Economic evaluation of simulated and traditional clinical placements in occupational therapy education

Authors

Elena Gospodarevskaya, M Econ, PostGrad Dip. Bus (FM&Ec), PostGrad Dip. HEcEv. Deakin Health Economics, Centre for Population Health Research, Deakin University, Locked Bag 20000, Geelong, VIC, 3220; elena.gospodarevskaya@deakin.edu.au

Rob Carter, BA (Econs, Hons), M Admin Studies, Grad Dip. Epi, PhD. Deakin Health Economics, Centre for Population Health Research, Deakin University, Locked Bag 20000, Geelong, VIC, 3220; rob.carter@deakin.edu.au

Christine Imms, B. AppSc (OT), MSc, PhD. School of Allied Health, Australian Catholic University, Locked Bag 4115, Fitzroy, VIC, 3065; Christine.imms@acu.edu.au

Eli Mang Yee Chu, BSc (OT), PhD, GCHE, Australian Catholic University, Locked Bag 4115 Fitzroy, VIC, 3065 (Monash University from June 2017); Eli.Chu@monash.edu

Kelli Nicola-Richmond, B. Physiotherapy, GCHE, School of Health and Social Development, Deakin University, Locked Bag 20000, Geelong, VIC, 3220; k.nicolarichmond@deakin.edu.au

Nigel Gribble, BSc(OT), MBA, School of Occupational Therapy, Social Work, and Speech Pathology, Faculty of Health Sciences, Curtin University, GPO Box U1987, Perth, WA, 6845; n.gribble@curtin.edu.au

Elspeth Froude, B. AppSc(OT), GradDip(NeuroSc), PhD. School of Allied Health, Australian Catholic University; Locked Bag 4115, Fitzroy, VIC, 3065; Elspeth.froude@acu.edu.au

Stephen Guinea, PhD, GradDipVocTrainDevelop, BN. Faculty of Health Sciences, Australian Catholic University; Locked Bag 4115, Fitzroy, VIC, 3065; stephen.guinea@acu.edu.au

Loretta Sheppard, B. AppSc(OT), MOT, D ClinSci. School of Allied Health, Australian Catholic University; Locked Bag 4115, Fitzroy, VIC, 3065; Loretta.sheppard@acu.edu.au

Angelo Iezzi, B.Eng (Civil), MSc (Counselling), Grad Dip Linguistics, Centre for Health Economics, Monash Business School, Monash University; Clayton, VIC, 3800; angelo.iezzi@monash.edu

Gang Chen, B.Med, MSc (Management), PhD (HealthEcon.), Centre for Health Economics, Monash Business School, Monash University; Clayton, VIC, 3800; gang.chen@monash.edu

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/1440-1630.12563

Funding statement

This project was funded by the Commonwealth Department of Health within the Workforce Development and Innovation program.

Authors' declaration of contributions

EG co-designed the economic component of the trial, led the acquisition of economic data alongside the RCT, analysed and led the interpretation of findings, drafting and revising the manuscript. RC led the design of the economic component of the RCT, contributed to analysis and interpretation of findings. CI led the conception, design and implementation of the RCT, contributed knowledge to the methodological elements of the economic design framework, including the discrete choice instrument. EMYC contributed to the design and implementation of the RCT, provided critical insight to the frameworks and tools for collecting economic data and contributed to data collection and validation. KNR, NG, EF, SG, LS contributed to the design and implementation of the RCT, including to developing and validating the economic instruments and to subsequent data collection.

AI, GC co-designed the discrete choice analysis and contributed knowledge to the methodological elements of the cost benefit analysis. All authors contributed to interpretation of the findings, critically reviewed the manuscript, gave final approval of the manuscript and agreed to be accountable for the work.

Conflict of interest statement

The authors declare no conflicts of interest.

Trial registration: ACTRN12616001339448

http://www.ANZCTR.org.au/ACTRN12616001339448.aspx

As the trial did not assess a health outcome, it was retrospectively registered on 26 September 2016.

Acknowledgements

We acknowledge all the site investigators not named as authors including: Susan Darzins, ACU Melbourne; Merrolee Penman The University of Sydney; Samantha Ashby, The University of Newcastle; Susan Gilbert Hunt, The University of South Australia; and all academic and administrative staff at each participating university, including Marcelle Alam, who contributed their expertise to the cost data collection. In addition, we acknowledge the

central project management team, Mark Symmons (Project Manager), Mirna Boujaoude (National Research Assistant), and Tanya Edlington (National Training Officer).

We also thank our project oversight board, which comprised representatives from the Commonwealth Department of Health, the Occupational Therapy Board of Australia, the Occupational Therapy Council (Australia and New Zealand), and the Australia and New Zealand Council of Occupational Therapy Education, and state that these entities received reports but had no role in the implementation of the trial or analysis and interpretation of trial outcomes.

Word counts

Abstract: 299

Main text: 5,016 (*including "insert Table near here" but excluding references, tables and Implications*)

References: 29

Tables: 4

Supplementary Tables: 5

Corresponding author

Elena Gospodarevskaya, Deakin Health Economics, Centre for Population Health Research, Deakin University, Locked Bag 20000, Geelong, VIC, 3220; elena.gospodarevskaya@deakin.edu.au

MeSH terms

Simulation training, economic evaluation, cost analysis, occupational therapy, randomized controlled trial.

PROF. CHRISTINE IMMS (Orcid ID : 0000-0001-9055-3554)
MS. KELLI MAREE NICOLA-RICHMOND (Orcid ID : 0000-0003-4874-5055)
MR. NIGEL GRIBBLE (Orcid ID : 0000-0003-4339-4292)
MS. ELSPETH HEATHER FROUDE (Orcid ID : 0000-0002-6863-2317)

Article type : Feature Article

Economic evaluation of simulated and traditional clinical placements in occupational therapy education

Abstract

Introduction: This economic evaluation complements results of the randomised controlled trial that established non-inferiority of the learning outcomes of a one-week simulated clinical placement (SCP) in occupational therapy qualifying degrees in comparison to an equivalent traditional clinical placement (TCP). This companion study presents detailed cost analyses of two placement alternatives and a cost-benefit study to assess the value for money of SCP. An economic evaluation of simulated versus traditional placements has not previously been conducted in Australia.

Methods: Nine SCP/TCP rounds were conducted by six Australian universities. Costs were collected using study-specific instruments. Public health sector costs were sourced from available literature. Willingness-to-pay for SCP/TCP was estimated using both a Discrete Choice Experiment and a Contingent Valuation method. These methods were employed to assess a comparative "value" of SCP/TCP from the perspective of heads of occupational therapy departments (N=28), who were asked to put a monetary value on the broader range of benefits associated with SCP/TCP.

Results: From the universities' perspective the average cost per student ranged from AUD$460 to AUD$1,511 for simulated and AUD$144 to AUD$1,112 for traditional placement. From the health care sector perspective, the difference in costs favoured simulated placements for four implementations and traditional placements for five. In the Discrete Choice Experiment respondents preferred traditional rather than simulated placement and would pay additional AUD$533. The estimated monetary value of simulated placements from a contingent valuation ranged from AUD$200 to AUD$1,600.

Conclusions: For universities that procure TCPs predominately at public health care facilities and sustain high administrative overheads, the SCP program could be a cost-saving

alternative. From a broader value-for-money perspective respondents favoured TCP over SCP, yet placed importance on placement availability and opportunity to demonstrate competence for students during the placement. Results should be interpreted with caution and further research with larger sample sizes is required.

Introduction

In Australia the professional accrediting body for occupational therapy currently allows up to 200 of the mandatory 1000 clinical placement hours to be completed via simulation activities. In response to the growing enrolments an increasing number of Australian universities have been incorporating simulation-based learning into occupational therapy curricula. In 2016, a pragmatic, non-inferiority, single-blind, multicenter, randomised controlled trial (RCT) compared the educational outcomes of a block of 40 hours of simulated clinical placement (SCP) with 40 hours of traditional clinical placement (TCP). From January to November 2016, 680 students from six Australian universities undertook the unit with either the TCP or SCP component, including 570 students who consented to participate in the RCT. The educational outcomes, reported separately in a companion paper (Imms et al., 2018), demonstrated the non-inferiority of a SCP in comparison to a TCP with respect to the educational outcomes. The protocol of the RCT was published in 2017 (Imms et al., 2017)

This paper complements results of the RCT by reporting results of the economic evaluation. Some theoretical fundamentals of the types of economic evaluation (cost-effectiveness/cost-minimisation and cost-benefit analyses) are briefly explained in Method section.

While the central focus of cost-effectiveness/cost-minimisation analyses in this study are educational outcomes, the value of broader outcomes, such as ensuring placement availability, was also explored through cost-benefit analysis. Use of a monetary unit to value outcomes allows a more comprehensive range of outcomes to be included through techniques that range from simple 'willingness-to-pay' for defined outcomes (e.g. tick the dollar amount) through to more complex techniques that involve respondents reading scenarios and making trade-offs. As part of the economic evaluation, this paper provides a detailed cost analysis of resources used in providing students with either the SCP or the TCP. Since the resources were used by all the students (N=680), the cost analysis was based on this actual number of unit participants. The cost data collection was embedded in the RCT as an integral part of the trial-based economic evaluation.

Comparative cost analyses and full economic evaluations in medical education remain uncommon (Maloney & Haines, 2016; Walsh, 2013). A recent systematic literature review of costs and benefits of providing undergraduate clinical placements for a health service organisation in Australia (Bowles et al., 2014), found a single cost-benefit analysis of dietetic student placements in rural and metropolitan Australian hospitals (Hughes & Desbrow, 2010). The researchers concluded

that students needed to be at least 80% as efficient as graduate level staff to add benefit to the host organisation. Characteristically, this and other Australian costing studies were undertaken from the placement providers' perspective and focused on the degree of productivity gains/losses experienced by providers of TCP. While authors of some studies found gains in productivity (Leiken, Stern & Baines, 1983; Dillon et al., 2003; Rodger et al., 2011; Rodger et al., 2012), others estimated substantial losses (Bowles et al., 2014; Jones & Akehurst, 1999; Foo et al., 2017). Unfortunately differences in methodological frameworks prevented a meaningful comparison of the published results.

Our literature search identified publications that adopted a multi-stakeholder perspective (Haines, Kent & Keating, 2014; Lalloo & Masey, 2013), but only one specifically focused on allied health students, albeit only those who failed their clinical education (Foo et al., 2017). None of the economic evaluations were conducted alongside an RCT or involved a SCP as one of the evaluated alternatives. Therefore this study addressed an important paucity of evidence on the economics of simulated versus traditional clinical placements in occupational therapy education in the Australian context.

The following economic research questions were addressed in this study: i) once non-inferiority is established, does SCP cost less than a TCP from the perspectives of the health sector and the universities as providers; and ii) what dollar value is placed on non-educational outcomes, such as ensuring availability of places?

Methods

Type of economic evaluation

The need for economic evaluation is based on the premise that choices between alternate uses for available funds/resources should be guided by the principle of 'opportunity cost'. In essence, the task here is to ensure that benefits gained from what you choose to do are not less than the benefits lost from opportunities not taken up. Opportunity cost is best understood as 'benefits gained' versus 'benefits forgone', with cost/resource use the medium by which researchers estimate the extent of each. Recognition of the central place of opportunity cost yields two key characteristics of economic evaluation: i) it involves an analysis of both costs and outcomes; and ii) it involves a comparison of at least two alternate options – for example, current practice (e.g. TCP) compared to an option for change (e.g. SCP). Further, recognition of the central place of 'benefits' in the principle of opportunity cost, leads to different forms of economic evaluation that measure benefit in different ways, viz: i) cost-effectiveness analysis, where benefit is measured in physical outcomes familiar to clinicians or educational providers (such as competency scores; pain free days;

quality-adjusted life years; etc.); ii) cost-benefit analysis, where benefits are measured in dollar terms; and iii) cost-minimisation analysis, where outcomes are deemed to be the same, and the analysis reduces to which option is cheaper. Therefore, deciding on the type of economic evaluation (i.e. the method of bringing cost and outcomes together in a single metric) may only be possible after both costs and outcomes were assessed. For example, if SCP had failed the non-inferiority test (i.e., poorer learning outcomes) and proved to be more expensive, the cost-effectiveness analysis would result in TCP being a "dominant" alternative (i.e. both more effective and less expensive). The scope of this paper prevents more detailed explanation of economic evaluation, but readers interested in further coverage of economic methods are referred to Drummond et al., 2015; Ramsey et al., 2005 and Glied & Smith, 2011. Apart from this general introduction, specific economic terms used in the paper are explained where they arise.

Given that non-inferiority of SCP versus TCP was supported by the RCT (Imms et al., 2018), the economic research question and methods for bringing costs and benefits together depended on: i) whether the SCP was found to cost less than a TCP, which would lead to cost-minimisation analysis; and ii) if the SCP was not less expensive than the TCP, whether there were offsetting benefits in addition to the assessed educational outcomes, that would still make the SCPs value-for-money. The corresponding economic methods for bringing costs and benefits together then depend on whether the benefits are monetarised and/or remain expressed in natural units of outcome (e.g. educational outcomes).

Assessment of costs

The cost calculations involved a series of steps: (i) the types of resources used for each category of placement were identified; (ii) the resources required for each activity were measured; (iii) corresponding dollar values (e.g. staff hourly rates) were assigned to each type of resource; and (iv) the total costs for a SCP and a TCP were calculated.

Trial-specific cost collection templates were developed and piloted prior to being distributed to site investigators, who were instructed in the method and practicalities of the cost data collection. The TCP cost data collection was complemented by interviewing relevant administrative and academic staff. The major cost category of university staff time (e.g. lecturers, tutors, practice coordinators, clinical supervisors, administrative support) was adjusted for salary oncosts. Estimation of the economic cost of TCP from the public health sector perspective was expected to be conducted through a grey literature search (e.g. evaluation reports, financial statements).

Organising a TCP is an established process that generally starts a year before the placements and requires inputs from multiple stakeholders, with academics involved in teaching and/or chairing the units with clinical placement component being assisted by administrative staff specifically

trained for the task. Some of the activities involved in organising TCP occurred at different levels of the university administrative hierarchy, or even at the State level. Therefore the associated costs used to secure placements, which consisted predominately of staff time, but also included information technology (IT) licenses and contributions made to the providers (financial or in-kind), needed to be allocated to the relevant categories of students. Data were collected on the annual amount of all resources required to secure a TCP for a typical occupational therapy student in the latest period for which the data were available (i.e. 2015 for the universities that started the RCT in January-April, or 2016 otherwise). To obtain average annual cost, the value of resources was divided by the total number of students enrolled in the course with TCP.

For SCPs, costs per student also included staff time in natural units, namely the number of hours spent in preparation for the SCP program (staff recruiting, organizing and participating in training, meetings, case material updates etc.) and delivering the placement (clinical supervision, assessment etc.). The time of volunteers who participated in the case studies, and non-university staff, involved in organising the site visits, was also counted and valued along with the salaried personnel. Sensitivity of the cost estimates to the variation in unit costs and the scale of the program was tested in scenario analyses.

In addition, marginal as opposed to the average cost, needs to be estimated. 'Marginal' cost means the extra cost of a small change in service provision (e.g one more student place) and usually excludes 'fixed costs' (such as the capital cost of buildings) and reflects 'variable costs' that increase directly with the number of students. A team at the Lead RCT Site was asked to prospectively collect all inputs (predominately the staff time) required to source new TCPs for one cohort of 46 students undertaking a vocational rehabilitation clinical practice. These newly sourced TCPs were in addition to the regular much larger annual load of procuring TCPs in this university and in this sense represent a small (i.e. marginal) increment.

It was not feasible to detect cost variation at the individual student level, therefore all students in the same placement modality (i.e. mental health, physical rehabilitation or vocational rehabilitation) from the same university were assumed to require equal resources. However, extra staff time associated with "troubleshooting", including on rare occasions, travelling to the placement providers, were estimated and averaged across all the students in the TCP arm.

Unlike the TCP, costs of SCPs included accommodation (e.g. simulated office and interview rooms). For the facilities that were hired out, the real market rates were used, otherwise market rates for hiring similar facilities in the area were obtained and used to estimate the opportunity costs. Hiring rates included the use of durable equipment for SCP (e.g. IT and video recording). The SCP involved the use of shared resources (e.g. educators' teaching time, lecture/consultancy rooms, access to the actors playing the part of patients or clients, video equipment, etc.). All ongoing costs

of organising and delivering SCPs were borne by the universities and were allocated to the students undertaking a unit with the simulation component - in this instance, a 40 hour block in mental health, physical or vocational rehabilitation courses in the first or second years of study (Imms et al., 2017; Imms et al., 2018). In addition, there was the cost of time and expertise that the Lead RCT Site invested into developing case materials, video production and a website. These cost components were treated as a capital investment for the universities with a useful life of five years, and allocated to all SCP students.

Assessment of benefits

Educational outcomes measured in the trial established equivalence between TCP and SCP (Imms et al. 2018). To measure broader benefits of TCP (e.g. 'real' experience) and SCP (e.g. certainty of placements), cost-benefit analysis techniques were used, including a Discrete Choice Experiment and a Contingent Valuation. The two techniques differ in the way the choice scenario is developed and put to respondents. Both techniques were employed to estimate the 'willingness-to-pay' for TCP and SCP. In the context of contingent valuation in health care research, the individuals are directly approached with the question of how much money they would trade for a given improvement in health in a market that is hypothetical (e.g. 'contingent') (Bayoumi, 2004). In our case, the maximum monetary value for SCP (i.e. the respondents' willingness-to-pay) was obtained through direct negotiations with the stakeholders.

In contrast to a Contingent Valuation, the respondents are not asked directly for their willingness-to-pay in the Discrete Choice Experiment. Rather, if price (or cost) is included as an attribute (characteristic) of the alternative placement options, respondents make trade-offs between price and other attributes (Ryan, 2000). The ratio of the two attribute coefficients, holding all else constant (explained below), would show the estimated "price" the respondents are willing to pay per SCP relative to what they would like to pay for the TCP. In theory, this estimate could be validated by comparing it to the marginal cost of TCP derived from the RCT. However, because the small, heterogenous sample in our study precluded obtaining reliable estimates of the marginal costs by applying a conventional statistical modelling technique, we used an opportunistic cost data collection for additional TCP placements at the Lead RCT Site to estimate the marginal cost.

Willingness-to-pay was assessed using the answers to the Discrete Choice Experiment and Contingent Valuation tasks completed by participants of a workshop that brought the current Heads of Occupational Therapy Programs from Australian universities together for one day to provide them with detailed findings of the RCT. The primary purpose of the workshop was to ensure the consultation process that was initiated in phase 1 of the RCT in 2014, was completed by providing each university with knowledge of trial outcomes, and an opportunity to contribute to discussions

regarding implications of the findings. Invitations were extended to each of the 20 universities (not counting the Lead University), which provide occupational therapy education. The target population comprised of "decision makers", which included but was not limited to the Heads of Occupational Therapy Programs. Therefore the attendees were invited to extend the Discrete Choice Experiment to colleagues in their universities who they thought could contribute to the study. Invited but non-attending delegates were followed up over the phone, bringing the total sample size of Discrete Choice Experiment participants to 28.

In addition to the type of placement (TCP or SCP), three other attributes for the Discrete Choice Experiment were selected by the study team based on their experience in sourcing the TCPs and the RCT results (Imms et al., 2018). These included: i) placement availability that ranged from 50% to 100%; ii) the percentage of students who did not have an opportunity to demonstrate competency according to the Student Practice Evaluation Form-Revised (SPEF-R, Rodger, 2016), which ranged from 5% to 25%; and iii) the cost of the placement, which ranged from $200 to $1,000 per student per week. These attributes were selected to highlight important differences between the TCP and SCP but, given the small sample size of targeted respondents, were limited to four. For example, the 'percentage of students who achieved a Pass grade' was omitted as one of the attributes in the Discrete Choice Experiment because every student in both groups of the RCT received an overall pass on the SPEF-R for their placement. Ngene, a choice experiment design software (ChoiceMetrics Pty Ltd, 2016), was used to generate a manageable number of choice tasks (n=11) for each respondent to complete (see Supplementary documents for more details on the Discrete Choice Experiment).

Participants in the Discrete Choice Experiment were asked to imagine that they were the person responsible for overseeing the occupational therapy program at their university and making recommendations regarding clinical placement while maximising the expected utility.

The Contingent Valuation exercise was conducted in one-to-one interview format after the Discrete Choice Experiment and with the same participants. Prior to the workshop in order to ensure the informed contribution to the willingness-to-pay study, the participants were asked to estimate the 'average cost' of a TCP in their university. Average cost is a familiar notion where total costs (fixed and variable) are simply divided by a convenient denominator (e.g. total number of students requiring placements). Participants from universities that took part in the RCT relied on the estimates of economic evaluation conducted alongside the RCT. If no estimate was available, the TCP cost was assumed to be within the AUD$700-$800 range (based on the preliminary results of economic evaluation). In the willingness-to-pay question, the participants were asked to indicate whether they would recommend SCP for their university if it cost AUD$800. Depending on the

response to this question, the maximum cost at which they would recommend the SCP to the decision-makers at their university was negotiated up or down in an iterative manner.

Analysis

The time horizon for the RCT was one year. Therefore, the results were expressed in terms of an average annual cost per student enrolled in the unit with a 40 hour clinical placement component. It was assumed that students undertake one placement per year, which was not an unrealistic assumption for the target population of students in the early years of an occupational therapy program. 2015-2016 prices were used in the valuation of resources and a discount rate of 7% (official discount rate used in public sector evaluations), was applied to the capital investment component (Harrison, 2010; Office of Best Practice Regulation, 2016).

Basic statistical description of the cost data (mean and standard deviation (SD)) was undertaken to assess the degree of variation between the sites and arms of the RCT. The SCPs and TCPs were implemented in six Australian universities, but included three campuses of one university and two different courses of another. Given the small sample size and considerable heterogeneity between the sites (discussed below), this sample size of nine pairs of SCPs vs TCPs was insufficient for more advanced statistical analysis. "Cost-drivers" for the two alternative modalities were identified from the descriptive statistics.

The Discrete Choice Experiment responses were analysed based on a random utility theory framework. The empirical model to be estimated was specified as:

$$U = \beta_1 * TCP + \beta_2 * PLACEMENT + \beta_3 * COMPETENCE + \beta_4 * COST + \varepsilon$$

where **U** is the utility an individual derives from each of the choice scenario; TCP, PLACEMENT, COMPETENCE, and COST are four attributes (i.e. placement type, placement availability, percentage of students who did not have an opportunity to demonstrate competency on placement according to the SPEF-R and the cost per student per placement week); and **β** is a vector of coefficients reflecting the desirability of the attributes and ε is an error term.

Using the results of Discrete Choice Experiment, willingness-to-pay was then calculated by dividing the estimated coefficients for three attributes by the estimated coefficient for the cost attribute. For example, the willingness-to-pay for placement was calculated as: $-\beta_2/\beta_4$. The 95% confidence intervals were calculated using the bootstrap technique (Hole, 2007). The conditional logit model was used for estimation of the Discrete Choice Experiment outcomes using Stata version 15 software (Gerard, Ryan and Amaya-Amaya, 2018).

Results

Estimated cost to university providers of SCPs

Table 1 shows the SCP staff hours and the corresponding costs observed per occupational therapy student per simulation week (40 hours) at each site of the RCT. The mean total cost of the SCP per student was AUD$893, which varied from AUD$460 to AUD$1,511. On average, the amount of staff time per student during the simulation week was 4.6 hours, about the same as the time spent in preparation (5.0 hours) or, more realistically, 3.8 hours when an outlier (11.1 hours) was excluded. The average cost of staff hours per student during the simulation week was AUD$370 rising to AUD$714 when preparation time was included. The combined cost of staff time in preparation and participation in the simulation week was the largest cost component, followed by the cost of venue hire that ranged from AUD$21.50 to almost AUD$600 per student per week. The annuitised cost of developing the case study materials, videos and a website, estimated at AUD$68 per SCP student, was added to the mean total cost of the SCP, bringing it to AUD$961.

[insert Table 1 near here]

Estimated cost to university providers of TCPs

Table 2 shows cost of a TCP week per occupational therapy student. The cost components reflected the differences in administrative structure between the universities, as well as other specific conditions (e.g. the legislated or voluntarily offered fees paid by the universities in some States), and/or practices (e.g. contracting practice facilitators who work at the providers' facilities for the duration of placements). The "other costs" category included the cost of providing regular training to practice providers, IT support and database licenses.

The administrative and academic staff cost occurring at the occupational therapy department level and "other costs" were the only cost components that applied to all sites. The costs of administrative staff at higher levels, contractors and fees were observed only in selected universities. Results indicated a considerable heterogeneity between the sites, which in turn compromised interpretation of the mean value of the total cost of the TCP per student (AUD$677) and rendered any statistical comparison of means meaningless. The total cost of TCP per student varied from AUD$144 to AUD$1,112 and with the exception of Site#2, was dominated by the cost of administrative/academic staff time.

[insert Table 2 near here]

The marginal cost of obtaining an additional TCP at the Lead RCT Site was estimated at AUD$462 per student per week under the assumption of the 2016 fees (AUD$35 per student per day) and at AUD$550 if the fees increase to AUD$52.50 as planned (State Government of Victoria, 2015).

Additional costs of TCP from a public health sector perspective

The full economic cost of TCP from the public health sector perspective would include administrative and strategic planning support, clinical training and development grants, purposefully funded projects such as investments into infrastructure and centralised databases, and direct payments to hospitals and community health organisations per student-day. The TCP providers received direct and indirect funding from their State governments delivered through multiple channels. Although many State government strategic plans conveyed an intention for costing their clinical placement systems, we were unable to identify an actual costing study in any Australian State.

There was only scant information in the published and unpublished literature to produce the estimates of TCP costs at the public health sector level. In a national survey the cost of a TCP day in public hospitals was estimated at AUD$142 for an occupational therapy student, and included lost productivity (Paxton Partners, 2016), but there were numerous methodological limitations in this study. One State government estimated the cost of a TCP day across all clinical specialties at AUD$43-$49 (Victoria Health Workforce Knowledge Bank, 2016; Darcy Associates, 2016). Ongoing costs of two different centralised public health placement databases in New South Wales (NSW) and Victoria translated into an estimated cost per placement day of $1.02 and $1.70 respectively. Although from the State Governments' perspective these may be perceived as negligible, introduction of the databases resulted in additional costs to the universities that needed to hire administrative staff in order to source the TCPs from these external databases.

Comparison of costs: SCP versus TCP

Table 3 summarises the cost estimates for the SCP and the TCP, expressed as the 'cost per occupational therapy student per week'. An average of two available estimates of the TCP costs per day (AUD $142 and AUD$49) from the public health perspective was used in the calculations.

[insert Table 3 near here].

From the universities' perspective, the cost per student in seven out of nine rounds of the SCP exceeded the cost of TCP by an average of AUD$238. One university without previous SCP experience administered two separate SCPs rounds (Sites#5/#7), the cost in the first round was three

times the cost of the second. It is possible that the experience gained in the first round (nine students) translated into some staff cost savings in the second round. Even more important was the scale factor: while the first round of the SCPs involved only nine students, 59 students participated in the second round, reducing the cost of the same venue hire from AUD$587 to AUD$105 per student per week. While the cost difference favoured TCP in the first round the combination of these two factors favoured SCP with substantial cost savings in the second round (Table 3).

Results of the sensitivity analysis from the universities' perspective confirmed that the estimates of the mean cost per SCP student were very sensitive to the scale of the occupational therapy program. In a hypothetical scenario two groups of students (N=8-10) were added to the total number of students at each site resulting in substantial cost-savings (range 29-63%) in comparison to the base-case analysis. The efficiency gain would be achieved from the fixed cost components being attributed to the larger number of students. The largest gains would be achieved in the small size universities with a relatively large administrative and academic load in preparing for the SCP and a significant cost of venue hire. The estimates were less sensitive to the small variations in the salary rates (i.e. all staff categories receiving an average salary), but this analysis allowed identification of the sites that have already achieved cost-efficiency with respect to the staff time allocation and salary rates.

Sizable savings (mean value of AUD$472) brought about by replacing TCP with SCP were observed in three out of nine rounds of the SCPs, when estimated from the combined university and public health sector perspective. Among the cost-saving sites was the second out of two SCP rounds (Site#7), with the largest observed total savings of AUD$890.

Willingness-To-Pay: Discrete Choice Experiment

Twenty eight respondents finished the discrete choice exercise. Supplementary Table 4 shows characteristics of the respondents. Conditional logit regression results in Table 4 show that all four attributes were statistically significant and that on average respondents preferred: the TCP over SCP; a higher placement availability; a lower chance that students will not have an opportunity to demonstrate competency; and a lower cost per student placement.

[insert Table 4 near here]

Based on the estimates of Discrete Choice Experiment, the willingness-to-pay results are also presented in Table 4. It can be seen that on average respondents would be willing to pay:

- additional AUD$533 for a TCP over SCP;
- AUD$23 for each additional 1% increase in placement availability;

- and AUD$39 for each additional 1% reduction in the chance of not being able to demonstrate competency according to the SPEF-R.

Willingness-To-Pay: Contingent Valuation

The willingness-to-pay results in Supplementary Table 5 shows the maximum cost the respondents (N=24) would recommend the SCP program to their university. Four respondents were unable to attend the one-to-one interview and were not included in the Contingent Valuation sample. The attendees at the workshop reported the higher mean willingness-to-pay value of AUD$797 (SD=466) for the SCP than those responding to the follow-up telephone interview, who were not part of the fuller briefing and discussion process (mean value AUD$585; SD=405).

Discussion

Comparative cost analysis of nine occasions of SCP and TCP administered by six universities in five Australian States failed to reach a definitive conclusion on whether SCPs, while proven to be non-inferior to TCP as a teaching and training option (Imms et al., 2018), also represents a cost-saving alternative. Cost variability was significant in both the SCP and the TCP and might be explained by: i) SCPs being a new experience in some universities, which resulted in longer hours in preparing and running the program for the first time; ii) differences in staff mix where senior staff, if engaged only in supervisory roles, would reduce the total cost; iii) differences in salary rates paid to the academic and contracted staff in clinical coordinator roles; and iv) the scale of SCP programs, which reduced the cost of venue hire per student as well as the cost of administrative overheads, since the preparation tasks required about the same amount of time regardless of the number of students. Spreading fixed costs through greater utilisation is a common way of decreasing costs per unit of output and improving efficiency of operations.

A key determinant of variability in the cost difference between SCPs and TCPs was variability in TCP costs per student, where the staff cost could be as little as AUD$32 per placement. This exemplary cost-effectiveness was observed in the favourable context of a long established network of loyal placement providers who, in the absence of any government intermediaries, were paid a standard (albeit non-legislated) fee directly by the university. The fees payable to the providers varied across the study sites depending on the legislative environment, but also on the type of placement (e.g. private providers of vocational rehabilitation did not charge any fee in this study). One of the cost-containment strategies seemed to be conducting all the work on securing clinical placements at the university's occupational therapy department (i.e. avoiding administrative costs at a higher organizational levels of School or Faculty), with no or very little involvement of external government organisations.

The TCP cost estimates presented here from the health sector perspective may have underestimated the total cost because there was insufficient understanding of the complexities of subsidising public and private placement providers from the states' health budgets. The sources of additional administrative costs that occurred at local health provider levels in NSW and Victoria was equally non-transparent. In general, the degree of certainty in the health sector cost estimates was considerably less than in the costs collected at the universities. Research in a larger sample of universities would help to identify a few relatively homogenous groups of universities in order to quantitatively assess both 'within-' and 'between-group' cost variability.

The willingness-to-pay estimates based on Discrete Choice Experiment for 1) placement availability; 2) opportunity to demonstrate competency according to the SPEF-R; and 3) cost all yielded responses in the expected direction. The results of the Discrete Choice Experiment with Heads of Departments and senior academics showed that on average TCP is favoured over SCP. The respondents were prepared to pay an additional cost of AUD$533 for TCP, which is consistent with a single opportunistic estimate of the marginal cost of TCP at AUD$462-$550 (depending on the fees paid to the providers). Cost-benefit analysis suggests the SCP should be significantly cheaper than TCP in order to become a preferred type of placement from the universities' perspective. Nevertheless, this finding is despite the educational equivalence demonstrated in the RCT. This raises questions about how best to support changes in educational practices when innovations have empirical support.

While completed in the population of "decision makers" represented by Heads of Departments and senior academics, the number of participants in the Discrete Choice Experiment was relatively small from a methodological viewpoint (Gerard, Ryan & Amaya-Amaya, 2008). Therefore, the above results should be interpreted with caution and the estimated coefficients require further research to validate.

Another of the study limitations related to the decision to focus on the perspectives of the universities and the public health sector. This design choice excluded the costs borne by students or the health sector productivity loss (if any), which could exceed the amount of fees paid to the providers. We were unable to identify a comprehensive study of economic costs of providing clinical placements conducted from the educational and health sector perspectives. Therefore, the value of results from the health sector perspective is more in highlighting the gaps in current knowledge than in supporting the actual cost estimates.

Conclusions

Notwithstanding the study limitations, the difference in costs between a SCP and a TCP favoured the SCP for four implementations and the TCP for five (combined perspective). In the subgroup of the universities with high cost of administrative overheads that procured TCPs in public health care settings, the SCP program, if delivered at a large scale with competent staff at a less than senior salary rate, could be an important cost-saving alternative. SCPs also provide an additional option should TCPs become difficult to secure. Notwithstanding reservations about cost-benefit analyses, the respondents generally favoured TCP over SCP in our research. It was also clear that value (including its monetary equivalent) is associated with increased placement availability and the opportunity for students to demonstrate competence during placement.

Key points for occupational therapy

- Short simulated placements are as effective for student learning outcomes as traditional placements, but tend to cost more from the universities' perspective.
- Cost-benefit analysis suggests program leads consider the SCP should be significantly cheaper than TCP to justify using it.
- Control over the process of placements varies across the universities, however, cost-containment measures could be implemented.

Authors Funding statement

This project was funded by the Commonwealth Department of Health within the Workforce Development and Innovation program.

Authors' declaration of contributions

EG co-designed the economic component of the trial, led the acquisition of economic data alongside the RCT, analysed and led the interpretation of findings, drafting and revising the manuscript. RC led the design of the economic component of the RCT, contributed to analysis and interpretation of findings. CI led the conception, design and implementation of the RCT, contributed knowledge to the methodological elements of the economic design framework, including the discrete choice instrument. EMYC contributed to the design and implementation of the RCT, provided critical insight to the frameworks and tools for collecting economic data and contributed to data collection and validation. KNR, NG, EF, SG, LS contributed to the design and implementation of the RCT, including to developing and validating the economic instruments and to subsequent data collection.

AI, GC co-designed the discrete choice analysis and contributed knowledge to the methodological elements of the cost benefit analysis. All authors contributed to interpretation of

the findings, critically reviewed the manuscript, gave final approval of the manuscript and agreed to be accountable for the work.

Conflict of interest statement

The authors declare no conflicts of interest.

Trial registration: ACTRN12616001339448
http://www.ANZCTR.org.au/ACTRN12616001339448.aspx
As the trial did not assess a health outcome, it was retrospectively registered on 26 September 2016.

Acknowledgements

We acknowledge all the site investigators not named as authors including: Susan Darzins, ACU Melbourne; Merrolee Penman The University of Sydney; Samantha Ashby, The University of Newcastle; Susan Gilbert Hunt, The University of South Australia; and all academic and administrative staff at each participating university, including Marcelle Alam, who contributed their expertise to the cost data collection. In addition, we acknowledge the central project management team, Mark Symmons (Project Manager), Mirna Boujaoude (National Research Assistant), and Tanya Edlington (National Training Officer).

We also thank our project oversight board, which comprised representatives from the Commonwealth Department of Health, the Occupational Therapy Board of Australia, the Occupational Therapy Council (Australia and New Zealand), and the Australia and New Zealand Council of Occupational Therapy Education, and state that these entities received reports but had no role in the implementation of the trial or analysis and interpretation of trial outcomes.

MeSH terms

Simulation training, economic evaluation, cost analysis, occupational therapy, randomized controlled trial.

References

Bayoumi, A. (2004). The Measurement of Contingent Valuation for Health Economics. Pharmacoeconomics; **22** (11): 691-700. doi.org/10.2165/00019053-200422110-00001

Bowles, K., Haines, T., Malloy, E., Maloney, S., Kent, F., Sevenhuysen, S., Tai, J. (2014). The costs and benefits of providing undergraduate student clinical placements for a health

service organisation: A rapid review. An evidence check review by the Sax Institute for the Health Education Training Institute (HETI). Canberra, ACT: Australian Government Department of Health.

ChoiceMetrics Pty Ltd (2016) Ngene User Manual and Reference Guide.

Darcy Associates. (2016). End-of-term evaluation of Well Placed. Well Prepared: *Victoria's* strategic plan for Clinical placements 2012-2015. Indicator Results Report. St Kilda, Victoria: Darcy Associates Consulting Services.

Dillon, L. S., Tomaka, J. W., Chriss, C. E., Gutierrez, C. P., Hairston, J. M. (2003). The effect of student clinical experiences on clinician productivity. Journal of Allied Health; **32**: 261–265. (doi unavailable)

Drummond, M., Sculpher, M., Torrance, G., O'Brien, B., Stoddart, G. (2015). Methods for the economic evaluation of health care programmes (4th edition). London, UK: Oxford University Press.

Foo, J., Rivers, G., Ilic, D., Evans, D. J. R., Walsh, K., Haines, T., . . . Maloney S. (2017). The economic cost of failure in clinical education: a multi-perspective analysis. Medical Education; **51** (7):740-754. doi:10.1111/medu.13266

Gerard, K., Ryan, M., & Amaya-Amaya, M. (2008). Introduction. In M. Ryan, K. Gerard, & M. Amaya-Amaya (Eds.), Using Discrete Choice Experiments to Value Health and Health Care (pp. 1–10). Dordrecht, Netherlands: Springer.

Glied, S., Smith, P. C. (Eds). (2011). The Oxford Handbook of Health Economics, London, UK: Oxford University Press.

Haines, T. P., Kent, F., Keating, J. L. (2014). Interprofessional student clinics: an economic evaluation of collaborative clinical placement education. Journal of Interprofessional Care; **28** (4):292–298. doi: 10.3109/13561820.2013.874983

Harrison, M. (2010). Valuing the Future: The Social Discount Rate in Cost-Benefit Analysis. Canberra, ACT: Australian Government Productivity Commission.

Hole, A. (2007). A comparison of approaches to estimating confidence intervals for willingness to pay measures. Health Economics, **16** (8):827-840. doi: 10.1002/hec.1197

Hughes, R., Desbrow, B. (2010). An evaluation of clinical dietetic student placement case-mix exposure, service delivery and supervisory burden. Nutrition Dietetics; **67** (4):287–93. doi: 10.1111/j.1747-0080.2010.01478.x

Imms, C., Chu, E. M. Y., Guinea, S., Sheppard, L., Froude, E., Carter, R., . . . Symmons, M. (2017). Effectiveness and cost-effectiveness of embedded simulation in occupational therapy clinical practice education: study protocol for a randomised controlled trial. Trials, **18** (1):345. doi: 10.1186/s13063-017-2087-0

Imms C, Froude E, Chu EMY, Sheppard L, Guinea S, Darzins S, Guinea, S., Gospodarevskaya, E., Carter, R., Symmons, M., Penman, M., Nicola-Richmond, K., Gilbert-Hunt, S., Gribble, N., Ashby, S., & Mathieu, E. (2018). Simulated versus traditional occupational therapy placements: A randomised controlled trial. Australian Occupational Therapy Journal doi: 10.1111/1440-1630.12513.

Jones, M. L., Akehurst, R. (1999). The cost and value of pre-registration clinical placements for Project 2000 students. J Advanced Nursing; **30** (1): 169-178. doi: 10.1046/j.1365-2648.1999.01061.x

Lalloo, R., Massey, W. (2013). Simple cost analysis of a rural dental training facility in Australia. Australian J Rural Health; **21** (3):158-62. doi: 10.1111/ajr.12027

Leiken, A. M., Stern, E., Baines, R. E. (1983). The effect of clinical education programs on hospital production. Inquiry; **20**: 88–92. (doi unavailable)

Maloney, S., Haines, T. (2016). Issues of cost-benefit and cost-effectiveness for simulation in health professions education. Advances in Simulation; **1** (13):1-6. doi: 10.1186/s41077-016-0020-3

Office of Best Practice Regulation. (2016). Guidance Note: Cost-Benefit Analysis. Canberra, ACT: Department of the Prime Minister and Cabinet, Australian Government.

Paxton Partners. (2016). Teaching, Training and Research Costing Study. Final Report. Darlinghurst, NSW: Independent Hospital Pricing Authority.

Ramsey, S., Willke, R., Briggs, A., Brown, R., Buxton, M., Chawla, A., . . . Reed, S. (2005). Good Research Practices for Cost-Effectiveness Analysis Alongside Clinical Trials: The ISPOR RCT-CEA Task Force Report. Value in Health; **8** (5):521-533. doi: 10.1111/j.1524-4733.2005.00045.x

Rodger, S., Stephens, E., Clark, M., Ash, S., Graves, N. (2011). Occupational therapy students' contribution to occasions of service during practice placements in health settings. Australian Occupational Therapy Journal; **58** (6), 412–418. doi: 10.1111/j.1440-1630.2011.00971.x

Rodger, S., Stephens, E., Clark, M., Ash, S., Hurst, C., Graves, N. (2012). Productivity and time use during occupational therapy and nutrition/dietetics clinical education: a cohort study. PLoS ONE; **7**: e44356. doi: 10.1371/journal.pone.0044356

Rodger, S., Chien, C., Turpin, M., Copley, J., Coleman. A., Brown, T. (2016) Establishing the Validity and Reliability of the Student Practice Evaluation Form–Revised (SPEF-R) in Occupational Therapy Practice Education: A Rasch Analysis. Evaluation & the Health Professions, 39(1), 33-48. doi:10.1177/0163278713511456

Ryan, M., Farrar, S. (2000). Using conjoint analysis to elicit preferences for health care. BMJ: British Medical Journal, **320**, 1530-1532. doi: 10.1136/bmj.320.7248.1530

State Government of Victoria. (2015). Standardised Schedule of Fees for Clinical Placement of Students in Victorian Public Health Services Version 2: July 2015. http://docs2.health.vic.gov.au/docs/doc/5C1FE5956DEDB741CA257E680023C30B/$FILE/Revised%20clinical%20placement%20fee%20schedule%20July%202015.pdf [accessed 20 February 2018].

Victoria Health Workforce Knowledge Bank. (2016). https://vicknowledgebank.net.au/current-workforce/public-health-services/ [accessed 27 February 2016].

Walsh, K. (2013). Cost and value in healthcare professional education—why the slow pace of change? Am J Pharm Education; **77** (9):205. doi: 10.5688/ajpe779205

Table 1: Estimated cost ($AUD) of SCP: resources used per occupational therapy student per simulation week (40 hours)

Sites / Cost category	Site #1	Site #2	Site #3	Site #4	Site #5	Site #6	Site #7	Site #8	Site #9	Mean (SD)
	N=24	N=70	N=18	N=19	N=9	N=36	N=59	N=41	N=57	N=38
Hours: staff time in SIM week*	5	4.6	5.5	6.8	5.2	4.3	2.6	4.2	3.1	**4.6 (1.3)**
Hours: non-SIM week time on preparation, training, case studies update etc.	5.0**	2.1	7.4	4.6	7.8	11.1	1.1	3.2**	3.1**	**5.0 (3.2)**
Subtotal staff hours	*10*	*6.7*	*12.9*	*11.4*	*13*	*15.4*	*3.7*	*7.4*	*6.2*	**9.6 (3.9)**
Cost of SIM week hours***	$495	$365****	$304	$450	$373	$322	$246	$412	$365	**$370 ($76)**
Cost non-SIM week hours	$325	$136	$597	$294	$551	$667	$109	$192	$226	**$344 ($209)**
Subtotal staff costs	*$820*	*$501*	*$901*	*$744*	*$924*	*$989*	*$355*	*$604*	*$591*	**$714 ($215)**

Cost of venue hire	$199	$204	$140	$217	$587	$21.50	$105	$106	$33	**$179 ($169)**
Total cost per student (staff + volunteers hours + actors + venue hire)	***$1,019***	***$705***	***$1,041***	***$961***	***$1,511***	***$1,010***	***$460***	***$710***	***$624***	**$893 ($310)**

Table Notes: SIM = Simulation; SD = Standard Deviation

* Clinical supervision, assessment, trouble shooting, inclusive of volunteers' hours but not actors' hours;

** Inclusive of non-University staff time;

*** Includes the cost of hiring actors;

**** Includes both: cost of actors and a "community house"

Table 2: Estimated cost ($AUD) of a TCP: resources used per occupational therapy student in traditional placement (40 hours)

Site / Cost category	Site #1	Site #2	Site #3 ^	Site #4 ^	Site #5/#7[&]	Site #6 ^	Site #8 ^	Site #9 ^	Mean (SD)
Admin staff cost at school/faculty or higher level	$376	N/A	N/A	N/A	$39	$240*	$101	$113	**$174 ($135)**
Admin/academic staff cost at OT department/unit level	$664	$32	$716	$210	$1,036	$530*	$505	$190	**$485 ($329)**
Practice facilitators	$31	$0	$0	$0	$0	$0	$60	$29	**$15 ($23)**
Subtotal staff cost	***$1,071***	***$32***	***$716***	***$210***	***$1,075***	***$770***	***$666***	***$333***	***$609 ($385)***
Other costs	$41	$12	$35	$10	$9	$49	$8	$13	**$22 ($17)**
Fees paid to providers/LHD	$0	$100	$175	$0	$0	$0	$0	$88**	**$45 ($68)**
Subtotal other costs	***$41***	***$112***	***$210***	***$10***	***$9***	***$49***	***$8***	***$101***	***$68 ($71)***

Total cost per student (staff + other costs)	***$1,112***	***$144***	***$926***	***$220***	***$1,084***	***$819***	***$674***	***$434***	***$677 ($376)***

Table Notes: LHD= Local Health District; SD=Standard Deviation; OT= occupational therapy;

***** The allocation of these costs is not comparable to any other; the organisational structure is unique to this university and involves a number of layered administrative units;

****** The comparator for this site was a "typical TCP across years 1; 3 and 4", since the 2nd year students are not involved in TCP; the average fee per week was adjusted for the likelihood of paying the fee (50%, planned 2017 budget, based on 2016 data) across all OT placement in years 1; 3 and 4;

& The TCP cost estimate for this University that had two separate rounds of SCP (coded as #5 and #7) was assumed to be the same.

^ Universities in the States with centralised databases: viCPlace or ClinConnect

Table 3: Summary of costs (AUD$) of a simulated and traditional practice week for an occupational therapy student (including public health sector costs)

Site / Cost category	Site #1*		Site #2		Site #3		Site #4		Site #6		Site #5/#7		Site #8*		Site #9*	
	SCP	**TCP**	**SCP**	**TCP**	**SCP**	**TCP**	**SCP**	**TCP**	**SCP**	**TCP**	**SCP**	**TCP**	**SCP**	**TCP**	**SCP**	**TCP**
Cost of a week in placement	$1,019	$1,112	$705	$144	$1,041	$926	$961	$220	$1,010	$819	$460 $1,501	$1,084	$710	$674	$624	$434
Cost of capital items: case materials; videos; website	$68	n/a	$68	n/a	$68	n/a	$68	n/a	$68	n/a	$68	n/a	$68	n/a	$68	n/a
*Subtotal^*	*$1,087*	*$1,112*	*$773*	*$144*	*$1,109*	*$926*	*$1,029*	*$220*	*$1,078*	*$819*	*$528* *$1,569*	*$1,084*	*$778*	*$674*	*$692*	*$434*
Difference in SCP and TCP costs *(university perspective)*	**-$25**		**$629**		**$183**		**$809**		**$259**		**-$556** **$485**		**$104**		**$258**	
Cost of the centralised database ($1.02*5=$5.10 or $1.70*5=$8.50)	0	0	0	0	0	$8.50	0	$5.10	0	$5.10	0	0	0	$5.10	0	$8.50
Cost of providing a TCP day[&] [($142+$49)/2]*5= $477.50[#]	n/a	$0 (0%)	n/a	$425 (89%)	n/a	$478 (100%)	n/a	$138 (29%)	n/a	$478 (100%)	n/a	$334 (70%)	n/a	$12 (2.6%)	n/a	$21 (4.3%)
*Subtotal^*	*$0*	*$0*	*$0*	*$425*	*$0*	*$486*	*$0*	*$144*	*$0*	*$483*	*$0*	*$334*	*$0*	*$18*	*$0*	*$29*

Difference in SCP and TCP costs (*aggregated university + public health sector perspective*)	**-$25**	**$204**	**-$303**	**$665**	**-$224**	**-$890** **$151**	**$86**	**$229**

Table Notes: SCP= simulated clinical placement; TCP=traditional clinical placement

*****Sites with vocational training that involves no or little public or private hospital placements.

Average of the two estimates of student placement day AUD$49 [20] and AUD$142 [19] multiplied by 5 working days.

& Applied in proportion of TCPs in public hospitals according to the distribution of students across the types of placements in the TCP arms of the RCT.

^Rounded to the nearest whole dollar amount.

Table 4. Discrete choice estimates (N=28)

Attribute	Coefficient	SE	WTP (AUD$)	95% CI (Lower)	95% CI (Upper)
TCP	1.152	(0.159)***	532.843	349.097	853.470
PLACEMENT AVAILABILITY	0.050	(0.005)***	23.161	15.236	38.061
COMPETENCE	-0.085	(0.008)***	-39.424	-63.537	-26.317
COST	-0.002	(0.000)***	—	—	—

Table Notes: Conditional logit estimates reported in the table. Except for the type of placement (which was included as a dummy variable, all other three attributes were included as continuous variables. Cluster robust standard errors (SE) in parentheses. Confidence intervals estimated using bootstrap method (with 1,000 replications). *** p<0.001. WTP: willingness to pay. CI: confidence interval.

Author/s:
Gospodarevskaya, E; Carter, R; Imms, C; Chu, EMY; Nicola-Richmond, K; Gribble, N; Froude, E; Guinea, S; Sheppard, L; Iezzi, A; Chen, G

Title:
Economic evaluation of simulated and traditional clinical placements in occupational therapy education

Date:
2019-06-01

Citation:
Gospodarevskaya, E., Carter, R., Imms, C., Chu, E. M. Y., Nicola-Richmond, K., Gribble, N., Froude, E., Guinea, S., Sheppard, L., Iezzi, A. & Chen, G. (2019). Economic evaluation of simulated and traditional clinical placements in occupational therapy education. AUSTRALIAN OCCUPATIONAL THERAPY JOURNAL, 66 (3), pp.369-379. https://doi.org/10.1111/1440-1630.12563.