AN EVIDENCE-BASED PROGRAM TO IMPROVE ANALGESIC PRACTICE AND PAIN OUTCOMES IN RESIDENTIAL AGED CARE FACILITIES

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Running head:

Effect of a Pain Management Program in RACFs

ABSTRACT

Pain is common in those living in residential aged care facilities (RACFs) and a number of obstacles have been identified as recurring barriers of adequate pain management. To address this, the Australian Pain Society developed 27 recommendations for comprehensive good practice in the identification, assessment and management of pain. This study reviewed pre-existing pain management practice at five Australian RACFs and identified changes needed to implement the recommendations, and then implemented an evidence based program that aimed to facilitate improved pain management. The program involved staff training and education, and revised in-house pain-management procedures. Reviews occurred pre- and post-program, and included the assessment of 282 residents for analgesic utilisation and pain status. Results showed that analgesic use improved post-program ($p < .001$), with a decrease in residents receiving no analgesics (from 15% to 6%) and an increase in residents receiving Around-The-Clock plus Pro Re Nata (ATC+PRN) analgesics (from 24% to 43%). There were improvements in pain relief for residents with scores indicative of pain, with ABBEY ($p = .005$), PAINAD ($p = .001$), and NOPPAIN ($p < .001$) scores all improving. Although physical function declined as expected, SF-36 bodily pain scores ($p = .001$) also showed improvement. The results demonstrate that improved evidence based practice and outcomes in RACFs can be achieved with appropriate training and education. Investing resources in the aged care workforce via this program has improved analgesic practice and pain relief in participating sites. Further attention to the continued targeted pain management training of aged care staff is likely to improve pain-focused care for residents.

KEY WORDS: pain, pain management, residential aged care, training, program

INTRODUCTION

Those in Australia aged over 65 years with care needs that include 24 hour nursing care are eligible to receive 'high level' care in Residential Aged Care facilities (RACFs). For some residents in RACFs, 'low level' care of 24 hours personal care and intermittent nursing care is sufficient. Overall, residents' care needs are substantial - over 40% of residents have circulatory system and/or musculoskeletal and connective tissue related diseases listed as their first medical condition (excluding mental and behavioural disorders). Also 50% of residents have dementia and 26% have a mental illness without dementia[1]. Pain is common in these settings, affecting up to 80% of residents, although international research findings demonstrate that the absolute prevalence of pain can vary substantially between facilities[2,3]. Obstacles have been recognised as potential barriers to adequate pain management in aged care. Under-prescription of opioids for pain relief in residential aged care is a problem, with some practitioners fearful of patients becoming addicted to prescription opioids or experiencing adverse side effects[4]. This practice is changing as research findings show that the risk of opioid dependency is low when these medications are used for medical reasons[5,6], and as new drug formulations are introduced with fewer side effects[7]. However, other factors remain that are detrimental to good pain management in residential aged care[8] - including non-standardised approaches to pain assessment[9], insufficient pain management knowledge base for staff[9], inconsistent care due to high staff turnover or staff shortage[4], and poor multidisciplinary pain management structures[8].

A number of international studies have implemented programs to improve pain management practice in residential aged care. These programs have involved strategies to improve the staff's education in pain assessment and management[10,11,12], typically administered to all levels of nursing staff and sometimes combined with changing pain management practice at an institutional level[12,13,14]. Results invariably show improvement on some aspect of pain

management practice, though pain relief outcomes may be mixed. Stevenson et al 2006[15] showed improvements in some areas relating to pain management in long term care facilities, as well as reduced self-reported pain of any severity and of at least moderate pain. Baier et al 2004[16] implemented a pain management program in nursing homes that showed improvements in pain assessment but not analgesic use or prevalence of pain. A similar program implemented by Horner et al 2005[14] showed improvements in pain assessment but failed to show a difference in pain treatment of residents with at least moderate daily pain. A program implemented in long term care facilities by Kaasalainen et al 2012[12] showed comparatively more increased pain in a control group compared to an pain protocol intervention group, though both groups had increased pain scores over the intervention period.

To address the complexity of pain management in residential aged care, the Australian Pain Society (APS) developed a framework comprising 27 key recommendations[17,18]. Based on best available evidence, these recommendations outlined best practice in the identification, assessment and management of pain in RACFs. These recommendations were also supported with a toolkit provided to all Australian RACFs by the Australian Government[17,18] that could be used as the basis of an evidence based training and education program to be deployed in RACFs. However, prior to this study, no implementation and evaluation program had been developed to embed the toolkit and recommendations into routine care. Also, although there are a number of pain management programs that have been developed and tested internationally, the authors were (and remain) unaware of any pain management program specifically designed for Australian RACFs that utilises a comprehensive framework such as the APS key recommendations. This project aimed to address implementation of the 27 recommendations and evaluate outcomes.

METHODS

Conducted in 2008-9, this study used a pre-test / post-test design. Five facilities in three Australian states (QLD, VIC, WA) were selected to partner in this study, representing a spectrum of RACFs (high, low or dementia-specific care, large or small bed capacity, culturally diverse, and in metropolitan or regional settings). A pre-test (baseline) review of pre-existing pain management practices and outcomes in these RACFs identified gaps in training and organisational changes needed to implement the recommendations. A comprehensive program (including staff education and training, pain assessment procedures, broadening staff roles, and pain management resources) was then conducted to address gaps in pain management practice. A post-implementation (post-program) review evaluated the success of the program in practice and outcomes.

Ethical approval for the study was obtained from the Alfred Hospital Ethics Committee (VIC), Curtin University Ethics Committee (WA), Edith Cowan University Ethics Committee (WA), and Queensland University of Technology Ethics Committee (QLD).

Subjects

An exhaustive sample of all residents participated in the reviews, with a minority of residents refusing to participate. Next of kin consented on behalf of residents without the capacity to consent themselves (unless there was no provision for proxy consent, in which case the relevant ethics committee granted waiver of consent).

Assessment tools

Residents were individually assessed using a comprehensive battery of pain and psychometric tools. The Resident's Verbal Brief Pain Inventory (RVBPI)[20], ABBEY pain scale[21], Pain Assessment in Advanced Dementia Scale (PAINAD)[22], Non-communicative

Patient's Pain Assessment Instrument scale (NOPPAIN)[23] and Short Form 36 Health Survey[24] were used to assess pain. The RVBPI was adapted from the Brief Pain Inventory[25] and is an abbreviated self-report verbal pain scale. It consists of a number of questions, including 'pain today', 'worst pain', 'average pain, 'least pain', and 'pain now'. ABBEY (0 to 18 scale), PAINAD (0 to 10 scale), and NOPPAIN (0 to 30 scale) are pain scales designed to be used in patients that cannot self-report or with cognitive impairment. These three scales differ slightly in the items they endorse as indicative of pain. The Short Form 36 Health Survey [SF-36] is a general health self-report questionnaire with subscales including physical (0 to 100 scale) and bodily pain assessment (0 to 100 scale). Resident prescription medication charts were also reviewed to determine analgesic utilisation and to complete the Medication Quantification Scale (MQS)[26]. Only analgesics prescribed and signed as given were included. Residents were also assessed on a number of well-established psychometric tools – the Geriatric Depression Scale (GDS)[27], Cohen-Mansfield Agitation Inventory (CMAI)[28], and Barthel Index[29].

Procedure

All eligible residents were assessed at baseline and post-program. The observational tools were used for every resident and tools requiring self-report were administered when achievable. The baseline review also included:

- expert assessment of current practice after observation undertaken over a four week period (including the evaluation of existing structured pain identification and assessment procedures, pain management policies and quality improvement processes, and the integration of multidisciplinary collaborations and treatment protocols)

- the compilation of summaries of pharmacological and non-pharmacological interventions,
- focus groups with residents, family and staff to describe existing practice and outcomes (including administration of a Pain Management Staff Survey)

In this way, the baseline review identified any evidence based practice gaps. These gaps were prioritised and the implementation program tailored at each individual facility to ensure that all key areas were covered but also to implement strategies that addressed prioritised areas. Program delivery was also adapted to the learning needs at each facility (variable due to differences in staff cultural background, English language proficiency, etc).

Each RACF then underwent the implementation program designed to address identified practice deficits. This program aimed to improve pain management in accordance with the 27 APS recommendations and encompassed four main categories of activities: staff education and training (eg training in verbal / non-verbal pain tools and the use of mobilisation protocols; importance of around the clock analgesics), the establishment of a regular evidence-based pain assessment procedure (eg regularly asking about pain and regular re-assessment; structured procedures to identify the causes of pain; structures to identify pain in those unable to report it), the appointment of pain champions / pain team (eg systems to improve multidisciplinary collaboration between physician, staff and allied health; referral to pain clinics for those that fail to respond to treatment; demonstration of a pain vigilant culture), and the co-ordination of available resources for pain management (eg structured staff procedures to document pain-related behaviour; availability of both pharmacological and non-pharmacological pain treatment therapies; pain management quality improvement processes).

Staff attended lectures, workshops (four x three-hour sessions) and one-on-one 'on the job' training (two x half-day sessions), though this varied depending on nursing staff capacity. Training was also tailored in response to staff roles at each RACF. Nursing staff received additional training on analgesics and behaviour assessment, support staff received additional training on noticing and reporting resident behaviours, and managerial staff received additional training on systems such as linking pain assessment with government funding structures. Educational content included an overview of pain and ageing and dementia, current evidence and APS guidelines, usage of pain assessment tools and their practical application, pain management practice and treatment options, and a summary of changes to pain management practice and staff roles. The RVBPI (and either ABBEY or PAINAD for non-verbal residents) were recommended to facility staff as appropriate tools in pain assessment and were encouraged to be completed at least every three months, or more regularly when appropriate. Facilities changed policy and procedures to reflect these new practices.

Pain Champions were also appointed at each facility and most established 'pain teams', staffed by a combination of clinical managers, pain champions, nurse unit managers, and allied health staff. Co-ordination of available pain management resources included collating resources, developing external pain management contacts, commissioning pain specialists for some residents with intractable pain, and making available a multidisciplinary pain clinic for individual treatments.

The post-program review was conducted approximately one year after the initial one. Assessments were done blind to any treatment changes between reviews.

Data Analysis

Residents were classified with cognitive impairment when scoring < 24 on the Mini-Mental State Examination (MMSE)[30] or 4+ on the Psychogeriatric Assessment Scales - Cognitive Impairment Scale (PAS-Cog)[31]. Analgesic use was defined as the protocol of drug administration [None (NIL), Pro-Re-Nata (PRN), Around-The-Clock (ATC), Around the Clock plus Pro-Re-Nata (ATC+PRN)]. The impact of the program on analgesic use at the RACFs was assessed using chi-square analysis.

Separate MANOVA repeated measures multivariate tests were used on non-verbal pain measures (ABBEY, PAINAD, NOPPAIN), RVBPI measures (worst pain, least pain, average pain, pain now), and physical components of the SF-36 (Physical Function, Role-physical, bodily pain, General Health) to determine between-subject cognitive status effects, within-subject program effects, and cognitive status x program interaction effects. For non-verbal pain assessment tests, only residents with baseline scores indicative of likely pain were included (cut-offs of ABBEY > 3.5, PAINAD > 3.5, NOPPAIN > 4.5[32]). Though cut-offs here were higher than recommended for 'daily practice', they correspond reasonably well with those recommendations, and were based on ROC curve cut-off points from previous work[32]. For RVBPI tests, only residents that answered 'Yes' to the item 'Do you feel pain today?' were included. Wilk's Lambda was used for all multivariate tests. Univariate analysis used Greenhouse-Geiser with Bonferroni correction. All analyses were conducted using SPSS Statistics for Windows, version 17.0 (Chicago: SPSS Inc).

RESULTS

Participation Rates

The project achieved a very high 92% recruitment rate with 365 residents assessed at baseline, and 330 residents assessed post-program. A sub-sample of 282 residents was used for analysis in this paper, restricted to residents assessed at both reviews. Table 1 shows the demographic and clinical characteristics of the sample at baseline. The sample was primarily female (77%), average age 85 years, and with 29% of residents with a PAS-Cog or MMSE indicating no cognitive impairment, 25% with mild cognitive impairment, and 46% with moderate or severe cognitive impairment.

[Table 1 around here]

Non-Pharmacological Pain Management

The use of non-pharmacological pain management treatments at baseline and post-program were compared. For residents reporting pain on the day of testing (n=83), 34% (n=28) reported using any form of non-pharmacological treatment at baseline review compared with 42% (n=35) at post-review (n=83, $\chi^2 = 0.928$).

Analgesic Utilisation Practice

The impact of the program on current analgesic use was assessed by comparing the prevalence of analgesic prescription type (NIL, PRN, ATC, or ATC+PRN) at baseline and post-program. Though the program could also be assessed in relation to changes in dosage or analgesic class, the timing of analgesic use (NIL, PRN, etc) is also an important benchmark, especially useful for evaluating pain management systems. The results showed significant

changes in analgesic utilisation practice after the program. This was evident for all residents (Fig 1), those cognitively intact (Fig 2A), those with any level of cognitive impairment (Fig 2B), and residents identified with at least moderate to severe cognitive impairment (results not shown).

Figure 1 shows the effect of the program on all participating residents. Analgesic prescription rates at baseline were 15% (NIL), 17% (PRN), 44% (ATC), and 24% (ATC+PRN). Post-program rates were 6% (NIL), 21% (PRN), 30% (ATC), and 43% (ATC+PRN). Chi-square analysis confirmed changes in analgesic practice ($\chi^2 = 116.43$, df = 9, $p < .001$). 75% (n = 30) of residents without analgesics were prescribed at least PRN post-program, with 53% (n = 16) of those prescribed at least ATC. Though 62% (n = 28) on PRN analgesics at baseline remained on PRN, 33% (n = 15) were on analgesics with an ATC component post-program. ATC prescription rates also shifted, with 48% (n = 56) previously on ATC prescribed an additional PRN analgesic post-program. It should be noted that a supplementary analysis of all participating residents (including those not assessed at both time points) yielded a similar pattern of analgesic use (results not shown).

[Figure 1 about here]

Figure 2 shows the effect of the program on analgesic use for the cognitively intact (A) and the cognitively impaired (B). For the cognitively intact at baseline (Figure 2A), rates were 25% (NIL), 16% (PRN), 32% (ATC), and 27% (ATC+PRN). Post-program rates were 6% (NIL), 25% (PRN), 32% (ATC), and 37% (ATC+PRN). Chi square analysis showed differences in analgesic use for the cognitively intact ($\chi^2 = 34.33$, df = 9, $p < .001$), with 44%

prescribed PRN from previously none, and 35% prescribed ATC+PRN from previously ATC only. Figure 2B shows the effect of the program on residents with any level of cognitive impairment. Baseline rates were 10% (NIL), 17% (PRN), 47% (ATC) and 26% (ATC+PRN). Post-program rates were 5% (NIL), 16% (PRN), 36% (ATC) and 44% (ATC+PRN). Chi-square analysis confirmed changes in analgesic use ($\chi^2 = 63.17$, df = 9, $p < .001$). 67% without analgesics at baseline were prescribed at least PRN post-program. 44% on ATC at baseline were changed to ATC+PRN post-program. When stratifying the group by only those with moderate to severe cognitive impairment, the pattern of analgesic practice was also similar (results not shown).

[Figure 2 about here]

Pain Measurement Scores

Multivariate repeated measures MANOVA (see Table 2) were performed on non-verbal pain assessments (ABBEY, PAINAD, NOPPAIN), RVBPI subscales (Worst pain, Least pain, Average pain, pain Now), and the physical domain of the SF-36 (Physical Function, Role physical, Bodily Pain, General Health). Sample sizes were smaller for non-verbal measures and RVBPI subscales due to fewer residents meeting the pain cut-off criteria or indicating pain on the day of assessment, respectively. For non-verbal pain measures, there were significant within-subject program effects [$F(3,121) = 7.06$, $p < .001$], with significant univariate effects for ABBEY ($p = .005$), PAINAD ($p = .001$), and NOPPAIN ($p < .001$). For RVBPI measures, there were no significant within-subject program effects [$F(4,81) = 2.08$, $p = .091$], though the univariate effect for Least pain was significant ($p = .046$). For the

physical components of the SF-36, there were significant within-subject program effects [$F(4, 202) = 6.22$, $p < .001$], with univariate effects significant for physical function ($p = .001$) and bodily pain ($p = .001$).

[Table 2 about here]

Table 3 shows the change in pain score (for ABBEY, PAINAD, NOPPAIN) from baseline to post-program, for residents meeting the non-verbal pain score cut-offs. Pain score worsened in 29% of residents. Pain score was unchanged for 11% to 21% of residents. Pain score improved in 50% to 60% of residents.

[Table 3 about here]

DISCUSSION

Pain management in residential aged care can be difficult due to obstacles such as non-standardised approaches to pain, insufficient staff knowledge and support, high staff turn-over, and poor multidisciplinary pain management integration. The APS key recommendations and associated toolkit endeavour to address these barriers, and this project aimed to improve pain management in a number of Australian RACFs by implementing and evaluating a comprehensive program that incorporated such guidelines.

The results suggest that a program aiming to incorporate a best available evidence approach to pain management in RACFs can improve both practice and pain-related outcomes. After

the program, analgesic use had shown considerable improvement. The number of residents with no analgesic prescription diminished post-program, particularly in the cognitively intact group. Likewise, the number of residents prescribed ATC + PRN increased post-program, with the largest gains seen in the cognitively impaired.

As well as significant improvements in adherence to APS guidelines in analgesic practice, there were improvements in pain scores after the program. For residents with pain scores exceeding the cut-offs, non-verbal pain measures (ABBEY, PAINAD, NOPPAIN) were all lower after the program. As previous work has shown that non-verbal pain assessments are sensitive to pain severity in people with dementia[32], it supports the notion that this intervention program was successful in improving pain relief. The distribution of change in pain score during the study showed that approximately 30% of residents had pain scores that had worsened post-program, whilst 10% to 20% had unchanged pain scores. However, the majority (50% to 60%) had pain scores that improved at least 1 point, with up to 20% of those improving by considerably more (4+ points on the ABBEY / PAINAD, or 7+ on the NOPPAIN). An improvement of this magnitude would potentially have a significant impact on a resident experiencing pain.

There were also changes in the physical component of the SF-36, with the bodily pain subscale from the Short Form-36 health survey improving post-program. This suggests that reports of recent bodily pain and interference with activity due to that pain were less severe after the program. The post-program bodily pain scores (69.85 ± 25.28) were consistent with normative scores of the general population over 75 years old (69.3 ± 23.84) whilst the baselines scores (63.99 ± 25.68) were consistent with scores of the general population of any age and with arthritis or osteoporosis conditions [33]. The results suggest an implementation program can be particularly successful at relieving bodily pain conditions and improving related function.

The results from our study showed that pain scores improved in residents in pain at baseline, and together with evidence showing improved compliance with APS pain management guidelines and improved staff self-efficacy (reported in a second paper by the same authors[34]), suggests that the program was successful in embedding evidence-based pain management recommendations into routine care. However, though overall pain scores after the program improved for residents with likely pain, still 40% to 50% either had unchanged or worsened pain scores. It is unclear whether these residents had difficult to treat or intractable pain, whether acute pain between baseline and post-program had inflated pain scores, whether disease had progressed with accompanying increases in pain, or that the program was insufficiently targeted to improve certain painful conditions. Likewise, other factors could instead be responsible for the improvements seen in analgesic use and pain scores. Unrelated management policies or turnover in aged care staff may have inadvertently impacted pain management. It is however reasonable to assume that any improvements seen post-program were due to the implementation program.

Comparisons with other international research on the efficacy of programs to improve pain management practice in aged care have shown mixed outcomes. Stevenson et al 2006[15] outlined a large scale program implemented in a variety of health care organisations. Though not specifically tailored to long-term care, the program demonstrated significant reductions in the average prevalence of pain in the past 24 hours for residents that could self-report in 26 long-term care facilities, when measured using a one-minute verbal pain questionnaire. Unlike our study, only a small sample (ten residents) at each facility was assessed pre and post-program. Nonetheless they showed that the number of residents receiving analgesics improved post-program. Our study showed a similar finding with an increase in the prevalence of analgesic use for residents without cognitive impairment post-implementation program. A program designed for long-term nursing homes by Horner et al 2005[14] showed

352 improvements in pain assessment but no difference in pain treatment of residents with
353 moderate or excruciating pain. Unlike our study, they did show an increase in the use of non-
354 pharmacological pain treatments post-program. A pain management program for long-term
355 care by Kaasalainen et al 2012 [12] showed that after a one year period, the control group had
356 higher non-verbal pain scores than the intervention group. However the intervention group
357 was still shown to have higher non-verbal pain scores post-intervention program. This
358 compares to our study also showing that pain worsened for 29% of residents that met non-
359 verbal pain score cut-offs. Overall however, all non-verbal pain measures were lower after
360 our implementation program. A recent study by Tse et al 2013 showed that an integrated pain
361 management program can improve a number of outcomes for the elderly in nursing homes[35].
362 This short program (eight weeks) was implemented only for cognitive residents in a nursing
363 home. Not only did pain scores improve, but also measures of happiness, geriatric depression,
364 and life satisfaction.

365 There are a number of limitations with this study. The inclusion of a control group would
366 have strengthened the design of the study and allowed for more direct comparisons of the
367 effectiveness of the implementation program at each facility. A second limitation is that this
368 study does not report on the impact of the side effects of analgesic medications, an important
369 issue in pain management. Although nursing staff was educated on the potential side effects
370 of analgesic medication, adverse events associated with its use (such as constipation with
371 opioids) were not documented for study purposes. As such, the implementation program
372 could not be assessed in this regard.

373

374 **CONCLUSION**

This study demonstrates that for the RACFs that participated in the program, best evidence based practice can be achieved with additional training and education, and appropriate changes to institutional pain management practice. The results show that the implementation program can demonstrate improvements in pain-related outcomes, such as better analgesic utilisation and improved pain relief. Investing directed resources in the aged care workforce may therefore improve care for residents.

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Conflict of Interest:

Elements of Financial/Personal Conflicts	S Savvas		C Toye		E Beattie		S Gibson	
	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		X		X		X		X
Grants/Funds		X		X		X		X
Honoraria		X		X		X	X	
Speaker Forum		X		X		X		X
Consultant		X		X		X		X
Stocks		X		X		X		X
Royalties		X		X		X		X
Expert Testimony		X		X		X		X
Board Member		X		X		X		X
Patents		X		X		X		X
Personal Relationship		X		X		X		X

*Authors can be listed by abbreviations of their names.
For all "Yes" responses, provide a brief explanation here:

S.Gibson is on the advisory board of Pfizer and CSL pharmaceutical companies, but these activities have no connection to the content or conduct of studies relating to the current article.

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GRAPHICS

Table 1: Clinical Characteristics of the Sample (n=282) at Baseline.

	Total n	(%)	Mean ± SD
Age (years)	282		85.3 ± 7.7
Sex: Total	282	(100%)	
Male	66	(23%)	
Female	216	(77%)	
MMSE Score	51		19.1 ± 12.1
PAS-Cog Score	183		9.7 ± 6.9
Cog Impairment: Total	230	(100%)	
No impairment	67	(29%)	
Mild impairment	58	(25%)	
Moderate or Severe	105	(46%)	
SF-36 Total Score	222		61.5 ± 19.5
Abbreviated GDS	217		3.8 ± 3.1
MQS	282		13.6 ± 9.4
CMAI	281		34.9 ± 11.8
Barthel Index	280		53.9 ± 31.8

SD, Standard Deviation; MMSE, Mini-Mental State Examination (range 0-30); PAS-Cog, Psychogeriatric Assessment Scale - Cognitive Impairment Scale (range 0-21); SF-36, Short Form (36) Health Survey (range 0-100), GDS, Geriatric Depression Scale; MQS, Medication Quantitative Scale, CMAI, Cohen-Mansfield Agitation Inventory.

Table 2: *Change in Pain Score.* Mean pain scores at baseline and one year post-program.

	N	Baseline Mean (SD)	Post-program Mean (SD)	Pairwise comparisons df	MeanSq	F	p
Non-Verbal Pain Assessments							
ABBEY	124[a]	5.97 (2.63)	5.08 (3.19)	1	48.79	7.99	.005**
PAINAD	124[a]	3.90 (1.80)	3.19 (1.79)	1	31.23	12.48	.001**
NOPPAIN	124[a]	9.33 (4.87)	7.13 (4.74)	1	300.52	17.77	<.001**
Resident Verbal Brief Pain Inventory Subscales							
RVBPI worst pain	84[b]	2.39 (0.83)	2.35 (0.88)	1	0.05	0.09	.760
RVBPI least pain	84[b]	0.78 (0.68)	0.99 (0.99)	1	1.91	4.10	.046*
RVBPI average pain	84[b]	1.61 (0.62)	1.76 (0.73)	1	0.99	3.41	.068
RVBPI pain now	84[b]	1.15 (0.89)	1.14 (0.93)	1	0.01	0.01	.924
Physical domain of the SF-36							
SF-36 Physical Function	206	30.73 (27.07)	26.97 (25.49)	1	1457.83	10.53	.001**
SF-36 Role physical	206	60.07 (41.82)	63.64 (41.95)	1	1307.66	1.06	.304
SF-36 Bodily Pain	206	63.99 (25.68)	69.85 (25.28)	1	3541.90	12.06	.001**
SF-36 General Health	206	59.87 (20.48)	60.79 (23.72)	1	86.70	0.46	.498

*p < .05; **p < .01; SD, Standard Deviation; RVBPI, Resident Verbal Brief Pain Inventory; SF-36, Short Form 36 Health Survey.

[a]Residents with baseline scores meeting pain cut-off scores.

[b]Residents that answered 'Yes' to 'Do you feel pain today?'.

Table 3: Percentage of Residents Showing Improvement in Pain Score

	n	(%)
ABBEY		
Score worsened	36	29%
Score unchanged	20	16%
Score improved 1 to 3 points	45	36%
Score improved 4+ points	23	19%
PAINAD		
Score worsened	36	29%
Score unchanged	26	21%
Score improved 1 to 3 points	46	37%
Score improved 4+ points	16	13%
NOPPAIN		
Score worsened	36	29%
Score unchanged	14	11%
Score improved 1 to 6 points	49	39%
Score improved 7+ points	27	21%

Figure 1: Analgesic Use for All Residents. The figure shows the prevalence of analgesic use for all residents, at baseline and one year post-program. Note the significant changes in residents with no analgesic prescription (NIL) and Around-The-Clock and Pro-Re-Nata (ATC+PRN) prescription.

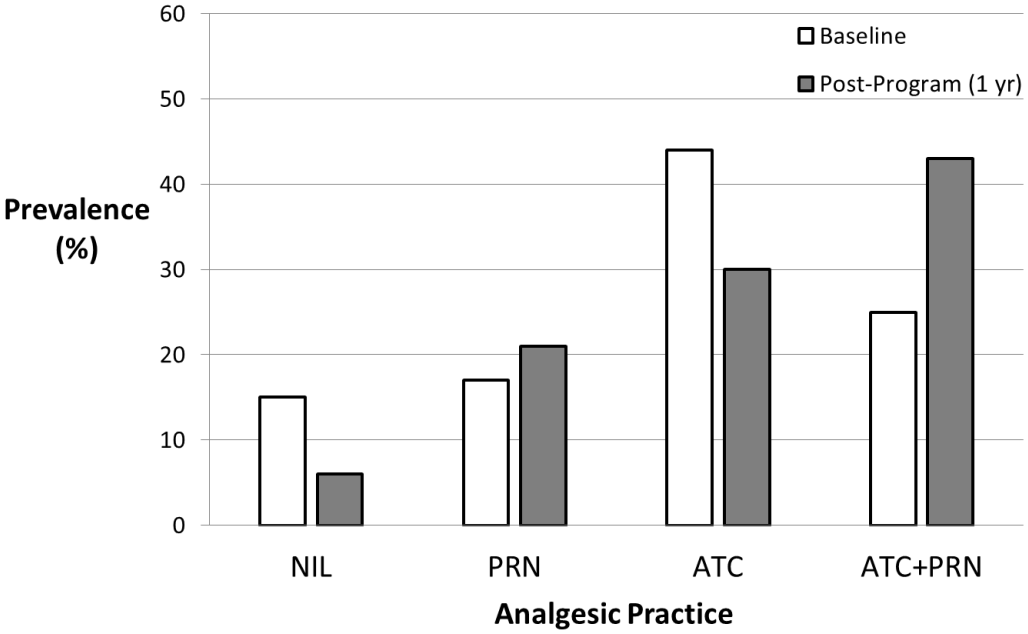
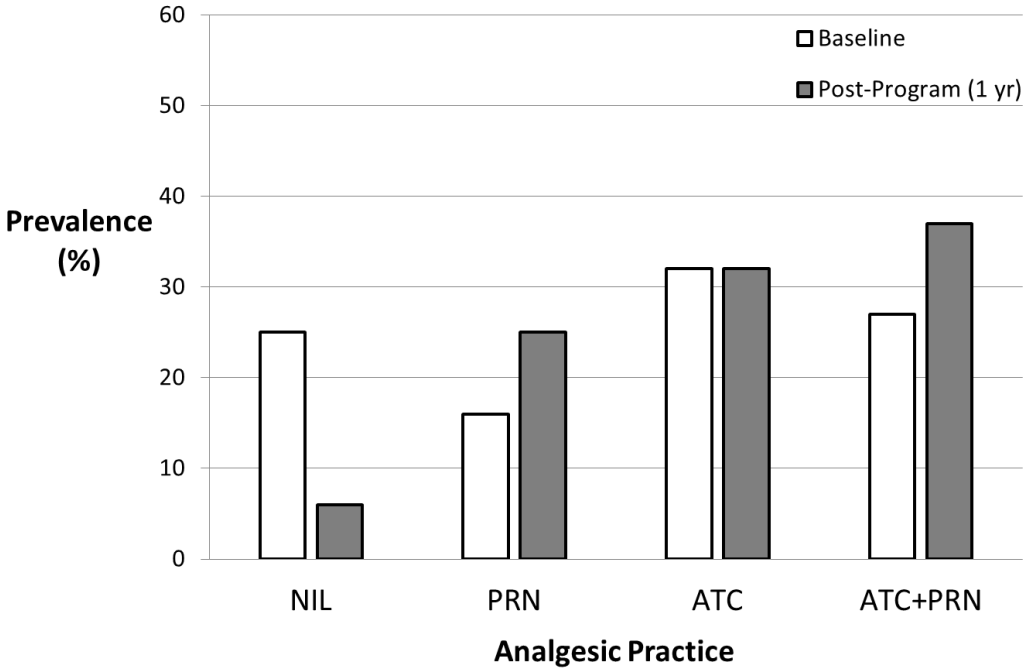

60
50
40
30
20
10
0
Prevalence (%)
Baseline
Post-Program (1 yr)
NIL
PRN
ATC
ATC+PRN
Analgesic Practice

Figure 2: Analgesic Use in the Cognitively Intact and Impaired. The figures show the prevalence of analgesic use for residents with / without cognitive impairment, at baseline and one year post-program. A: Analgesic use in the cognitively intact. B: Analgesic use in the cognitively impaired.

A: Cognitively Intact



B: Cognitively Impaired