemore in the wake of the PAs' departure is to provide experienced registered nurses and allied health workers with additional training to enable them to perform some of the roles and activities performed by PAs in the Middlemore trial. It was argued that this would be more cost-effective than both putting "unskilled and untrained" individuals through a two-year course and bringing in US-trained PAs and would give the workers an opportunity to advance their careers. However, there are regulatory issues around this that would have to be resolved such as whether or not they can maintain their nursing/allied health certification whilst working in the PA-type role.

3.1.8.6 PA Salary

It was agreed that the \$130,000 salary (a 100,000 base with \$30,000 for relocation expenses) paid to the PAs who participated in the Middlemore trial would not be the salary paid to home-grown PAs. This salary was set at value high enough to compete with US PA salaries which are around \$90,000USD on average (approximately 110,000NZD at the current exchange rate). Two questions must therefore be answered: will future imported PAs also be paid \$130,000 and what will home-grown PAs be paid? One stakeholder stated that \$130,000 is as much as some specialist doctors earn and was therefore considered to be too high. This was reinforced by another interviewee who pointed out that prescribing nurse practitioners who have a similar level of qualification as PAs earn \$90,000-105,000. However, the same stakeholder argued that if New Zealand-trained PAs are not paid at a rate commensurate with the rate paid overseas they will follow the money and leave. It appears that in answering both questions a balance must be sought between the need to pay a rate that is equitable in the home market and the need to pay a rate that is sufficiently high enough to attract and retain workers.

3.1.8.7 Are further trials needed?

With the exception of nursing and medical stakeholder groups and the radiology consultants, interviewees felt conducting further trials was not necessary for proof of concept and would take too long given the pressing nature of the medical workforce shortages. A long history of success in the United States and the positive outcomes of the Middlemore and overseas trials were thought to have provided sufficient supportive evidence. However, some interviewees believed that trials could

be useful in reassuring skeptical nursing and medical stakeholder groups that the PA role will not disadvantage them and their members.

Stakeholder groups uniformly believed that before the role is introduced into any context that differs significantly from acute general surgery day-shifts, it should first be piloted in that context. In particular they noted that a pilot is required in after-hours A&E first-assessments in a public hospital as this is where the biggest need lies. It was also noted that although PAs have been demonstrated to be effective in primary care and in provincial healthcare, there are barriers to their introduction into these contexts (funding issues and lack of supervision respectively) that will be challenging to overcome. An alternative suggestion made by an interviewee to address the issue of stakeholder buy-in was to run a series of brief concurrent demonstrations in a range of sites across New Zealand with a special focus on hospitals that are experiencing high workload, and staff shortages and gaps. Once momentum had been built by these hospital-based demonstrations, trials could then be established in the more challenging areas of primary care and provincial practice.

3.1.8.7.1 Design of further trials and demonstrations

Interviewees agreed that the first step in designing any future trials or demonstrations is to get the logic of the trials/demonstrations straight, that is, to clearly establish why the PA role is being trialed/demonstrated, why it is being trialed/demonstrated at particular sites/settings, and what the aims and objectives of the trials and demonstrations are. It was also considered vital that continuous evaluation be built in to the trials from the outset. This means setting systems in place before the trial has begun to measure the desired outcomes longitudinally across the duration of the trial. One interviewee suggested that the pilots/trials/demonstrations should be “needs-based” instead of “forced” on providers. He believed a “ground up” approach should be adopted which he defined as follows:

“We need to put a tool-kit together that lists the professions that we currently have that providers could use in their workforce and the skills they have. Then give that toolkit to people [service providers] and say “If you were redesigning your service and were using these professionals, who would you want to put where on your team”. Instead of just looking at PAs and thinking “where can we fit PAs in our existing teams”. We are not going back far enough when asking the redesign question. Pick three or four settings and get them to use the tool kit to design a team to pilot the PA role in.”

(Stakeholder)

The PAs advised that if further trials and demonstrations are run they should make use of the protocol-based sign-off rights recently approved by the medical council. Finally, one stakeholder group recommended that an advanced practice nurse should be trialed in parallel with a PA to determine whether PAs outperform advanced practice nurses.

Section 4: Conclusions

Taking the qualitative and quantitative results of this trial, the evaluators' observations from on-site visits, the findings of the formative evaluation, and the governance documents for the trial, the conclusions as they pertain to the eight evaluation questions are outlined below.

Improved operating theatre efficiency

Across the agreed indicators of theatre efficiency (time to theatre, early discharges, and pre-operation length of stay) mildly positive effects and no negative effects were observed in teams with PAs while indicators of theatre efficiency in teams without PAs worsened. For the teams with PAs to have held theatre efficiency steady on all indicators amidst the highest acute volumes ever seen at Middlemore and the high junior doctor vacancy rates experienced over the trial period is an achievement that the key informants attributed directly to the presence of the PAs in the system. Hospital staff who worked with the PAs believed the improvements in efficiency were due to:

- the PAs' management of problems that were preventing patients from getting to theatre or the PAs freeing the junior doctors up to manage the issues by doing some of the junior doctors' work;
- the PAs' constant presence on the ward which allowed them to get to know the ward processes, team members, and patients intimately; and
- the fact that PAs and house surgeons worked well together.

Improved productivity of teams with PAs

It was the view of all informants with direct experience of working with PAs that they had a very positive impact on the communication, teamwork, organisation, job satisfaction, stress levels, workload and trust in their teams; factors which are well known to result in improved productivity. Further evidence of the improvements they made to team productivity is that the PAs enabled house surgeons to spend more time in theatre and freed them up to perform more clinically-relevant tasks and receive more education and training. Additionally, the moderate improvement in the quantitative indicator of productivity (the amount of time registrars were able to spend in theatre) in teams who received PAs was in stark contrast to the deterioration found in teams without PAs. This adds extra support to the qualitative findings.

Improved patient outcomes

Speed of treatment

The PAs noticeably improved the speed of treatment by: taking on a first-responder role in emergencies; always being available on the ward; and organising things such as diagnostics and booking occupational therapy time that would otherwise have been delayed.

Continuity of treatment

Interviewees were unanimous in their view that the PAs greatly improved continuity of care. Their constant presence on the ward allowed them to:

- plug the service gap created when house officers were pulled away from the ward for training and education;
- be available to nurses throughout the day to assess patients, provide information on what needed to be done with any patient, and respond to emergencies;
- orient new house officers to the ward, the team, the processes, the procedures and the patients;
- be a reliable point of contact for non-surgical consultants when the general surgery consultants were not available; and
- eliminate the communication issues that were occurring in handovers between the night-shift Patient-at-Risk team and the doctors.

Adverse outcomes

Evidence from staff and from case studies provided by the PAs themselves suggests the PAs' presence resulted in safer patient care. This was attributed to the presence of a constantly available, knowledgeable, diligent and vigilant worker on the ward who had time to focus on quality and safety, freed up other staff to do the same, and consistently reviewed unwell patients and passed on their high-level of understanding of the patients' situation to a consultant. This improvement in quality and safety and the resulting reduction in adverse outcomes is evidenced by the finding that teams with PAs made 24.5% fewer Patient-at-risk calls than teams without PAs.

Patient Satisfaction

The PAs took the time to explain procedures, conditions, outcomes and prognoses in a manner that patients and their families understood, and this was felt to build trust and rapport and reduce stress which all increased patient satisfaction. House surgeons were felt to lack the time to provide this level of care and their ability to communicate in as effective a manner as PAs was felt to be lacking.

Generalisability of the findings

It was the view of the majority of interviewees that the findings of this trial could not be reliably extended to other dissimilar sites and settings. The reasons given for this were that the clinical circumstances at Middlemore were highly unusual; the PAs were not trialed in night shifts, weekend work, or emergency departments; the PAs may not be representative of other members of the US or the still-to-be-developed New Zealand PA workforce; the PAs were supernumerary; and the PAs received backing from consultants which may not occur in other sites. However, some of the positive outcomes outlined above could be expected to occur in other sites and settings as they are the result of PA training and were not dependent on the nature of the context or site.

Pilot program establishment, setup and implementation

On the whole the process was managed well; however, more communication was needed with Middlemore staff to alert them to the commencement date of the PAs and to provide them with detailed information of the scope of their role.

Alternative explanations for the findings

It was the view of interviewees without direct experience working with PAs that:

- the majority of work could have been done by medical secretaries, ward clerks, nurse practitioners, or experienced nurses upskilled through a one-year post-registration program and that under such severe junior doctor shortages any spare set of hands would have improved outcomes; and
- it was the PAs' exemplary personal qualities rather than their training that led to the improvements and similar outcomes would not have been seen with new graduates.

These views were unanimously rejected by the PAs themselves and interviewees with direct experience working with them. They asserted that:

- Nurses, nurse practitioners, ward clerks and medical secretaries all lack the grounding in the medical model required to earn the respect and support of medical staff, understand and work well with them, be proactive, and act as effective intermediaries between medical and nursing staff – factors considered central to the improvements in outcomes seen in this trial; and
- The PAs were not exceptional in their US cohort, one of the PAs had been out of training for only 4 years, and the PA training program prepares PAs to be work ready straight out of training.

PA role development during the trial

The roles and activities adopted by the PAs extended beyond what was formally agreed at the start of the trial. A list of the activities performed by the PA can be found in section 3.1.7.1. The biggest constraint on their role was the lack of prescribing and sign off rights which were thought to reduce the PAs' impact on theatre efficiency and team productivity and resulted in the PAs deciding to leave at the end of the trial to avoid deskilling. It was determined that there was no practical reason why these individuals could not have performed these roles and that the regulatory and industrial barriers preventing this from occurring should be addressed immediately.

Possible future directions

Following on from the response to the previous evaluation question, it would appear that the most pressing matter to resolve in regards to the development of the PA role in New Zealand is the restriction of PA's prescribing and sign off rights. Granting these rights would require the establishment of a regulatory body; which was considered by interviewees to be a challenging, costly and convoluted process which may only be viable once a sufficient number of professionals are work-ready.

Establishing a PA training program was also considered to be an important step; however without a guarantee from the DHBs that there will be a demand for graduates of a PA program, the Faculty of Medical and Health Sciences at the University of Auckland will be unwilling to take the financial risk associated with establishing a new program. Another factor to consider is the possibility of importing PAs from the US and spreading them through the New Zealand health system as a short-term solution to tide the system over until the first few cohorts of PAs graduated from a New Zealand program. Concerns were raised that the salary received by imported PAs was out of step with the local market and it was concluded that a balance should be found between the need to pay a salary that is equitable in the home market whilst being sufficiently generous to attract and retain workers.

With the exception of medical and nursing stakeholder groups, respondents felt further trials were not necessary for proof of concept but may be useful in reassuring stakeholder groups who continue to have concerns about quality and safety and the impact on other roles. These stakeholder groups believed that before the role is introduced into any context or site that differs significantly from the one used in the trial, it should first be piloted in that context. A suggested compromise between these two positions is to run a series of brief demonstrations in a range of hospital sites across New Zealand and then, once momentum has been built through these demonstrations, introduce trials in the more challenging areas of primary care and provincial practice. Finally, it was thought that the trials and demonstrations should have robust longitudinal evaluation built into them from the outset, be "needs-based" instead of "forced" on providers, and have very clearly delineated aims, objectives and desired outcomes.

Section 5: Recommendations

While it is not possible to generalise from the acute surgery setting used in this trial to other sites and settings in New Zealand, the implications of this are attenuated by fact that the PA role has been trialed globally in a variety of metropolitan and rural/remote hospital- and community-based primary and secondary care settings including emergency departments, acute and elective surgery, orthopaedics, anaesthesia, and paediatrics (see the literature review in Appendix H). Based on the results of these trials, the long-term international experience of PAs in private and public sector settings (forty-three years in the US health system, seven years in the NHS, and ten years in the Netherlands), and the results outlined in this report, it would appear that there is not any need to further test the role as useful, safe and appropriate for New Zealand. However, it must be noted that several stakeholder groups are concerned that the current trial was more of a demonstration than a trial, and that multiple trials in a variety of settings are needed to conclusively demonstrate the need for and suitability of the new role in New Zealand before it is introduced. The descriptive literature on the broader experience of PAs in the various health systems and the findings of this report suggest that many of the concerns raised by stakeholders and detailed in this report do not appear to eventuate, and opinions by important key stakeholder representative bodies (e.g. American Medical Association, Australian Medical Association, Australian Nursing Federation) change once a significant number of their constituency experience working directly with PAs.

Accordingly, the decision whether or not to conduct further trials appears to be more about managing “small p” politics and demarcation disputes than it is about the need to conclusively test the usefulness and suitability of the role in New Zealand. Instead of conducting more expensive and time consuming trials, it may in fact be faster, more effective and less costly to invest in robust stakeholder engagement, strong leadership and competent change management with a focus on eliminating misinformation and resolving residual concerns about the new role. Stakeholders throughout the country could be provided with detailed information on the roles filled by PAs in New Zealand and overseas, the results of previous international trials, the success of the Middlemore trial, and positive comments from those involved in it. This information could be accompanied by a survey to identify what aspects of the PA role would be of use to providers and a strong message that PAs will not be taking anything away from the existing professions as there is no shortage of work to go around. Finally, key stakeholder groups could be provided with the opportunity to contribute to the further development of the scope of the role and identify and resolve any remaining industrial barriers. It would be ideal to combine all of this with an assessment of workforce vacancy and needs, training capacity, staff retention, and quality and safety in overstretched settings. In particular we suggest HWNZ work with RNZCGP and other stakeholders in the primary practice setting (such as nurse practitioners) to look at the nursing and medical workforce supply for primary care relative to demand, reach agreement on the workforce issues such as training capacity, retention, and workforce distribution and determine if there is a workforce need for the PA role in the primary care setting.

If it emerges through this thinking that the role is needed in primary care, a study tour should be organised in which key thought leaders (doctors, nurse practitioners, and union representatives) in New Zealand primary care would be invited to visit sites in Scotland, England, and the US for short placements in established practices where physician assistants are employed, to observe the role in action and prepare a report for HWNZ on their professional view of the usefulness of the role. Individuals would be selected to maximise buy-in within their professions and professional bodies. It would be important that an evaluation framework is developed to guide the site visits. It would incorporate a set of evaluation tools and templates to apply in a systematic way across the sites. Siggins Miller has developed a tool for the systematic assessment of sites as part of the evaluation of a national cancer workforce strategy for Health Workforce Australia (HWA) which could, with the permission of HWA, be adapted to suit the proposed site visits. From this process three in-depth

case-studies would be developed that would be assembled into a report which would be used to determine whether the PA role should be adopted in primary care in New Zealand.

In the hospital sector, the rising volumes driven by changing demand, considerable RMO workforce shortages, risks to the retention of current staff, and risks to the capacity for teaching and learning, have been brought into stark relief by the Physician Assistant trial at Middlemore. Some of the junior doctors who have experienced working with the PAs are now either considering or actively pursuing training opportunities in Australia. It appears therefore, that there is an increasing risk that junior doctors will leave to do their specialist training elsewhere, thereby creating a vicious cycle in which doctors leave to escape the pressures caused by workforce shortages thereby worsening the shortage which worsens the conditions and so on. In this context it would seem sensible that, provided the concerns of those stakeholders that still remain can be managed, HWNZ could consider taking the following actions (listed in order of priority):

- 1) work towards removing the regulatory barriers to PAs practicing to the top of their license;
- 2) recruit experienced PAs from the US on a contractual basis as an interim solution for whatever period of time the workforce data indicates is appropriate – these PAs could be given the opportunity to work as educators and mentors of those going through a New Zealand PA program;
- 3) assess the level of demand for PAs in the DHBs and, if it is deemed to be sufficient, establish PA training programs at New Zealand’s health workforce educational institutions and universities – in the interim, NZ students could be supported to train as PAs in overseas universities;
- 4) maintain connections with Australian PA training programs to encourage the sharing of experiences and conduct scoping and planning studies on the establishment and accreditation of trans-Tasman training programs to maximise economies of scale; and
- 5) recruit graduates of the University of Queensland PA program to compliment the US PAs – this would require the establishment of a supervisor workforce of experienced overseas PAs

Given the level of global experience with PAs, this new role could be confidently introduced in range of hospital settings including emergency departments, general medicine, acute and elective surgery, paediatrics, orthopaedics and preoperative assessment clinics. Based on the experience at Middlemore and the results noted in evaluations in other sites and settings, HWNZ could expect this to result in significant gains in continuity of care, productivity, efficiency, quality and safety, patient satisfaction, training capacity, and team morale, and a reduction adverse patient outcomes and staff stress and burnout, provided the PAs are allowed to work within their full scope of practice.

If stakeholder concerns remain at a level that precludes taking the course of action outlined above, an alternative could be to conduct several short demonstrations in hospital sites throughout New Zealand in a range of settings using imported PAs. These demonstrations would be of a much shorter duration than the Middlemore trial and would be designed specifically to address concerns about the role by directly exposing stakeholders to the benefits of working with PAs. To this end, continuous evaluation should be built in to the demonstrations from the outset to enable the longitudinal measurement of desired outcomes across the duration of the trial. Hospitals should also be allowed to nominate themselves as hosts of a demonstration and could be provided with a toolkit to help them design a team to place a PA. This “ground-up” approach is in contrast to the standard “top-down” approach in which a hospital is chosen and a PA is inserted into an existing team. In introducing the PA role to the hospitals’ teams, care should be taken to communicate with hospital staff prior to the PA’s commencement to provide them with detailed information on the PAs’ scope of practice and the date they will be commencing. Finally the demonstrations should also make use of the protocol-based sign-off rights recently approved by the medical council.

We do not advise pursuing the “upskilling” of nurses to fill a PA-like role or using nurse practitioners to fill the role. To have the same impact on productivity, efficiency, continuity of care, patient

satisfaction and adverse outcomes, nurses would have to do a full two-year postgraduate PA course where they would receive training in the medical model; the factor thought to be largely responsible for the improvements noted at Middlemore. Although their nursing experience would be beneficial, very few people who enter PA courses do so without having had some experience working in the health industry. Although there is a need to look at the organisational, cultural and system barriers to the full expression of the nurse practitioner role in the NZ system, in doing so it must be noted that the PA and NP roles are not the same. PAs are generalists trained in the medical model to work as assistants to allow doctors to work to the top of their license, while nurse practitioners are specialists trained in the nursing model to work as autonomous health professionals. While the two roles are not mutually exclusive, they are not interchangeable.

On balance, other than managing some remaining stakeholder concerns and the need to address the removal of system level impediments to full scope of practice there appears to be no reason not to proceed with the recruitment of US PAs to assist with relieving the rising pressures placed on the New Zealand workforce.

Appendix A: Program logic approach

A program logic model is a systematic way of summarising program components and how the program will work². The program logic models can be read as:

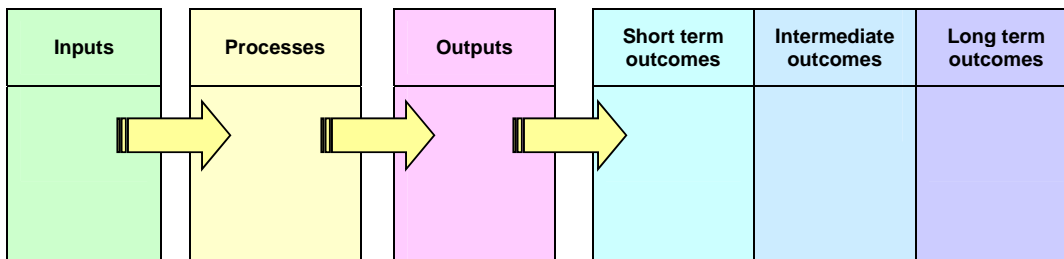
- with these inputs, these activities will be implemented;
- if these activities are implemented, these outputs (products or services) will be created or delivered;
- if these activities are implemented and outputs are created, these short-term outcomes (e.g. changes to the service system, increases in knowledge, changes to patient experience) will be achieved; and
- if these short-term outcomes are achieved, then these mid-term outcomes will be achieved, etc.

The basic components of a program logic are:

- *Inputs*: Set resources associated with the program, including the policy context, research base, and human, financial, organisational, community or system resources;
- *Processes*: Set of activities, practices or functions by which the resources are used in pursuit of the desired results;
- *Outputs*: Set of products anticipated by executing activities, practices or functions; and
- *Outcomes*: Set of changes in program participants, providers, organisations and/or systems, as a result of the program. They are often grouped by time increments into short- (1-3 years) and long-term (7-10 years)

An example of a generic program logic is illustrated below:

Figure 1. Generic Program Logic Model



Developing a program logic model is an important first step in any evaluation because it helps clarify the detail of a program's design and develops consensus on what a program is trying to achieve. This in turn provides a comprehensive framework to evaluate the program that will meet the organisational learning and development needs of the internal stakeholders, as well as the reporting and accountability needs of external stakeholders.

Another important benefit of the program logic approach is its capacity to directly and indirectly improve programs. Articulating program logic can expose faulty thinking about why the program should work, which can then be corrected.

Using the program logic approach ensures that the evaluation of the PA trial addresses issues associated with implementation progress, as well as program appropriateness, efficiency and effectiveness. Conducting the input, process and output evaluation provides data in relation to implementation progress and program efficiency (whether the design of the program achieves the

² W.K. Kellogg Foundation. Using Logic Models to Bring Together Planning, Evaluation, and Action Logic Model Development Guide. Battle Creek, Michigan: Author; 2004.

desired results with the most effective use of resources). On the other hand the outcome evaluation will measure program appropriateness (whether the program is based on evidence and established standards) and effectiveness (whether the program is achieving its objectives/the desired results). Program logic models are then supported by the development of evaluation matrices that assist with: a) determining the explicit performance indicators on which expected outcomes of a program can be evaluated; and b) identifying data sources. The evaluation matrix is also a valuable tool for identifying the various internal and external factors affecting the success of the project.

Program logic models alone do not take contextual factors into account. John Mayne, the eminent Canadian adviser on public sector performance, says a credible account of a program's performance must address the question "How much of the outcome is the result of the program, and how much is the result of other causes?"³. Mayne argues that making these attributions for outcomes is always a challenge, since decisive evaluations that can prove causality with scientific rigour are not always available; and complexity in a program's environment significantly complicates the analysis of its contributions.

The essential prerequisites, he says, are that:

- the program has an explicit theory of change (also known as a 'program logic');
- the program's activities were in fact carried out;
- there is evidence to support the program's theory of change;
- other influencing factors, internal and external, have been assessed.

Programs are embedded in their context, and these contexts affect how the program works and how individuals and groups react to them. Understanding the context of the interventions is as important as understanding the interventions themselves. Identifying non-program factors and considering and monitoring these in order to analyse the context allows evaluators to reflect more validly on attribution and contribution of both program and non-program (or contextual) factors, where randomised controlled trials are not possible. In this context we argue that quasi-experimental designs are impracticable and inappropriate. Even so, these designs will need to be supplemented with descriptive designs and methods to allow for full interpretation of findings and a deep understanding and analysis of lessons learned.

³ Mayne, J. (2008). Contribution Analysis: An Approach to Exploring Cause and Effect, ILAC Brief. Available at http://www.cgiar-ilac.org/files/publications/briefs/ILAC_Brief16_Contribution_Analysis.pdf

Program logic model

<i>Resources (or Inputs)</i>
<p>Policy Context:</p> <ul style="list-style-type: none">• PAs in the trial are ‘unregulated staff’ and are not registered by a New Zealand regulatory body• Scope of practice influenced by NZ legislation (HPCA Act, Medicines Act etc.).• PAs prevented from undertaking tasks that can only, by law, be undertaken by registered health practitioner <p>Funding:</p> <ul style="list-style-type: none">• HWNZ funding: PA salaries and relocation costs; project management up to the time of appointment of PAs; and development of project plan• CMDHB funding: practice location and facilities; PA induction and supervision; and on-going project management following commencement of the PAs <p>Governance and management arrangements:</p> <p><i>Steering groups:</i></p> <ul style="list-style-type: none">• Regional steering group comprised of Chief Medical Officers and other senior HR management personnel from four Northern Region DHBs and medical academics from Uni of Auckland• Counties Manukau Pilot Implementation Steering Group comprised of CMDHB personnel – CMO, deputy CMO, General Manager HR, Head of Department General Surgery, Clinical Directors of General Surgery, Anaesthesia, and the Manukau Surgical Centre, Director of Nursing, personnel from legal, communications and recruitment units and academics from the Uni of Auckland. <p>Partners:</p> <ul style="list-style-type: none">• HWNZ <p>Other Key Stakeholders:</p> <ul style="list-style-type: none">• Professional bodies; Staff working with the PAs; CMDHB human resource personnel; Senior medical officers/supervisors <p>Other resources/inputs:</p> <ul style="list-style-type: none">• Infrastructure of host hospitals and health service
<i>Activities (or processes)</i>
<p>Project Planning</p> <ul style="list-style-type: none">• Comprehensive discussion amongst senior management of the four Northern Region DHBs, and with Auckland University and HWNZ, to scope the relevance and feasibility of a PA pilot• Extensive consultation with the University of Auckland’s School of Medicine, relevant PA teaching institutions and professional bodies, and contemporary PA pilots in Australia• Development of a detailed strategy and action plan for establishing the trial• Development of detailed scoping papers – one focused on the potential ‘fit’ or suitability of the PA role to the New Zealand health workforce; the other focused on the feasibility and best approach for establishing and implementing a pilot, including the identification of key barriers to the trial and some suggested ways to mitigate those• Division of establishment tasks into work streams, to spread the workload and allocate tasks to appropriately skilled people <p>Governance</p> <ul style="list-style-type: none">• Recruitment and selection of Project Directors• Establishment of Steering Groups comprising people with a complementary range of relevant skills, expertise, experience, and the necessary authority to drive the trial and champion it publicly• Regular face-to-face Steering Group meetings throughout the trial’s establishment phase

Development of PA Role

- Early management of regulatory issues, to ensure the feasibility of employing US-trained personnel
- Development of a circumscribed PA scope of practice for the initial phase of the trial
- Development of supervision structures and standards
- Development of comprehensive PA recruitment, employment and induction systems and processes

Stakeholder Engagement

- Active championing of the initiative at a senior management level.
- Sector consultation and communication

Recruitment and Induction Phase

- Recruitment and selection of PAs
- Induction of PAs
- Communication with other staff with regards to PAs' roles and responsibilities

Implementation Phase

- Service delivery by PAs
- Supervision of PA's
- Policy and protocol review and refinement in relation to the PA role
- Formative evaluation of first three months of the implementation of the trial
- Design and implementation of the summative evaluation as a whole

Outputs**Project Planning**

- PA Relevance and feasibility document: "Physician Assistants in New Zealand – A Discussion Document"
- Detailed strategy and action plan for establishing the trial
- Two scoping papers: "Physician Assistant Scope of Practice and Details of Proposed Roles" and "Physician Assistants in New Zealand – A Discussion Document"

Governance

- Two Project Directors appointed
- Regional Steering Group and Counties Manukau Pilot and Implementation Steering Group established
- Number of meetings held
- Minutes of face-to-face steering group meetings

Development of PA Role

- Legal advice on regulatory issues
- Medical council advice on regulatory impediments.
- PA scope of practice documented
- Supervision structures and standards documented
- Recruitment, employment and induction systems and processes documented

Stakeholder Engagement

- Number and type of briefings provided
- Number and type of consultation meetings held.
- Reports of consultation meetings and processes

Program Evaluation

- Formative evaluation report produced

Physician Assistants

- Number and type of patients seen
- Number and type of supervision meetings held between medical staff and PAs

Short-term and intermediate outcomes (1 - 3 years)

- Improved theatre throughput
- Improved theatre utilisation
- Improved speed of treatment
- Improved continuity of treatment
- Reduction in adverse outcomes
- Improved patient satisfaction
- Alternative explanation of findings
- Generalisability
- Pilot program establishment, setup and implementation
- Possible future directions
- PA role development

Long-term outcomes (3 - 6 years)

System Level

- Decreased workforce shortages
- Decreased medical workforce maldistribution

Provider Level

- Improved retention of medical staff
- Sustained improvements in team productivity

Consumer Level

- Sustained improvements in patient satisfaction with interpersonal aspects of care
- Improved timeliness of access to care

Appendix B: Evaluation Matrix

Evaluation object	Key evaluation question	Performance Indicators	Data Sources
Outcomes			
Improved operating theatre efficiency	What was the impact of the PA positions on operating theatre efficiency?	<ul style="list-style-type: none"> Reduced length of from time on acute theatre list to operating time Reduced pre-op length of stay (totality – measured from time patient arrives at hospital) Earlier time of discharge Decrease in day of surgery cancellations/pre-surgery cancellations U 	<ul style="list-style-type: none"> Hospital clinical information system Key informant interviews
Improved productivity of teams containing PAs	What was the overall impact of the PA positions on the productivity of the teams they worked with?	<ul style="list-style-type: none"> Increased time spent in theatre for surgeons Decrease in surgeon overtime claims I 	<ul style="list-style-type: none"> Registrar training logs – time in and time out of theatre Payroll I Key informant interviews
Improved speed of treatment Improved continuity of treatment Reduction in adverse outcomes Improved patient satisfaction	What impacts did the PA positions have on patient outcomes, including speed and continuity of treatment, adverse outcomes or the avoidance and patient satisfaction?	<i>Improved speed of treatment:</i> <ul style="list-style-type: none"> Decrease in time to receive antibiotics once prescribed U <i>Reduction in adverse outcomes:</i> <ul style="list-style-type: none"> Decrease in patient-at-risk (PAR) calls Decrease in unplanned avoidable hospital readmissions U <i>Patient satisfaction:</i> <ul style="list-style-type: none"> Reduction in number of patient complaints 	<i>Improved speed of treatment:</i> <ul style="list-style-type: none"> PYXIS U <i>Continuity of treatment:</i> <ul style="list-style-type: none"> Key informant interviews <i>Reduction in adverse outcomes:</i> <ul style="list-style-type: none"> PAR database Key informant interviews <i>Patient Satisfaction:</i> <ul style="list-style-type: none"> Patient interviews Hospital complaint system
	How were these impacts achieved?	N/A	<ul style="list-style-type: none"> Key informant interviews
Alternative explanation of findings	To what extent can the outcomes be attributed	Expert informants agree/disagree with regards	<ul style="list-style-type: none"> Key informant interviews Results of

	specifically to PA training (for example would similar outcomes have been seen with an additional nurse joining the team)?	to the unique role and place of PAs relative to other disciplines in the current workforce structure	formative evaluation
Generalisability	To what extent are these findings likely to be generalisable to other sites?	N/A	<ul style="list-style-type: none"> • Key informant interviews • Results of formative evaluation
Pilot program establishment, setup and implementation	How effectively was the process of introducing PA positions managed?	<ul style="list-style-type: none"> • Time to recruitment • Retention of PAs • Success of orientation program • Success of communication with stakeholders 	<ul style="list-style-type: none"> • Key informant interviews • Interviews with PAs • Results of formative evaluation
Possible future directions	What factors should HWNZ take into consideration for the development of this role in New Zealand?	N/A	<ul style="list-style-type: none"> • Key informant interviews • Results of formative evaluation • Program documentation
PA role development during the trial	What roles did the PAs adopt? To what extent were these roles constrained by external factors such as regulations or the need to fit in with other positions in the teams?	Scope of practice developed	<ul style="list-style-type: none"> • Role descriptions in program documentation • Key informant interviews • Results of formative evaluation

U = Unavailable; I = Could not be interpreted

Appendix C: Contribution analysis

	Non-program factors	Program factors
Enablers	<ul style="list-style-type: none"> Highly efficient surgical unit with one of the highest levels of throughput in Australasia, proven experience in innovation, staff loyalty and good will towards new initiatives, and a new centre for innovation and training in the final stages of construction. Good working relationship with industrial bodies The specialized nature of the nursing workforce in NZ makes the generalist knowledge/experience of PAs highly valuable Good clinical information management systems in the host hospital Positive Attributes of PAs: <ul style="list-style-type: none"> very strong work ethic, personal maturity and self-confidence advocacy of the PA role and strong commitment to the trial strong communication skills with colleagues and patients team players with great ability to fit into the two teams competencies in working in a multicultural environment Highly skilled in forward thinking and problem solving Medical workforce shortages Nursing and medical professions' views of the need for and legitimacy of the PA role in the New Zealand context 	<ul style="list-style-type: none"> Early consultation with the Australian Pilot program Comprehensive scoping papers and comprehensive start up investment Selection of a general surgery unit for the location of the trial Visit by Ruth Ballweg, President of the Association of Physician Assistant Programs (US) to explain the PA role to staff with reservations Active championing of the role by SMOs and PAs Having two PAs working together provided the opportunity for them to support and mentor each other Training in the medical model provides PAs with common language to work in a delegated role to medical practitioners Clear job descriptions and roles and responsibilities Allowed for orientation and induction to the NZ health system as part of the trial design Clear policy and protocols for supervision Clear governance and steering committees established in early part of the trial
Barriers	<ul style="list-style-type: none"> Middlemore hospitals surgical teams have the highest throughput in Australasia which creates a ceiling effect that may limit the ability to achieve significant improvements in throughput and utilisation. Resistance from radiology department who felt they were not adequately consulted prior to the trial and are concerned about legal issues (e.g. a concern that PAs have not attended a course which provides the credentials to write out radiology requests/forms. Resistance from gastroenterologists – not putting through requests from PAs. Thought to be an issue of authority and status – they don't respect PAs. Junior doctors were sceptical of PAs Concerns expressed by nursing profession with regards to roles and responsibilities of advanced practice nurses versus PAs Legislative/regulatory requirements for full scope of practice for PAs 	<ul style="list-style-type: none"> Insufficient staff communications strategy to inform staff and stakeholders of trial initiatives, successes, barriers and the management of barriers. Formal supervision of the PAs not sustained for the life of the trial. PAs are working very long hours Loss of Project Director mid trial Governance has stalled and lost focus with steering group meetings not occurring resulting in a lack of a clear plan for progression of the trial. Limited by the requirement that they work under one SMO despite being capable of working under multiple SMOs Lack of time, resources, and structured planning devoted to expanding scope of practice resulting in a missed opportunity to fully demonstrate the PA's full potential Workload issues for members of governance and steering committees limiting consistency of meetings and capacity to plan for and implement PAs full scope of practice.

Appendix D: Quasi-experimental design

The 'gold standard' for assessing the impact of an intervention is a randomised controlled trial (RCT). That is, where units (in this case, Surgery Teams) may be randomly allocated to an intervention (the presence of a PA in the team) or control (no PA) group, so that variables that might impact upon the intended outcomes are evenly distributed between the two groups. However, RCT's are rarely feasible for evaluating interventions in the real world. Consequently, quasi-experimental methods (or natural experiments) are typically used.

Because of lack of randomisation there are a number of threats to internal validity⁴ so that observed group differences are hard to interpret. For example, group differences could be due to pre-existing differences between groups. As discussed by Cook and Campbell⁵, different quasi-experimental designs are subject to different threats to validity and there are a number of methods for addressing these problems. In this case, threats to internal validity include:

- *Selection* – The units chosen to host PAs may be higher performers than the comparison surgical teams
- *Confounding* - The populations serviced by the different surgical teams may differ in terms of acuity and case mix.
- *Interaction of confounding and selection* – A change in an important confounding variable could occur during the intervention period, for example staff turnover could affect team performance and capacity to continue to deal with existing case mix

These threats can be addressed by:

- Including a comparison group
- Measurement of confounding variables and multivariate data analysis
- Triangulation of data from multiple sources: key informant interviews with secondary data.

Given that data exists on the key outcome variables (improved operating theatre efficiency, improved productivity of teams containing PAs, improved speed and continuity of treatment, reduction in adverse outcomes and improved patient satisfaction) and possible confounding variables (case mix and staff mix) secondary analyses of existing data allowed for quasi-experimental evaluation methods.

⁴ Internal validity is the validity of causal inferences in evaluation studies. Threats to internal validity include confounding, selection bias, history, maturation, repeated testing, instrument change, regression to the mean, differential attrition, compensatory rivalry etc.

⁵ Cook, T. D., & Campbell, D. T. (1979). *Quasi-Experimentation: Design and Analysis Issues for Field Settings*. Boston: Houghton Mifflin Company.

Appendix E: List of Interviewees

Name	Position & Organisation	Status
Steering group members		
Donald Mackie	Ex-CMO	Interviewed
Dianne Wilson	Health Intelligence Unit Manager	Interviewed
Dr Wilbur Farmilo	Acting CMO	Interviewed
Denise Kivell	Director of Nursing	Interviewed
Andrew Connolly	Clinical Head of Surgery	Interviewed
Janet Anderson-Bidois	Senior Legal Advisor	Interviewed
Staff members		
Stethanie Jacobs	Physician Assistant	Interviewed
Kristan Wheeler	Physician Assistant	Interviewed
Graeme Anderson	Radiology Consultant	Interviewed
Stewart Hawkins	Radiology Consultant	Interviewed
Lynn Kane	Charge Nurse, CNM Ward 9	Interviewed
Helen Bretherton	Charge Nurse, CNM Ward 34 East	Interviewed
Melanie Olliff	Charge Nurse, CNM Ward 34 North	Interviewed
Richard Jurawa	Gastroenterology Research Fellow	Interviewed
Jon Morrow	General Surgery Consultant	Unavailable
Nicola Hodges	Registrar	Unavailable
Paul Fagan	House Officer	Unavailable
Lisa Dawes	House Officer	Interviewed
Anna Choi	House Officer	Interviewed
Susan Takerei	Patient at Risk Team Coordinator	Submission Received
Andrew Hill	General Surgery Consultant	Interviewed

External Stakeholders		
Kate Bell for Celia Devenish	Executive Officer, RANZCOG	Submission Received
Angela Belich	Assistant Executive Director, Association of Salaried Medical Specialists	Interviewed
Frances Townsend	Senior Policy Analyst, Royal New Zealand College of General Practitioners	Submission Received
Deborah Powell	National Secretary, New Zealand Resident Doctors' Association (Anna Paton referred us to Deb as she is more informed in this area)	Interviewed
Lucille Curtis	NZMA	Submission Received
Dr Sandra Hicks	GP and NZMA Board Member	Submitted response to NZMA
Anne Kolbe	Head of Auckland Clinical School, University of Auckland	Interviewed
Kate Baddock	Chair, General Practitioners Council	Submitted response to NZMA
Harvey White	Director of Coronary Care, Auckland City Hospital	No response
Allan Forde	Senior Lecturer, James Cook Uni, School of Medicine & Dentistry	Interviewed
Dr Stephen Child	General Physician, Director of Clinical Training, Auckland District Health Board	Interviewed
Oliver Hansby	President, NZ Medical Students Association	Unavailable
Michael Thorn	Senior Policy Adviser and Researcher, Medical Council of New Zealand	Interviewed
Susanne Trim	Policy Analyst, New Zealand Nurses Organisation	Interviewed
Carolyn Ready	Nursing Council	No response
Patients		
Pema Manga		Interviewed
John Hardgreaves		Interviewed

Joanna Painter		Interviewed
Unnamed Patient		Interviewed



**Steering Committee Focus Group Protocol for HWNZ Physician Assistant Summative Evaluation
2011**

We would like to engage with you in a facilitated discussion about your views on:

- the overall impact of the PA positions in the CMDHB environment, including both positive and negative effects and any unforeseen costs and benefits;
- the productivity benefits or costs of using PAs in the roles adopted in this trial;
- any processes that either facilitated or hindered the successful integration of the roles into the workforce;
- how processes around the trialling of the position from CMDHB, the Northern Region DHB group, HWNZ and MOH could be improved to provide the best possible information from future trials; and
- how the trialling of PA positions could be progressed in future;

More specifically, we wish to work through the evaluation questions with you and then ask you to reflect with us on some of the early feedback we have received from external stakeholders.

Note: Depending on the flow of the conversation these questions may not be asked in this order and some questions may become redundant due to responses to earlier questions.

- 1) What was the impact of the PA positions on operating theatre throughput and utilisation and how was this achieved?
- 2) What was the overall impact of the PA positions on the productivity of the teams that they worked with?
- 3) What impacts did the PA positions have on patient outcomes, including speed and continuity of treatment, adverse outcomes or their avoidance and patient satisfaction? How were these impacts achieved?
- 4) To what extent are these findings likely to be generalisable to other sites?
- 5) How effectively was the process of introducing PA positions managed?
- 6) To what extent can the outcomes be attributed specifically to PA training (for example would similar outcomes have been seen with an additional nurse joining the team)?
- 7) What roles did the PAs adopt? To what extent were these roles constrained by external factors such as regulations or the need to fit in with other positions in the teams?
- 8) What factors should HWNZ take into consideration for the development of this role in New Zealand?

- 9) I'd like to look at some of the main lessons you have learned in this trial that should be taken into account in future trials. If you had to start again, what would you do differently when planning and governing the trial? What do you believe was done well?
- 10) Do you believe the lack of formal supervision of PAs for the duration of the trial negatively impacted on the ability to trial the PA role?
- 11) What impact, if any, do you believe the loss of the project director and lack of consistent meetings had on the trial?
- 12) A few concerns have been raised by external stakeholders and we would like to get your perspective on them. These concerns are that:
 - a. introducing PAs will reduce the amount of time available for the training of junior doctors.
 - b. similar outcomes could have been achieved through the introduction of an additional nurse or an administrative role such as a ward clerk and are not the result of PA training.
 - c. the results observed at Middlemore are more to do with Stethanie and Kristan's exemplary personal qualities and depth of experience than their training as PAs.

Can you reflect with me on whether or not you believe these concerns are substantiated and why?



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**Radiology and Gastroenterology Protocol for HWNZ Physician Assistant Summative Evaluation
2011**

Information for participants

Project background

Counties Manukau District Health Board (CMDHB) is currently being funded by Health Workforce New Zealand (HWNZ) to conduct a 12 month trial of two Physician Assistants to determine (1) whether the role is relevant, accepted and of value within the New Zealand workforce, and (2) if efficiencies in service delivery are achievable through the use of PAs without compromising quality and safety of service. In 2010 a formative and summative evaluation of the PA trial was commissioned by the Clinical Training Agency (since incorporated within HWNZ). Health Workforce New Zealand commissioned Siggins Miller to undertake a summative evaluation of the implementation and impact of the Physician Assistant (PA) demonstration project at Counties Manukau District Health Board (CMDHB) that builds on the findings of the formative evaluation completed by Pam Oliver and associates in April 2011. Members of this project team are: Professor Mel Miller, Professor Ken Donald, and Mr Cameron Elliott.

Staff Consultations

Information obtained from CMDHB staff will be used in conjunction with information obtained from external stakeholders, patients, and quantitative hospital data to inform the final report for this project. Your participation in this consultation process is entirely voluntary and you may withdraw your participation at any time, for any reason. The information you provide will be used solely for the purpose of this project. If you have any questions or concerns about your participation in this consultation process, please feel free to contact Bernard Woodhams from HWNZ (Bernard_Woodhams@moh.govt.nz), Professor Mel Miller (mel.miller@sigginsmiller.com.au) or Cameron Elliott (cameron.elliott@sigginsmiller.com.au).

We value your input and time and look forward to working with you on this important project.

Warm regards

Professor Mary-Ellen Miller



Note: Depending on the flow of the conversation these questions may not be asked in this order and some questions may become redundant due to responses to earlier questions.

- 1) Have you had any direct experience working with the PAs in this trial? If so, have you observed any expected or unexpected positive or negative consequences of the introduction of the PA role. Why do you think they occurred? If not do you feel able to comment on any expected or unexpected positive or negative consequences of the introduction of the PA role and why do you think they occurred?
- 2) Do you consider the PA role to be useful and relevant to the New Zealand health system?
- 3) How effectively do you believe the process of introducing the PA role to Middlemore Hospital was handled?
- 4) Further trials have been proposed for the PA role; what are some of the main lessons learned in this trial that should be taken into account in these future trials?
- 5) What factors should be considered in the further development of the PA role in New Zealand?



Physician Assistant Protocols for HWNZ Physician Assistant Summative Evaluation 2011
Information for participants

Project background

Counties Manukau District Health Board (CMDHB) is currently being funded by Health Workforce New Zealand (HWNZ) to conduct a 12 month trial of two Physician Assistants to determine (1) whether the role is relevant, accepted and of value within the New Zealand workforce, and (2) if efficiencies in service delivery are achievable through the use of PAs without compromising quality and safety of service. In 2010 a formative and summative evaluation of the PA trial was commissioned by the Clinical Training Agency (since incorporated within HWNZ). Health Workforce New Zealand commissioned Siggins Miller to undertake a summative evaluation of the implementation and impact of the Physician Assistant (PA) demonstration project at Counties Manukau District Health Board (CMDHB) that builds on the findings of the formative evaluation completed by Pam Oliver and associates in April 2011. Members of this project team are: Professor Mel Miller, Professor Ken Donald, and Mr Cameron Elliott.

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We value your input and time and look forward to working with you on this important project.

Warm regards

Professor Mary-Ellen Miller

- 1) Can you describe in detail for me the roles and responsibilities you have had and any limitations placed on your scope of practice?
- 2) Can you please describe how you have worked with registrars, residents, house officers and nurses?
- 3) In the New Zealand context the PA position was an entirely new role being inserted into well-established teams of professionals with well understood and delineated roles, ground rules, and ways of working together. What lessons, if any, were learned from your entry to the team and the inevitable reorientation that occurs when a new role is inserted? How would you recommend that teams be prepared for working with the PA role in the future?
- 4) Were there any ways that your team members reacted to you and the role which might be useful to document for future trials and implementation? Are there any other lessons you and your team have learned in this trial that should be taken into account in future trials?
- 5) What modifications, if any, have you made to the way you work and behave to better fit into the New Zealand health system?
- 6) We understand that your formal supervision has varied from what was originally specified. Can you reflect with us on the extent, nature, and quality of the supervision you received during the trial?
- 7) What do you think would need to change at the operational level of the hospital to get the most out of the PA role?
- 8) In what ways, if any, would the culture of the hospital need to change to get the most out of the role?
- 9) In what ways, if any, would the New Zealand health system need to change to get the most out of the PA role?
- 10) What improvements and successes, if any, have occurred at Middlemore as a result of the introduction of the PA role to Middlemore hospital?
- 11) Based on your experience in the US do you expect that similar improvements would be seen in other hospitals and settings such as primary care, A&E etc. If so, why? If not, why?
- 12) A few concerns have been raised by stakeholders in our interviews with them and it would be great to get your perspective on them.
 - a. It has been suggested that the results observed at Middlemore are more to do with your exemplary personal qualities and depth of experience than your training as a PA. Can you reflect on this with me?
 - b. It has been suggested that the performance of new graduate PAs would be significantly lower than yours and that, as a result, the findings of this trial cannot be generalized to new graduates. In your experience, how practice ready are new graduates? Would similar results have been observed with recent graduates? Do you know enough about the history of PAs in the US to talk to us about what happened to early career practitioners when the role was first created?
 - c. A few stakeholders have commented that similar results could have been achieved through the introduction of a nurse or an additional administrative role such as a ward clerk. To what extent do you believe the outcomes of the trial can be attributed specifically to PA training?

- d. A common concern is that introducing PAs will reduce the amount of time available for the training of junior doctors. Has this been your experience at Middlemore?
- 13) With the wisdom of hindsight what would you suggest is done differently in future trials of the PA role?
- 14) What do you believe should be the next step in the development of the PA role in New Zealand?



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House Officers, Registrars and Charge Nurses Protocol for HWNZ Physician Assistant Summative Evaluation 2011

Information for participants

Project background

Counties Manukau District Health Board (CMDHB) is currently being funded by Health Workforce New Zealand (HWNZ) to conduct a 12 month trial of two Physician Assistants to determine (1) whether the role is relevant, accepted and of value within the New Zealand workforce, and (2) if efficiencies in service delivery are achievable through the use of PAs without compromising quality and safety of service. In 2010 a formative and summative evaluation of the PA trial was commissioned by the Clinical Training Agency (since incorporated within HWNZ). Health Workforce New Zealand commissioned Siggins Miller to undertake a summative evaluation of the implementation and impact of the Physician Assistant (PA) demonstration project at Counties Manukau District Health Board (CMDHB) that builds on the findings of the formative evaluation completed by Pam Oliver and associates in April 2011. Members of this project team are: Professor Mel Miller, Professor Ken Donald, and Mr Cameron Elliott.

Staff Consultations

Information obtained from CMDHB staff will be used in conjunction with information obtained from external stakeholders, patients, and quantitative hospital data to inform the final report for this project. Your participation in this consultation process is entirely voluntary and you may withdraw your participation at any time, for any reason. The information you provide will be used solely for the purpose of this project. If you have any questions or concerns about your participation in this consultation process, please feel free to contact Bernard Woodhams from HWNZ (Bernard_Woodhams@moh.govt.nz), Professor Mel Miller (mel.miller@sigginsmiller.com.au) or Cameron Elliott (cameron.elliott@sigginsmiller.com.au).

We value your input and time and look forward to working with you on this important project.

Warm regards

Professor Mary-Ellen Miller

Note: These questions may vary subsequent to conversations with the steering committee and Kristan Wheeler on Monday the 29th of August. Depending on the flow of the conversation these questions may not be asked in this order and some questions may become redundant due to responses to earlier questions.

- 1) What roles did Stethanie/Kristan adopt? Do you believe the scope of her role was limited, and if so, what was it limited by? (Prompts: lack of prescribing rights, unable to take consent)
- 2) Can you please reflect with me on any expected or unexpected positive or negative impacts Stethanie/Kristan had on operating theatre efficiency? How and why did these changes occur? (Prompts: earlier time of discharge, reduced pre-op length of stay, decrease in day of surgery cancellations)
- 3) Can you please reflect with me on any expected or unexpected positive or negative impacts Stethanie/Kristan had on the productivity of your team? How and why did these changes occur?
- 4) Can you please reflect with me on any expected or unexpected positive or negative impacts Stethanie/Kristan had on the speed and continuity of treatment? How and why did these changes occur?
- 5) Can you please reflect with me on any expected or unexpected positive or negative impacts Stethanie/Kristan had on the number of adverse outcomes that occur in your team? How and why did these changes occur?
- 6) Can you please reflect with me on any expected or unexpected positive or negative impacts Stethanie/Kristan had on patient satisfaction? How and why did these changes occur?
- 7) To what extent can the improvements you have mentioned be specifically attributed to the training PAs receive? Would similar improvements have occurred with the addition of another nurse or administrative role such as a ward clerk to your team?
- 8) To what extent can the improvements you have mentioned be specifically attributed to the personal qualities of Stethanie/Kristan rather than the PA role itself?
- 9) What do you believe should be the next step in the development of the PA role in New Zealand?
- 10) Further trials have been proposed for the PA role; what are some of the main lessons you and your team have learned in this trial that should be taken into account in these future trials?
- 11) Do you believe the improvements that have occurred as a result of the introduction of the PA role would occur at other sites and in other settings? If not, why is this and what other sites and settings should the role be piloted in?
- 12) In the New Zealand context the PA position was an entirely new role being inserted into well-established teams of professionals with well understood and delineated roles, ground rules, and ways of working together. Were there any lessons learned from Stethanie/Kristan's entry to the team and the inevitable reorientation that occurs when a new role is inserted? How would you recommend that teams be prepared for working with the PA role in the future?
- 13) A common concern is that introducing PAs will reduce the amount of time available for the training of junior doctors. Has this been your experience at Middlemore?



General Surgery Consultant Protocol for HWNZ Physician Assistant Summative Evaluation 2011
Information for participants

Project background

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We value your input and time and look forward to working with you on this important project.

Warm regards

Professor Mary-Ellen Miller

Note: Depending on the flow of the conversation these questions may not be asked in this order and some questions may become redundant due to responses to earlier questions.

- 1) Using data collected by the hospital we will be comparing the differences between teams with PAs and teams without PAs in operating theatre efficiency, team productivity, speed of treatment, reduction in adverse outcomes or patient satisfaction. Have there been any major alterations to your processes, team, case –mix etc. during the trial period that may account for any observed changes in these variables?
- 2) Do you consider the PA role to be useful and relevant to the New Zealand health system?
- 3) How effectively do you believe the process of introducing the PA role to Middlemore Hospital was handled?
- 4) Further trials have been proposed for the PA role; what are some of the main lessons learned in this trial that should be taken into account in these future trials?
- 5) What factors should be considered in the further development of the PA role in New Zealand?

Appendix G: Quotes by interviewees

Improved productivity of teams with PAs

Working with PAs was a positive experience

“As far as I am aware from everyone that I have spoken to, which is a lot of my colleagues who have been on my team and have had the physician assistant [working with them]; they have found it to be a very positive experience”

(House Surgeon)

“They’ve been a great part of our team and I will be sad to see them go.”

(Charge Nurse)

PAs improving communication and teamwork

“You notice it in the teams that don’t have a PA. You see the gaps in communication, organisation and teamwork. That’s not to say they don’t get the job done but it’s just not at the same level.”

(Charge Nurse)

“The PAs have been particularly great in terms of communication. We often find communication between nurses and the rest of the team very challenging and they have made this easier.”

(Charge Nurse)

PAs reduced co-worker stress

“I would have really struggled if I had not had her [the PA].

(House Surgeon)

“My colleagues and I just feel that we are in a pretty safe sort of environment, we don’t have to worry about as many things.”

(Clinical Head of Surgery)

“When my PA had a holiday, the house surgeon on my team applied for additional duties payments because he thought his job had got significantly worse.”

(Clinical Head of Surgery)

“Having the PA gives me extra comfort because I know that the minute I say ‘Hang on a minute I am worried about this patient, I can’t put my finger on it, can you come and review’ they will come straight away. And they know what to do next and I feel I can back off and feel reassured.

(Charge Nurse)

PAs allowed house officers to perform more clinically-relevant tasks and receive more education and training



Continuity of treatment

“There will be a real gap when they leave. They formed the back bone of the team. They were the gel. Particularly in general surgery where you have so many people going to clinics, surgery, radiology, it is very hard to get consistency with the team and the PAs provided that consistency.”

(Charge Nurse)

“One of the huge benefits that we have found has been continuity of care; learning the team structure, learning the protocols, learning the way the team functions and passing that on to succeeding runs of RMOs. That is something that cannot be undervalued.”

(Acting CMO)

“When I came on to the team, she [the PA] knew the patients inside out so the handover and the continuity of care was fantastic.”

(House Surgeon)

“The registrar and consultant are so often in theatre but the PAs are always available so it will be the PA that they [the house surgeons] go to. They have become a guide to them to the area, the processes and patient care.”

(Charge Nurse)

Patient satisfaction



“They [the patient] have no clue of what is going on which makes them frustrated and unhappy. You just have to understand where they are coming from, sit down with them and explain [what is happening] to them. That is how you get the message through and ease the situation.”

(PA)

Pilot program establishment, setup and implementation

“They [the nurses] didn’t understand quite what the PAs were and weren’t allowed to do. Our educator liaised with them to tell them what they [the PAs] could do. And we got Stethanie and Kristan to come and talk to the nurses on the ward. That was a lesson that we learned; you can’t just plunk them in there you have to prepare the nurses on who these people were.”

(Charge Nurse)

“I had no formal knowledge that the PA role was going to be introduced. It took a while for me to adapt because I didn’t know what the role of this person was or what they were able to do. We learned it as we went along. I am afraid the role was not clearly defined from the beginning. It took a few weeks before everyone became comfortable with what they could do.”

(Gastroenterology Research Fellow)

Alternative explanations for the findings

“We are trained in a general, certifiable, and reproducible fund of knowledge. We are all trained in the same way. We are one of thousands. We are not exceptional in our field. There are people who are far more skilled than I am in surgery.”

(PA)

“I know for a fact that it is not just me. Every six years we have to be recertified and we have to do 100 hours of medical education every two years.”

(PA)

“They are outstanding individuals but with good training you can have a consistently high standard of PAs. If you set the bar high and make the job attractive and expect a lot from them I am sure the right people will come along and deliver.”

(Charge Nurse)



Appendix H: Literature review of PA pilot programs and their evaluation

According to Hooker *et al* (2007), the countries that have introduced PAs into their healthcare systems in some form are Australia, New Zealand, England, Scotland, Canada, The Netherlands, Ghana, Ireland, Kenya, Nicaragua, South Africa, Thailand and Taiwan. Most of these countries face similar health workforce challenges - a growing and ageing population needing increasing chronic and complex care, and a decreasing supply of the health care professionals needed to supply that care, particularly in rural areas. They have trialed the PA role as a partial solution to these needs.

Many of these countries have modeled the PA role on the US model. Other countries (for example, The Netherlands) have adapted their own interpretation of the role (Spenkelink-Schut 2008).

Most PA trials to date are pilots that have used US-trained PAs imported to rehearse the role of a PA in local health care systems. Countries where US-trained PAs have been imported to trial include New Zealand, England, Scotland and some Canadian Provinces, and also Australia (one in South Australia and the other in Queensland).

These trials potentially represent significant changes to health services and their staff. Evaluative components are therefore embedded in these Australian trials. The review of these pilots will consider the set-up of the trials and the evaluation design and findings, taking account of the issue of attribution and contribution in assessing the results. In the context of a complex healthcare system, contribution analysis is highly relevant, as it examines considers other influencing factors in assessing the contribution of the PA trials (see Mayne 2000). Introduction of PAs into particular healthcare settings is not a standardised intervention, and the findings need to attend to the character and influence of the contexts in which the trails have occurred.

South Australian Physician Assistant trial

The first trial of PAs in Australia began in 2008, initiated by the South Australian Department of Health. The trial employed four US-trained PAs in three urban teaching hospitals. Two PAs started in the Department of Surgery at Queen Elizabeth Hospital (TQEH), one PA in the Department of Anaesthesia at Royal Adelaide Hospital (RAH), and one PA in the Paediatric Outpatients Clinic at Flinders Medical Centre (FMC). These placements were identified as areas of clinical need. Each PA was introduced for one year, and strategically placed to display the range of PA contributions.

Evaluation of the trial was conducted by an independent consultant, Healthcare Management Advisors (HMA). Pilot objectives, identified by HMA to guide evaluation of the implementation and outcomes of the trial, were adopted by SA Health (HMA 2010):

- What organisational features facilitated or inhibited effective implementation of the PA role?
- What was the contributory value of the PA role? This was assessed in terms of health service impact, clinical outcomes, patient impact, and workforce impact.
- What is the fit and applicability of the PA role within SA Health?
- What is required to support transferability and sustainability of the PA role? (.

Implementation

Guidance and supporting structures, required for successful management of change efforts (Sutton & Kahn 1986), were implemented in the SA trial. Governance and facilitation of the trial was the responsibility of the SA Health Physician Assistant Steering Committee comprised of various health workforce stakeholders. Even though governance frameworks were established, the Steering Committee had to delay the beginning of the trial by 6 months because of unforeseen issues of implementation largely around limited understanding of the role of the PA in an Australian context (HMA 2010). They included creating employment contracts that specified remuneration. At the

Queen Elizabeth site, it took 13 months to establish a policy that allowed the introduction of PAs (Ho 2011). Recruitment difficulties also meant that one PA was engaged only one week before the end of the evaluation period, so that this PA's contribution was not assessed. The HMA evaluation recommended that greater planning needed to be applied to ensure smoother transitions (HMA 2010).

Scope of practice was a major hindrance throughout the trial. Part of the Steering Committee's responsibility was to develop standards for the recruitment and management of the PAs, while SA Health managed legislative matters concerning prescribing rights, radiological investigations and pathology, as guided by the standards document; but these bodies had difficulty obtaining authority for the PAs to prescribe medications and order radiology tests.

While the scope of practice emerged over the course of the trial so as to ensure a safe work environment, the difficulty in obtaining authority meant that the PAs could not carry out all the tasks for which they were certified in the US system. At one of the sites, it took three months from when the PAs began before they could use their full prescribing license (Ho 2011), but they were still barred from prescribing Schedule 8 drugs (such as post-operative pain management medications). Over the course of the trial, PAs were permitted to order pathology tests without delay, but were limited in some other clinical practice rights available in their US roles. These factors posed inefficiencies in patient care and limited the PAs' opportunity to demonstrate the range of their abilities. As a result, prescribing and radiology licensing appears to be an important implementation barrier to overcome in relation to the PA role.

Contributory value

HMA's evaluation reports that the four PAs made a positive contribution to health service delivery, clinical outcomes, patient impact, and workforce impact. While the evaluation method included a range of data types and collection strategies at multiple time points, there were some limitations in the capacity of the quantitative data to assess the PAs' contribution. The quantitative data used to inform these outcomes varied according to the specific role of the PA at each site: the trial sites were charged with the task of identifying productivity indicators (clinical activity, outcomes, patient waiting-times, and throughput data), and then gathering information on the selected indicators. This *ad hoc* method of collecting data restricted the potential for comparisons across the sites where PAs were deployed, and diminished the strength of conclusions made about PAs in health service impact, clinical outcomes, patient impact, and workforce impact. The findings were largely descriptive rather than inferential in nature, and did not assess other contextual influences. Caution must be exercised in attributing positive results to the PAs' activities alone.

Nevertheless, across the three sites, HMA observed the following over the course of the trial:

Health service impact:

- Waiting lists decreased (At TQEH additional clinics were established)
- Increases in patient throughput

Clinical outcomes:

- PAs identified medical conditions requiring further intervention
- PA involvement in audit processes identified compromised patient care which resulted in amended protocols
- FMC did not collect data

Patient impact:

- Patients considered the PA to be a part of the medical team
- Patients were either satisfied or very satisfied with care provided

- Patients believe the PA had enhanced patient care

Workforce impact:

- No negative impacts on junior medical staff training opportunities, in fact training opportunities were increased
- Positive impacts on supervisor job satisfaction
- Nursing staff concerned about impacts on career opportunities

Trial participants thought there were likely improvements in cost-effectiveness owing to the PA role, but this was not assessed.

The length of the trial may have affected the ability of the pilot to demonstrate the usefulness of the PAs. In particular, it may not have been long enough to allow for the impact of the positions to become evident. Anecdotal evidence also suggests that some staff at the RAH were unsure of the PA roles and responsibilities months into the trial, a factor that may have impeded the efficiency of service delivery (HMA 2010). A longer trial may have been required to demonstrate greater value of PA contributions to SA Health services.

It is difficult to ascertain whether improvements observed from the trial were due to the unique skill set of the PA, or the simple presence of additional staff members, or other factors. Since the design of the trial ensured that the PAs were placed in areas of clinical need not covered by other staff, the fact that the PAs made contributions to improvements may or may not have been due to their specific expertise. Similar ancillary health professionals were not available for a trial where the value, contribution and cost-benefit of the PA compared to other professions could be assessed.

Fit and applicability of the PA role

The PAs themselves, in describing their experiences in the SA trial, said they were positive and optimistic for the future of the PA role in Australia. Three of the four PAs involved in the trial were invited to extend their stay in Australia, a development which demonstrates interest in the role (Pesicka 2010).

Even though it is asserted that nurses practice ‘nursing’, and PAs practice ‘medicine’ (Urbis 2010), the HMA evaluation found that informants agreed the PA role could be performed by another professional such as a nurse or a junior doctor. A cost-benefit analysis was not done to explore whether this would be a financially viable option, nor were examinations made into the interest of nurses or junior doctors’ in undertaking PA-type positions.

Qualitative data also indicated that the PAs had no detrimental effect on the training requirements of junior doctors and interns, and that in fact their training opportunities were enhanced.

Transferability and Sustainability of the PA Role in SA Health

Characteristics of the PA role considered transferable across the SA health system included:

- non-rotating position,
- broad-based training background in the medical model, and
- ability to communicate across all staff levels (HMA 2010).

However, as the trial consisted of four PAs across three urban hospitals, transferring findings to rural and remote areas or private hospitals remained uncertain. The data collection methods used during the SA trial also limit the generalisability of its findings.

Queensland Physician Assistant Trial

In Queensland, a 12-month pilot was established in 2009 to assess the effectiveness of five US-trained and qualified PAs distributed across four sites in Queensland, including rural and remote



areas. These PAs were recruited for their demonstrated experience and resilience in dealing with new situations. They were remunerated based on a salary equivalent to that of a Nurse Practitioner (Urbis 2010; Dennis Pashen personal communication).

The PAs were placed in both primary and secondary care settings. One was placed in the Interventional Cardiology Unit of Princess Alexandra Hospital in Brisbane. Two were placed at the Cooktown Multi-Purpose Health Service; one in the Emergency Department of the Mt Isa Hospital; and one at a GP clinic and local hospital at Normanton.

An independent consultancy, Urbis, was contracted by Queensland Health to provide an assessment of the PA Pilot. The final evaluation focused on four key areas, assessed using a number of methods:

- the value of PAs’ contribution to the capacity of the health care team to address patient needs,
- legislative facilitative or inhibitory factors surrounding implementation and effectiveness of the role,
- the fit of the PA role within Queensland Health, and
- sustainability requirements beyond the pilot.

The evaluation framework to assess the trial was grounded in program logic theory. Within this framework, the methods used included a review of relevant literature and documentation, fieldwork at tan three sites, interviews and focus groups, surveys, and analysis of service activity and scope of practice. Pre- and post-assessments surveys, and were distributed to examine changes in attitudes across various group of staff affected by the PA role or had interacted with the PAs. After the PAs and other team members had established working routine, patient surveys were conducted (Urbis 2010).

There were =delays in setting up the Queensland trial: recruitment was made difficult by economic; there were barriers to implementation similar to those experienced in the SA trial; and substantive claims could not be made owing to the small sample size. Accordingly, the Urbis evaluation report states: “Pilot findings should be read as indicating the need for further research and demonstration of the PA role within Queensland Health” (Urbis 2010).

The evaluation therefore focused on telling the story of how the PAs were engaged with new teams and the health environment, and on increasing understanding of the strategic and potential value of the PA role in Queensland Health.

Difficulties in gaining access to statistical data including waiting times, length of stay and throughput inhibited the review’s ability to provide evidence of the contribution of the PA role to the evaluation sites and to the wider health system. High turnover of staff in clinical sites throughout the trial also limited the quality of the data collected, since some of those who completed the pre-pilot assessments did not complete post-pilot assessments.

Despite the limited availability of objective sources of data to support increased productivity claims, findings from the evaluation suggest that, at all the sites where PAs were deployed, a range of staff members considered that they had contributed to improve the functioning of service delivery. Specifically, the PAs were measured against six domains of quality identified by the US Committee on Health Care Quality: safe, effective, patient-centred, timely, efficient, and equitable care. Most of the findings reported in these six domains were based qualitative data.

Table 1 Queensland Trial findings measured against Domains of Quality

Domain	Findings
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<p>1. Safety <i>Avoiding injuries to patients from the care that is intended to help them.</i></p>	<ul style="list-style-type: none"> · Pre to post staff survey responses for PA quality of care (61%-80%) and safety of care (53%-70%) increased significantly · This finding is similar to those reported in NHS England and Scotland trials.
<p>2. Effective (<i>“effective” findings were based on qualitative data</i>) <i>Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively).</i></p>	
<p>2.1 Team Capacity</p>	<ul style="list-style-type: none"> · PAs had a positive impact on service delivery (increased throughput) across trial sites.
<p>2.2 Continuity</p>	<ul style="list-style-type: none"> · The PA position was referred to as a “go-between” for the nurses and doctors where PAs possess the ability to respond to nurses queries about medical charts rather than asking the case doctor.
<p>2.3 Task Delegation</p>	<ul style="list-style-type: none"> · The presence of PAs enabled doctors to redistribute tasks to those most clinically able. · It was noted this potentially enabled freed doctors to give attention to junior doctor/intern training requirements
<p>2.4 Flexibility</p>	<ul style="list-style-type: none"> · Those involved in the trials noted that an additional health worker (regardless of title) contributed to service capacity. · Concerns were raised about the potential for PAs to replace nurses and doctors, rather than expand on the health care team. One doctor suggested the potential of the PA role to act as a retention strategy, especially in rural locations.
<p>3. Patient-centeredness <i>Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.</i></p>	
<p>3.1 Patient engagement</p>	<ul style="list-style-type: none"> · 91% of patients were ‘very satisfied’ with PA patient care and would be ‘definitely willing’ to see a PA on a subsequent visit patients (response rate was not recorded, therefore only patients who were satisfied with PA service may have completed the survey) · Patients’ responses indicate that PAs had a heightened sense of patient care in terms of quality of information, courtesy, clarity of explanations, listening skills, and respected cultural and/or religious needs.
<p>4. Timely <i>Reducing waits and sometimes harmful delays for both those who receive and those who give care.</i></p>	<ul style="list-style-type: none"> · At Cooktown, patient waiting times decreased according to anecdotal reports. · At PAH movement through the clinical process was purportedly faster. · At Mt Isa, attendance data revealed reduction in category 5 presentations to emergency from February 2009 to February 2010.
<p>5. Efficient <i>Avoiding waste, including waste of equipment, supplies, ideas and energy.</i></p>	<ul style="list-style-type: none"> · PAs considered limited scope of practice (i.e., seeking out a doctor to co-sign prescriptions and Centrelink forms and to conduct the consent process) as a detriment to their ability to contribute to the efficiency of the health care system. · Cost-efficiency was not assessed.

Equity of service was not assessed. Nevertheless, the evaluation report states: *“Increasing services to Aboriginal and Torres Strait Islander patients, who are traditionally less able to access services, and in rural and remote locations, may also be said to have increased the equity of health care delivery.”*

In terms of organisational integration, some data showed an increase from 32% to 50% in the proportion of staff who felt that the PA role complemented the health care system and existing positions. Nurses and doctors said the benefits of the pilot outweighed the drawbacks to the system, but junior doctors and nurse practitioners in particular were concerned that there should be continued commitment to the existing health workforce. Doctors interviewed at the end of the pilot thought the role had potential to relieve medical workforce pressures through task delegation under supervision. However, supervising doctors said adjustments might need to be made to the Australian

health system if the benefit of PAs was truly to be felt. They emphasised that PAs were restricted in practice by not having a Medicare provider and prescriber number – an obstacle also noted in the SA trial.

The trial provided some limited evidence to suggest the introduction of PAs may address Queensland Health's *Strategic Plan 2007-2012* (in pursuit of "attracting and retaining skilled professionals, especially for specialist services and in rural and remote areas" (Urbis 2010)

Subjective evidence suggested that rural doctors considered PAs to be vital addition to the healthcare system. One Cooktown doctor said: *"They have made a significant difference and, to be honest, the thought of working a weekend without them is overwhelming. It has been so helpful having them around... we are all lamenting their departure."*

A recently graduated PA indicated willingness to practice in a rural location: *"My dream job would be rural; a family practice with general surgery options"* (Sweet 2011).

The Queensland Aboriginal and Islander Health Council has been scoping the potential benefits of having PAs in their communities (Sweet 2011). In lieu of quantifiable data, anecdotal evidence suggests PAs integrated with Aboriginal and Torres Strait Islander communities well. However, although the trial took place in areas with large Aboriginal and Torres Strait Islander populations (Mt Isa and Cooktown), few Indigenous patients completed patient surveys.

Even though the Queensland trial elicited some promising findings requiring further investigation, proponents who took part in the pilot are frustrated that its findings have not led to action to implement the PA role (Sweet 2011).

New Zealand Physician Assistant Trial

A 12 month trial with two US trained PAs in general surgery was undertaken by the Counties Manukau District Health Board (CMDHB) in New Zealand. The trial began in September 2010 under the governance of two steering committees, and is funded by Health Workforce New Zealand (HWNZ). The trial is to be completed in September 2011. It was intended to determine (1) whether the role was relevant, accepted and of value within the New Zealand workforce, and (2) whether efficiencies in service delivery were achievable by using PAs without compromising quality and safety of service.

HWNZ commissioned a formative evaluation of the trial in 2010 (Oliver 2010, unpublished), and in 2011 appointed Siggins Miller to make a summative evaluation of the implementation and impact of the PA trial. The purposes of the summative evaluation are:

- To determine the overall impact of the PA positions in the CMDHB environment, including both positive and negative effects and any unforeseen costs and benefits.
- To determine the productivity benefits or costs of using PAs in the roles adopted in this trial.
- To identify processes that either facilitated or hindered the successful integration of the roles into the workforce.
- To identify how processes around the trialling of the position from CMDHB, the Northern Region DHB group, HWNZ and MOH could be improved to provide the best possible information from future trials.
- To suggest how the trialling of PA positions could be progressed in future.

The evaluation strategy uses descriptive methods to answer questions about program implementation and outputs, and a quasi-experimental design for questions about program outcomes. Contribution analysis will help interpret whether the results can be attributed to the PA role, or to other activities and influencing factors.

The evaluation is currently under way, and comments cannot yet be made about its findings. It is anticipated that these results will become available in December 2011.

NHS in England Physician Assistant Trial

In the UK, the Department of Health has conducted a PA trial in a variety of settings, across two phases. Phase 1 took place in 2003: two general practices in an underserved urban area employed US-trained PAs on a trial basis. They were appointed for a fixed-term contract of two years and provided a salary of £39 500 (approximately A\$61,459) plus relocation costs. In Phase 2 in 2004, a further twelve PAs were employed. They were deployed in general practices, accident and emergency departments, and GP referral centres. As the PAs were distributed across primary and secondary care settings, the range and complexity of their tasks differed (Woodin *et al* 2005).

Health Services Management Centre (HSMC) was commissioned by the Department of Health to independently evaluate the effectiveness of these trials. Their evaluation was based on Pawson and Tilley's 1997 framework in which differential outcomes are explained in terms of the interplay of the mechanism (the PA) with the context in which it is applied (Woodin *et al* 2005). A benefit of this method is that it allows inferences to be made about the relative effectiveness of PAs in the British context. The research questions of interest were:

- What are the potential benefits and drawbacks (to patients, professionals and the NHS) of introducing the role of PA into healthcare provision?
- What impact does the introduction of the PA role have on service quality and service improvement?
- What factors improve and impede the integration of PAs with other professional groups, in particular doctors and nurses?
- To what extent does the introduction of the role of PA re-define professional boundaries and produce new lines of accountability?
- Does the introduction of the role of PA result in a re-profiling of work between doctors, nurses and PAs?
- What issues does the experience of introducing the PA role raise in respect of the commissioning of programmes to train PAs in England, and for regulation?

To inform conclusions on these questions, a range of quantitative data was collected describing the scope of PA practice, and qualitative data which sought views to inform interpretation of the quantitative data (Woodin *et al* 2005).

After initial difficulties with introducing US-trained PAs into the British health care system, the PAs had a positive impact on the delivery of better patient-centred health care in the underserved areas. It was found that the PAs reduced the workload of other members of general practice teams where they worked. The introduction of PAs led to improved service delivery in increased patient throughput and reduced waiting times. Non-PA employees reported increased job satisfaction as well as reduced workloads (Parle *et al* 2006).

Supervisory relationship arrangements worked well, and patients appeared satisfied with consulting arrangements. Indeed, the main reported concern of patients was that they were required to wait after consultation for prescriptions to be written by a doctor, as PAs did not have prescribing rights, a factor which impeded the integration of the PA in the trial.

The British trial examined the cost-effectiveness of the PA role. There was some variation between sites owing to factors such as longer consultation times taken by PAs compared to doctors. Overall,

this was balanced by an increase in the capacity of areas of medical practitioner shortage to service the needs of their patients (Woodin *et al* 2005).

Even though the evaluation elicited positive results, response to the trial was reserved. The British Medical Association (BMA) accepted that there was potential for PAs to ease workload pressure on doctors, but stressed that patients must consistently be made aware that PAs were not doctors (Jolly 2008). Further, the BMA voiced concerns about the possible future impacts on doctors and doctors in training, namely that medical students and doctors-in-training would have to compete for the same education and training opportunities as PAs (Jolly 2008).

Despite these concerns, some general practitioners recruited PAs to work in their practices independently from the pilot schemes. Drennan *et al* (2011) recently conducted a study of these employers by examining their motivations and factors that sustained PA employment. This qualitative study showed that GP employers viewed PAs as a positive addition to the practice, particularly for meeting patient demand within a practice's finances. However, GPs acknowledged that there was a need to develop stronger governance and regulatory frameworks for this emerging profession (Drennan *et al* (2011).

NHS Scottish Physician Assistant Trial

A NHS Scotland pilot of PAs ran from November 2006 to October 2008. Fifteen US trained PAs worked in Scotland at some period during those 24 months in a variety of settings in Grampian, Lanarkshire, Lothian and Tayside: primary care; out of hours clinic; emergency medicine; intermediate care; orthopedics; and an acute receiving unit. Pilot settings were not based on areas of clinical need.

The tasks these PAs undertook and the challenges they faced were diverse. Over the course of the trial, the PAs functioned in various ways as part of medical teams. Some were used as additional team members; others were a new way of providing a service. This approach was suggested to attain wide-ranging observations of the potential applicability of PAs.

The main aim of the evaluation was to assess the impact and contribution made by the PAs to delivering effective healthcare in Scotland. While the main objective was summative, the aims of evaluation were also formative. A case study approach was used, similar to the Australian trials where descriptive findings predominated. Quantitative data were collected, but these data were not the main target. Information was gathered longitudinally, which allowed limited inferences to be made about the value of the PA role over time. To assess aspects of the PAs' impact, information was gathered from the diverse perspectives of the PAs themselves, patients, senior managers, and partnership forum representatives. The dispersal of the PAs across settings enabled discussion about the PA in varying healthcare settings (Farmer *et al* 2009).

Some facets of the trial and the evaluation design had the potential to influence the findings – features that were not dissimilar to the limitations faced by other pilots.

First, while quantitative data was collected about work activity, this information was not used to assess productivity, but was used to annotate the dynamics of the work of teams. It was argued that the small sample size was not suitable to allow meaningful interpretations. Differential quantitative data collection methods meant it was difficult to make comparisons of productivity across settings and roles (Farmer *et al* 2009). For example, comparative health activity data was collected by various methods from other health professionals at each of the trial settings, but was not collected at the intermediate care site.

Secondly, retaining PAs over the course of the assessment period was difficult and as a result some PAs came and went during the trial. This probably affected the consistency of the data gathered.

Finally, the PAs in the Scottish trial were not able to work to the full scope and level of practice they would have exercised in the US. Again, inability to prescribe was the main hindrance, an external factor that may have influenced the effectiveness of the trial. For example, the PAs who were deployed to the out of hours clinic could not make home visits owing to this restriction on a major aspect of the PA role.

The evaluation report examined cultural differences between the US and Scotland as an external factor that may have influenced the effectiveness of the PA in the Scottish system. These included differences in the PA-supervisor relationship, allocation and delegation of tasks, different treatments, and work strictly to evidence-based guidelines. Communication was suggested as a change management strategy, to be used in adapting imported personnel from different cultures and systems.

Nevertheless, patterns emerged across the trials about PA skills and attitudes regardless of context. Characteristics identified as valuable were critical thinking, diagnostic skills, training in a medical approach, communication skills, and confidence in dealing with uncertainty.

The salary of the PA towards the end of the trial was evaluated to be £29 091 to £38 353 (~A\$45 089 – A\$59 444 AUD) (Farmer *et al* 2009).

Canadian Physician Assistant Trials

The first Canadian institution to recognise the potential place of PAs with was the Canadian Forces (CF) in the 1980s. However, it was not until the mid-2000s that provinces in Canada developed a similar model (Jones & Hooker 2011). At present, the primary PA-trialling and practice provinces are Manitoba and Ontario (Hooker *et al* 2007). Various other provinces - Nova Scotia, New Brunswick, Alberta, and British Columbia - have undertaken review and analysis on whether the PA model should be a part of the provincial medical systems (Jones & Hooker 2011).

The main trial taking place in Canada provinces is the Health Force Ontario pilot project. The project is a multi-faceted initiative aimed at transforming Ontario's health care system (Jones & Hooker 2011; Jolly 2008). The initiative was focused not only on PAs; the aim was also to increase the placement of nurse practitioners, and prepare a trial conversion of some international medical graduates to PAs (Jones & Hooker 2011). After consultation with stakeholders, selection of six demonstration hospital sites, and development of competency profiles and scope of practice statements, a two-phase pilot project began in 2007. PAs for the project were retired graduates of the Canadian Forces Physician Assistant education program, US- trained PAs, and International Medical Graduates who passed a competency-based assessment and integration process (<http://www.healthforceontario.ca/>).

The Ontario project capitalised on the US and British experience in developing its competency profiles and scope of practice statements. An alliance of interested parties oversees the project and an extensive evaluation project assesses the outcomes of care and satisfaction of all participants (that is, patients, doctors, nurses, and the PAs). In early 2011, applications were underway to extend the project (<http://www.healthforceontario.ca/>).

Other countries have experienced difficulties with inception of PAs into their health care systems. Ontario circumvented such challenges through these factors identified by Frossard *et al* (2008):

- strong partnerships and collaborative relationships,
- support from other health professions and experts,
- developing PA competencies,
- government backing of the a new workforce position, and

- establishment of a steering committee in order to alleviate apprehensions by health professionals about the implementation of a new role within the Ontario workforce.

The consequential pilot was divided into two phases. The first phase focused on the demonstration of PAs, nurse practitioners and acute care nurses in the emergency departments of six hospitals. The Health Force Ontario website reports that the trial showed positive influence on healthcare delivery including decreases in waiting times (<http://www.healthforceontario.ca/>).

In the second phase, 50 PAs were dispersed across various multidisciplinary healthcare teams in the province, in hospitals, primary care, diabetes, and long-term care.

The Netherlands

International emergence of the PA role has largely focused on reproducing the US model of education and clinical practice. The Netherlands has embarked on a different model to implement the PA role. The reasons for developing the role in The Netherlands health system are similar to other international motivations, but in this case, implementation was more anticipatory (The Netherlands is the only country that does not fall short of the World Health Organization's recommended doctor to population ratio (Ho 2011; Jolly 2008). This created opportunities for wide consultation on the inception of the Dutch PA curriculum. Effective lobbying of the medical profession and educationalists, as well as political and financial support facilitated emergence of the PA profession in The Netherlands (Verboon 2005).

While PAs have been in practice in The Netherlands since 2001 (PAs were first introduced into secondary care settings in 2001 and primary care in 2004), very limited evaluation has been conducted of the role's effectiveness of PAs who are graduates of the Dutch Program.

One evaluation of PAs in The Netherlands was a pilot study of 12 Urology PAs who worked in different hospitals. The evaluation's objectives differed somewhat from the pilots trialled in Australia, New Zealand, UK and Canada, and asked what critical professional activities required relevant competencies, and how supervisors could know when to entrust such activities to a trainee (Spengelink-Schut *et al* 2008).

Another evaluation was a case-study conducted in 2003 on a general practitioner in a partly disadvantaged urban area, who used the skills of a US-trained PA (owing to local recruitment difficulties) (Simkens *et al* 2009). The effects were studied using a quantitative pre- and post- design. The Dutch-speaking PA and the GP arrived at mutually agreeable scope of practice, patient caseload, job responsibilities and supervision arrangements although prescribing medicine was a legal barrier, similar to most other countries' barriers to PA implementation. The study found that the PA may have improved access to GP care - that is, the total number of contacts per 1000 patients increased over the course of the study. The range of the PA's clinical activities was comparable to f the GP's, confined to less acute cases.

Concluding comments on PA pilots

Trials conducted to date involving US-trained PAs appear to have been focused on assessing the concept of the PA role across a number of countries in a variety of health system contexts. Evidence demonstrating the efficiency and effectiveness of the position in each healthcare system is limited.

Objectives adopted by various evaluations sought to assess both formative and summative components of the trials, but limitations of the trials and the evaluation designs fall short of answering research questions robustly, particularly conclusions about productivity and cost effectiveness. The available supportive results are largely descriptive, and centre on engagement of PAs, and on informants' understanding of the strategic and potential value of PAs. However, the PA role has now been trialled across multiple international health systems in a variety of metropolitan and rural/remote hospital- and community-based primary and secondary care settings including

emergency departments, acute and elective surgery, orthopaedics, anaesthesia, and paediatrics. Based on the supportive findings of these trials (though limited by a lack of quantitative data) and the long-term international experience of PAs in private and public sector settings (forty-three years in the US health system, seven years in the NHS, and ten years in the Netherlands), it would appear that there is no need for further proof-of-concept testing.

The importation of US-trained PAs into local health care systems needs to be viewed in light of real and potential operational differences between the host country's health care system and the American system.

The Australian trials highlighted the skills and experience of the US-trained PAs (Urbis 2010; HMA 2010). In fact, PAs in the Queensland trial experienced marked differences between the Australian and US health care systems in the PAs' efficiency in delivering patient service: one PA thought they were far more efficient when they worked in US practices (Urbis 2010).

From the trials described above, few conclusions can be drawn to inform training programs, acquisition of competencies, supervision, specialisation, integration into medical teams, and value in rural, remote and indigenous areas.