Appendix Table (*B. summary of predictor studies*).

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| Design | Population | Staff/Institutional | Quality of Care | Quality of Life | Main Results |
| **Long-term Prospective**  | **Chappell and Reid (2000). Quality=**++**; Comment.** Prospective study conducted over a 12 month period, looking at many of the variables shown in our Figure 1.  |
| Residents: N=510; 67% female; M age=81.57 (SD=6.60).Attrition mainly due to death. Those lost were younger, and had greater functional dependency. | Staff Education: Provision of a range of general and specific training (e.g. on managing behaviour or how to reduce stress).Environment=TESS 2+ Instrument C.Facility: Type (SCU/Not SCU); Ownership type (public/private); No. of beds. | Restraint: Physical and chemical in previous year (how many of 10 types of restraint they used for each resident, and how many of 10 psychotropic meds).Assessment on Admission: Whether or not there is formal pre-admission and admission assessment (range: 0-3).Flexible Care and Activities: Part of normal day (range: 0-2).QOC: Panel Score: assessment by outsiders on many aspects of care: 0=gold standard, 1=not gold standard. | Affect: FTQ.Agitation: CMAI – SF.Physical Function: MDS (Item E).Cognitive Function: MAS-R (early memory & orientation subscales).Social Function: MAS-R (social behaviour skills & expressive language skills subscales). | Staff education, use of restraints, whether the unit was an SCU, % of residents with dementia, and age of resident were all unrelated to any of the outcomes in the multivariate analyses. Residents in facilities chosen as gold standard by the panel, in public facilities, and in facilities with fewer beds deteriorated less in affect.Residents in facilities having less flexible care showed less decline in social skills and those facilities with poorer assessment procedures had better cognitive functioning. |
| **De Roo *et al.* (2014).** **Quality=**+**; Comment.** Well planned, described and comprehensively reported study on an important topic. Prospective data while resident still alive. |
| Residents: N=233; 66.5% female; M Age=85.7 (SD=7.2); All had dementia and 46.4% classified as advanced dementia (MDS-CPS and GDS). | Facility: Size, No. of psychosocial interventions, religious affiliation reflected in end-of life decision-making policies, enough nurses available, enough physicians available, quality of the nurses adequate \*all from DEOLD items. | Care Characteristics: Adequate personal attention (DEOLD), adequate personal care (DEOLD), always treated with respect (TIME), always treated with kindness (TIME), care goal priority for palliative or symptomatic care (No care goal priority for palliative/symptomatic care/having care goal), spiritual care provided at the end of life (DEOLD). | Dying peacefully: (by relatives) 1 QOD-LTC item “he/she appeared to be at peace”.Symptom burden: SM-EOLD. No. of symptoms: pain, shortness of breath, skin breakdown, depression, fear, anxiety, agitation, restiveness to care.Residents (as predictors): Symptom burden, importance of faith/spirituality (CASCADE item “importance of faith”), optimism (DEOLD), having advanced dementia (DEOLD) | Univariate associations between adequate personal care, adequate personal attention, treated with respect, treated with kindness and family perceptions of having enough nurses associated with peaceful death but these disappear in the multivariate analysis. Using multivariate analysis, the only within person variable associated with peaceful death is an optimistic attitude. Final finding is that only family members opinion that there were enough nurses present, and a moderate influence of religious affiliation on end of life decisions associated with peaceful end of life.Counterintuitively, more flexible care was associated with greater decline in social skills. |
| **Mjørud *et al.* (2014).** **Quality=**++**; Comment.** Prospective study, looking at the links between psychotropic medications and QOL. Conducted over a 10 month period, using data from a RCT control group. |
| Residents: N=198; Baseline 79% female, Follow-up 81.7% female: Baseline M Age=87 (SD=7.7), Follow-up M Age=87.2 (SD=7.9); Baseline: 24.7% mild, 36.9% mod, 38.4% severe dementia, Follow-up: 16.1% mild, 39.9% mod, 44.1% severe. Attrition (27.8%) mainly due to death. | Facility: Type of ward (SCU/Other). | Psychotropics: No. of psychotropics daily; plus separately: On sedatives, antipsychotics, anxiolytics, antidepressants, anti-dementia drugs. | QOL: QUALID (factors: tension, sadness, wellbeing).Residents (as predictors): Gender; age; general medical health; type of dementia; CDR level; LOS on wards; ADL (PSMS); challenging behaviours (no. of NPI-10 symptoms). | For total QUALID the only significant differences between baseline and follow-up for predictors are no. of psychotropics and whether or not they are on anxiolytics and number of challenging behaviours. For well-being subscale they find no variables differ. For sadness it is only no. of NPI symptoms. For tension it is only CDR level of dementia and anxiolytic use. For the main analysis, controlling for various measures, they find, for total QUALID that Time 1 QOL and change in NPI predicts time 2 QOL. |
| **Reid & Chappell (2003).** **Quality=**+**; Comment.** Prospective (1 year) study, with a large number of staff facility variables and QOL variables. No adjustments have been made for the large number of variables measured and statistical test used.  |
| Residents: N=257; 64% female; M Age=80 (SD=6.54);Dementia Severity M=18.16 (SD=4.16).Attrition mainly due to death. Those lost had poorer social skills, expressive language skills and greater physical dependency. | Facility: Registered Nurse (RN)-to-resident ratio, care assistant-to-resident ratio, activity staff-to-resident ratio.Control: T1 scores for each of the six outcome variables and for fixed variables: age, gender, No of beds, ownership type (non-profit/for-profit); environment (TESS 2+ Instrument C). |  | Physical function: MDS (Item E).Challenging Behaviours: CMAI-SF.Social Function: MAS-R (social behaviour skills & expressive language skills subscales).Affect: FTQ (Affect sub scale). Cognitive Function: MAS-R (early memory & orientation subscales). | Only T1 physical dependence predicts T2 physical dependence and the same for agitation and affect. For expressive language, care aide-to-resident ratio, activity staff-to-resident ratio and no. of beds predict T2 language but in odd directions. More nursing aides and the more beds predicts more language decline at T2 but higher ratio activity workers less language decline. For social skills, the higher the Activity Aide ratio, less decline in social skills at T2. For cognitive status, higher activity aide ratio, less decline in cognitive status. T1 cognitive status predicts more cognitive decline. |
| **Slaughter & Hayduk, (2012). Quality=**++**; Comment.** Environmental and resident risk factors for walking and eating (excess) disability. |
| Residents: N=120; 78% female; M Age=86 (SD=6.5); M GDS=5.5 (SD=.41) – middle stage deterioration; Charlson Comorbiditiy Index M=1.75 (SD=1.63).Please note: This article is a comprehensive representation of two other articles by the same authors. Only this paper is presented in detail here. | Facility: Ownership type (non-profit/for-profit); dementia education offered to staff during the previous year; no. beds in the facility; Staff-to-resident ratios; environment quality (PEAP). |  | Disability: Walking disability; excess walking disability; eating disability; excess eating disability.Residents (as predictors): Age; sex; education; Charlson Comorbidity Index; type of dementia; cognitive impairment (GDS); admission date; medication use (cognitive enhancer or psychotropic: neuroleptic, benzodiazepine, antidepressant): Fortnightly introduction and discontinuation of medications. | 3 possible causes for onset of disability: the initial severity of a resident’s dementia; the extent of resident comorbidities; and the quality of the resident’s environment. More-advanced dementia and greater comorbidity at baseline accelerated walking and eating disability onset. A better environment associated with a delay in disability onset. Fairly modest effects though. Medications were not significant. Environmental quality was lower for residents in the larger and private and voluntary facilities. Indirect influences from facility size, private and voluntary ownership through environment to disability onset. |
| **Short –term Prospective** | **Bahareethan & Shah (2000). Quality=0; Comment.** Small study looking at the relationship between staff attitudes and challenging behaviours. Data was collected once a month for 4 months using a convenience sample, however results only reported for one time period. Withdrawals not reported. |
| Residents:N=39; 74.36% female; median age=83 (range: 68-99); median LOS=1181 days (range 12-4380). 2 wards.Staff: 2 RNs per ward (N=4). One completed the RAGE, one the MAS. | Staff Attitudes:MAS: 8 separate factors: (1) feeling distant from the resident; (2) deliberate use of symptoms by the resident; (3) alienation of the resident; (4) vulnerability of the resident; (5) withdrawal/uncommunicativeness; (6) variable mood in the resident; (7) depression in the resident; and (8) aggression by the resident. |  | Aggressive behaviour: RAGE. | Significant association between aggression and overall scores on the MAS; feeling distant from the resident; deliberate use of symptoms by the resident; alienation of the resident; variable mood in the resident; and aggression by the resident. Negative association between aggression and withdrawn/uncommunicativeness by resident and depression. No relationship between aggression and vulnerability of the resident. |
| **Fitzgerald *et al.* (2009). Quality=**++**; Comment.** This is a prospective study over 3 months with all three parts of the Figure 1: Staff – QOC – QOL. |
| Residents:N=84; 59.4% female; M Age=83.15 (SD=9.18); M MMSE=7.13 (SD=7.83).Staff:N=550; M Age=44.76 (SD=10.87); 94% female; Aides=437, Licensed Practical Nurse (LPNs)=27, RN=68, Psych Nurses=19; M yrs experience= 15.25 (SD=10.63). | Staff fear of residents falling: 2 questions: How afraid are you that this person many experience a fall?; How confident are you that this person will not experience a fall?Staff fear of activity causing residents pain: One question: How afraid are you that this person may experience pain with activity? | Activity restriction/restraint: 2 questions: How often do you use restraints/restrict this person to prevent falling?; How often do you use restraints/restrict this person to prevent pain?  | Functional ability: OARS ADL.Falls and fall-related injury: No. over 3 months. Pain: One question, global rating of pain by staff.Risk Factors for falling: 24 item checklist with things like impaired vision, history of falls, confusion. | Overall results are that, controlling for physical risk factors and functional ability at T1, staff fears that residents will fall or experience pain make them restrict activity/ use restraint and this, in turn, leads to greater functional disability at T2. Staff imposed restrictions to prevent pain predicted fall-related injuries after controlling for T1 physical risk factors and functional ability. |
| **Cross-Sectional** | **Amella (1999) Quality=**++**; Comment.** Cross-sectional study looking at the way that nursing assistants and residents’ interaction influences food consumption. |
| Residents:N=53; 74% female; M age=80.4 (SD=10.4); M MMSE=4.2 (SD=5.5); M GDS=6.1 (SD=1.2).Staff: N=53; 77% female; M age=39.5 (SD=8.8); 89% in facility for over a year. |  | Quality of resident-Certified Nursing Aide (CNA) relationship: IBM: Relevance, Personal Attending, Relaxed, and Social/Flexible. Quality of Resident-CNA Relationship (resident): IBM-M: Personal Attending, and Functional.CNA Empathy: IRI (Perspective Taking and Empathic Concern subscales).CNA Power: FIRO-B (Wanted Control and Expected Control). | Time to complete the meal Weight of food remaining | Positive reciprocal interactions between the resident and CNA (personal attending and functional factors of resident behaviour) and CNAs ability to allow another to control their behaviour (Wanted subscale) was associated with a greater proportion of food consumed by the resident and explained a significant amount of variation in the proportion of food consumed. Suggests the presence of a relationship, one in which both parties were influenced by the actions of the other. No relationship between CNA behaviours or empathy and proportion of food consumed. |
| **Ballard *et al.*, (2001). Quality=**++**; Comment.** QOL was well assessed. Link medications with QOL.  |
| Residents:N=112; 79.5% female; M age=82.5 (SD=6.8); M MMSE=8.4 (SD=7.2). |  | Medications: Psychotropics: neuroleptics; benzodiazepines; anti-depressants; other psychotropics; and no drugs. Reported by number and % of residents. | Well-being: DCM.% Time Socially Withdrawn: DCM. % Time engaged in activity: DCM.Challenging Behaviours: NPI. | Significant relationship between neuroleptics and lower well-being, lower engagement in activity, and increased social withdrawal. People taking neuroleptics spent less time passively engaged in activities, less time eating, and less time doing work like activity. No relationship between psychotropics and challenging behaviours. |
| **Beer *et al.*, (2010). Quality=**++**; Comment.** This is a well-executed attempt at finding out whether people with dementia in residential care self-assess QOL. Little information given about how they choose predictors and how they score different instruments. |
| Residents: N=351 (226 were able to self-assess QOL); M age=85.3 (SD=7.9); Dementia Severity - Those able to self-rate QOL Median MMSE score=17 (range: 12-21). Those unable to self-rate Median MMSE=5 (range: 0-11). | Staff distress: NPI-NH caregiver distress >4 | Restraint: Documented restraint in previous two weeks (any way resident unable to get out including chair trays).Regular case conference. Psychotropics. | QOL: QoL-AD, ADRQL.Pain: PAINAD, Brief Pain Inventory (self-report).Falls: No. Falls, hospital presentations and GP reviews in the last month, comprehensive medical assessment within 6 weeks admission, pain assessment within 12 months, weight.Challenging Behaviours: NPI-NH. | People with dementia can self-assess QOL and those that can't are more impaired. They also find that proxy ratings (staff or family) are consistently lower than self-report. Using only the data for those who could self-assess on the QoL-AD, one QOC variable (restraint) related to lower QOL, and two within-resident/QOL variables (pain and challenging behaviour) related to lower QOL. No effect: MMSE, regular GP review, case conference, perimeter fence, sent to hospital, falls, and staff distress. |
| **Beerens *et al.*, (2014). Quality=++; Comment.** Cross-sectional study conducted across 8 European countries. Primarily looking at relationships between QOC variables and QOL. |
| N=791 (76 UK; 115 Estonia; 122 Finland; 49 France; 119 Germany; 113 Holland; 113 Spain; 84 Sweden); 74% female; M age=84.1 (DS=6.4); M MMSE 11.9 (SD=6.3). 486 were able to self-assess on the QoL-AD. |  | Psychotropics (including PRN): % yes/no.Restraint: % present or not in assessment period. | QOL: QoL-AD.Depression: Proxy Cornell.Pain: Presence of pain last week yes/no.Falls: No. of falls since admission.Weight loss: Yes/no.Pressure ulcers: Yes/No.Mortality: Deaths in 3 months after assessment.Challenging Behaviours: NPI-Q. | Depression predicted both proxy and self-report QOL. Pressure sores predicted only proxy QOL. Psychotropics and restraint did not predict QOL. |
| **Bravo *et al.*, (1999). Quality=**++**; Comment.** Rigorous study looking at associations between staff, facility and DON characteristics and QOC. Facilities and residents were randomly selected. QOL variables were not included. |
| Residents: N=301(96% of those enrolled); 66% Female; M age=83.3 (SD=7.1); M 3MS (score 0-100)=52.6 (SD=29.0); M SMAF=36.6 (SD=17.1);M LOS=4.4 yrs. (SD=4.5).Staff: N=88; all DONs; M trained as RNs=.31 (SD=.37); M Age=46.1 (SD=9.4); 80% female; M yrs. employment (1 or less)=.16 (SD=.37). | DON: Age; gender; university degree; nursing training; Yrs of employment (1 or less); prior experience caring for older adults.Staff: Staff-to-resident ratio; professional staff; turnover in the last 6 months (%).Facility: Regulatory status; size; occupancy; non-profit/for-profit; profile of clientele, no. of services; no. of external collaborators. | QOC: QUALCARE. |  | Significant relationship between QOC and whether or not the DON is a trained nurse.Staff variables (staff/resident ratio, turnover in last six months, and whether there were nursing as opposed to care staff) had no effect. |
| **Chang & Roberts (2011). Quality=++; Comment.** Simple cross-sectional study looking at predictors of malnutrition or risk of malnutrition.  |
| Residents; N=83; 59% female; M age=81.5 (SD=7.52); M duration of dementia (months)=51.1 (SD=26.9). |  | Medications: Number. | Malnutrition: WHO BMI.Risk of malnutrition: MNA-SF. | No significant relationships. |
| **Crespo *et al.*, (2013). Quality=**+**; Comment.** A well-planned study looking at multiple staff and QOC variables with QOL. Random selection of residents. Basic correlations. |
| Residents:N=209 (102 able to self-rate QOL); 79.4% female*;* M Age=86.07 (SD=6.46); M MMSE=13.3 (SD=5.88).Staff: N=92; M Age=39.8 (SD=9.96); 96.7% female; 88.1% CNAs; M time working in environment=47.34 months (SD=49.52).Family: N=184. | Staff: Gender; age; profession (NA, other); job status (temporary, permanent), work shift (rotating, permanent); burnout (Maslach); perceived job satisfaction, job satisfaction (JSQ S21/26); training and experience (specific training with older people and/or dementia; months working at current facility; months working with older people).Facility: Ownership (public/private); size. | Restraint: Physical and chemical (in previous month). | QOL: QoL-AD - Self rated by resident, proxy-rated by staff, proxy by family member.Residents (as predictors): Depression (Cornell -resident and proxy); challenging behaviours (CMAI, behaviour frequency in previous month); functional status (Barthel, record of needs and care provided); visit satisfaction. | QoL-AD from resident’s perspective: Higher cognitive status and lower depression predicts better QOL.QoL-AD from families’ perspective: Resident's ADL dependence, family contribution to facility fees and use of feeding tubes predicts lower QOL. QoL-AD from staff perspective: Resident's ADL dependence, restraint use, higher cognitive impairment and increased depression predicts lower QOL. Permanent shifts for staff and private administration of the facility are associated with better QOL. |
| **Dobbs *et al.* (2005). Quality=**+**; Comment.** Large no. of facility and QOC variables with QOL. Data was collected very comprehensively but there was a large proportion of predictors to outcome, increasing the likelihood of type I errors (i.e. false positives).  |
| Residents: N=400; 80% female; M Age=84.7 (range 66-101). | Facility: Type; ownership type (non-profit/for-profit); bed size. | Activity Involvement: PAS-AD; Administrator Interview: degree the facility provides and encourages resident participation in 10 activities; Supervisor interviews: whether or not the resident’s ability to participate and preferences for participation were assessed by activity director; or by a written assessment; and how involved family members were in determining activities; is anything done to encourage involvement in activities the resident preferred and able to do (yes/no); how well they feel the facility involved residents in activities suited to abilities and preferences; and how well trained they feel in identifying residents’ preferences and abilities to participate in activities, and helping residents participate in activities; Families reported their involvement in care. | Depression: Cornell.Challenging Behaviours: CMAIPain: PGC-PIS.Immobility: Observation.Low food intake: SMO.Functional status: MDS-ADL. | Lower activity associated with level of cognitive impairment, behavioural symptoms, depression, and ADL impairment (though effect diminished in the adjusted model). More activity associated with family involvement in assessing activities, family social involvement, and staff encouragement of activity involvement.  |
| **Edvardsson *et al.* (2008).** **Quality=0; Comment.** Convenience sample from an intervention study (reference was not reported by the authors). Simplistic look at the relationships between challenging behaviours, ADL and staff work strain, care climate and opportunities to discuss difficulties/ethical conflicts. |
| Residents: N=344; 71.2% female; M Age=82.1 (SD=7.8).Staff: N=346; M Age=42.6 (SD=12.1); 90% female; M 90.8 to 93.0% are Nurse Aides (NAs) or LPNs; M range: 14.2-17.4yrs experience. | Staff: Work strain (JSAS -job demands, job control, social support); knowledge in caring for people with dementia (self-report rating)Facility: Care climate (self-report rating); opportunities to discuss difficulties and ethical conflicts (self-report rating). |  | Challenging Behaviours: MDDAS.ADL: MDDAS. | In highest strain units, staff tended to be women, younger, less experienced, saw care climate as less positive, and fewer opportunities to discuss work difficulties. Residents tended to be more impaired.More verbal disruption in high strain units. Wandering was more prevalent in the 20 units where the caring climate was rated least positive. Escape behaviour, restless behaviour and wandering more common in lowest 10% of units on care climate. No relationship between knowledge in high vs low strain sites. |
| **Edvardsson, *et al.* (2014). Quality=0; Comment.** Large cross-sectional study looking at person-centred care and activity engagement with QOL. No attempts to control for common fixed variables. Simple statistics. |
| Residents: N=1266; 70% female; M Age=86 (SD=7.5); < 24 on GRS; M LOS.=2.5 yrs. |  | PCC: P-CAT (Swedish version).Engagement in everyday activity: MDDAS. | QOL: QUALID (Swedish version). | Those that take part in everyday activity have better QOL, higher cognitive status and lived in units with higher PCC scores. No sig relationship between excursions and PCC. |
| **Huizing *et al.* (2007). Quality=**++**; Comment.** Staff variables with physical restraint. Several observers were used and many resident variables were controlled for. |
| Residents: N=371; 80% female; M Age=83 (SD=6.9); M MDS-CPS=3.9 (1.7); MDS-ADL=3.6 (SD=1.9); M Mobility from MDS=1.9 (1.7).Staff:N=193; M Age=36.9 (SD=10.1); 94.8% female; 69.4% care workers, 10.4% RNs, 16.1% care helpers, 4.1% care assistants. | Staff: Workload (1-5 likert scale for each of its 8 items), autonomy (MAQ), social support (JCQ).Facility: FTE ratio per ward, %RNs per ward, %sickness/absence per ward (all over 1 month period). | Restraint: present or not on the day of the data collection. Observed on four separate occasions over a 24 hour period during all 3 shifts. Any limitation of movement is restraint. |  | 56% of residents were physically restrained. Higher restraint use was linked to higher job autonomy for nursing staff and a higher FTE ratio. Resident characteristics were also associated with restraint use.No association between restraint use and staff workload, social support, absenteeism. |
| **Isaksson *et al.* (2009). Quality=**+**; Comment.** Large no. of staff and facility factors with challenging behaviours. Split 33 wards between low proportion of violence (n=18) and high proportion of violence, based on a median split from two items on the MDDAS (‘hits patients/staff’ and ‘aims aggressive threats, words and gestures to patients/staff’). Residents were said to be exhibiting violent behaviour if they exhibited both once a day or at least once during the last week. |
| Residents*:* N=450; 66.4% female; M Age=82.47 (SD=8.58); 'Orientation' score from 27 MDS items=12 (range 4-22) for low violence facilities and 10 (5-19.5) for high violence.Staff: N=364; M nurse assistant=2.49 (SD=2.49); M Enrolled Nurses (ENs)=9.55 (SD=4.12); M RN=2.46 (SD=1.30); M Experience=13.62 (SD=3.26) yrs. | Staff: Staff/resident ratio; professional experience; experience with older person; dementia education and knowledge; creative climate (CCQ: challenge/motivation, freedom, idea support, trust/ openness, liveliness/dynamism, playfulness/humour, debates, conflicts, risk taking, idea time); job satisfaction (competence, emotions, control, initiative, relationships).Facility: No. of beds; area available residents (communal and private); possibilities of surveying resident; length of corridors; locked doors. Residents: Physical workload, psychological workload, general behaviour, psychiatric index, ADL (MDDAS); cognition (GRS). |  | Challenging Behaviours: Violent behaviours from 2 items from the MDDAS (both items endorsed once a day or at least once during the last week=violent behaviour). | 14 variables that discriminate best between high and low violence units: caregiver-to-resident ratio, professional experience, experience of working with older people, job satisfaction (competence), CCQ (risk-taking), no. of beds, total area/resident, corridor length, physical workload, psychological workload, behaviour index, psychiatric index, gender and needing help with dressing. Stepwise analysis: 5 predictors of differences between high and low violence unit: behaviour index (general behaviour), psychiatric index, psychological workload, assistance with dressing and competence from job satisfaction. |
| **Karlsson *et al.* (2001).** **Quality=**++**; Comment.** Analysed each item in each instrument so there is a very large no. of staff predictors, looking for links to restraint. Lack of consistency in method/measures and reporting in results. |
| Residents: N=540; Nursing Home (NH)=66.4% female, Group Living (GL)=75.6% female; M Age NH=82.5 (SD=8.6), GL=81.1 (SD=7.4); % cognitive impairment NH=81.1%, GL=96.6%;% Psychotropics NH=72.9%, GL=75.6%.Staff: N=529; Age between 20 and 49; approx. 90% female; Nurses aide=96, LPN=300, RN=68, Physician=18, Nurse Administrator=28, Physios=9, OT=10; Median 2-16.5 yrs experience in geriatric care. | Staff: Knowledge of restraint; attitudes about restraint; profession; gender; time working in aged care; education about dementia care; knowledge of dementia care; job satisfaction; staff ratio; creative climate (CCQ – nursing staff only).Facility: Total size ward; distance to nursing station/common room; no. of beds; locked door; residents per unit; access to therapist staff and physicians, possibilities to survey residents from ward design and staff ratio; degree ward design is adjusted to meet resident needs. | Restraint: Restraint free wards (n=11); low restraint (n=14 wards); high restraint wards (n=20 wards). Restrained at any time in previous week (Yes/No). | Residents (as predictors): Age; gender; cognitive impairment (GRS); MDDAS (motor function, vision, speech, ADLs, psychotropic use, behavioural symptoms, psychiatric symptoms walk without assistance, incontinence, Physical workload, psychological workload); falls. | Restraint wards needed more assistance to manage dressing, eating, and bowel and bladder functions. Physical workload also higher, as was the proportion of residents rated as aggressive and requiring 2 attendants with morning care. Residents in high restraint ward were more likely to demonstrate extremity paresis, impaired speech and be unable to walk independently. More negative staff attitudes toward restraint use in restraint-free wards. Restraint-free wards more knowledgeable about restraint use regulations and better scores on the Job satisfaction “to be in control of the job”. Three factors maximally separate restraint-free wards from restraint wards: proportion of residents unable to walk independently, staff attitudes to restraint, proportion of residents physically abusive to others. Important predictors of restraint: Staff attitude to restraint use; knowledge of restraint legislation and resident violence. |
| **Kim & Whall (2006). Quality=**+**; Comment.** Simple study with some easily measured institutional factors with psychotropic use. Lacks detail on staff and parsimonious with information about residents. |
| Residents: N=107; 88% female; M Age=87.1. | Facility: Size; ownership type (non-profit/for-profit).Staff: Proportion of RNs, RN hours (Medicare website). | Psychotropic Use: (Yes/No). | Resident (as predictors): History of aggressive behaviour; LOS; age; gender; MMSE; functional status (MDS-ADL); depressive symptoms (MDS-DRS). | 67.3% of residents on at least one psychotropic, mostly antidepressants (41.1%) and antipsychotics (37.4%). Presence of depressive symptoms and fewer RN hours per resident associated with use of any psychotropics. |
| **Kleijer *et al.* (2014). Quality=0; Comment.** MDS data with very few resident characteristics and very simple statistics. |
| Residents: N=1090; 75% female; 9% 60-74 yrs, 38% 74-85 yrs, 53% over 85. | Facility: Setting (rural/urban); size; gender; age group; offering acute admissions or respite care; availability of qualified personnel; personal attention and care; provided recreational and social activities. | Antipsychotic Use: In previous week. Tertile split of the 20 facilities to lowest in AP use (N=7), middle (n=7) and highest (n=6).Medication: Psychotropic, anxiolytics, antidepressants, hypnotics.Quality of Care: 3 items from the CQ: (1) do you feel there are enough nurses and aides; (2) do the nurses and aides pay enough personal attention to your family member; and (3) does the nursing home provide enough recreational and social activities. | Functional ability: MDS-ADL. Depression: MDS-DRS.Cognition: MDS-CPS.Behavioural symptoms: Resisting care, anxiousness or restlessness, verbally abusive, physically abusive, conflict with caregiver, socially inappropriate/ disruptive behaviour, wandering, hallucinations, delusions, delirium signs.\* All from the MDS. |  (1) 'Almost significant' trend for more behaviour symptoms overall in the High Use facilities. (2) The high AP use facilities have significantly more verbally abusive, socially disruptive behaviours and delusions. (3) The high AP use group have less indicators of delirium (distracted, fluctuating consciousness). (4) The high use facilities have more functionally dependent and cognitively impaired residents. (5) High use facilities have more with depression. (6) High use units more likely than low use to be urban and larger size. (7) The high use of antipsychotics units have below average satisfaction with levels of staffing, and staff attention and care. |
| **Lin, Watson & Wu (2010a). Quality=**++**; Comment.** Good targeting of staff predictors of food intake.  |
| Residents:N=477; 32.29% female; M Age=79.46 (SD=9.62); Low food intake group M MMSE=8.51 (SD=8.16); Normal intake M MMSE=9.82 (SD=7.28). |  | Food Intake: Low defined as consumption of <75% of a meal; BMI.  | Residents (as predictors): Age; gender; MMSE; functional ability (Barthel); CVA; Parkinson’s disease; depression; length of time in facility; family visits (frequency); eating difficulty and feeding assistance (Yes/No: EdFED). | Highest association with low food intake is if resident has eating difficulties, next is a lack of feeding assistance and next is moderate ADL dependence. Age gender, and family visits also associated – being older, female and having fewer visits are associated with low food intake. Feeding assistance and age are associated with BMI. Thus, feeding assistance has an important association with low food intake and BMI. |
| **Lin *et al.* (2011). Quality=**++**; Comment.** Restraint use with pain. |
| Residents: N=112; 42% female; M Age=74.41 (SD=11.08); CDR-C < 3=36, CDR-C=3=32, CDR-C > 3=44; 4 have osteoporosis, 2 have a fracture, 6 have gout, 3 have osteoarthritis, 1 has low back pain, 2 have cancer. |  | Restraint: Yes/No. | Pain: PAINAID-C, observed during bathing, or self-transfer or assisted transfer. ≥2=Pain.Residents (as predictors): Gender; age; wounds; analgesics; tube insertion; falls last week; medical history (cancer, osteoporosis, fracture, gout, osteoarthritis, back pain); depression; CDR-C (three levels); type of care activities when pain recorded (assisted transfer, bathing, self-transfer). | Significant associations with pain: Restraint, advanced dementia, during bathing, and during assisted transfer. Multivariate analysis, controlling for other variables: Restrained people more likely to be in pain, those who were being bathed when observed for pain behaviour more likely to be in pain, and those having assisted transfer during observation more likely to be in pain than those who transfer independently. |
| **McGilton *et al.* (2012). Quality=0; Comment.** Great way of measuring staff interactions with residents, and the impact it has on resident affect/mood. Good clinical planning though results are only reported at the facility level.  |
| Residents: N=38; 81.6% female; M Age=88.3 (SD=6.2); M MMSE=6.4 (SD=4.6); M Comorbidities=3.1 (SD=1.2); 17 non-resistive and 21 resistive in care; M LOS=36.4 months (SD=32.1).Staff: N=35; M Age=34.2 (SD=16.8); 91% female; M years working on unit=approx. 3 years. | Relational behaviour: RBS.  |  | Affect: AARS (pleasure, interest, anger, anxiety/fear, sadness).Mood: DMPT. | Instead of providing the overall RBS scores and relationships with affect and mood, they presented results at facility level. Basically, good RBS scores - showing good care - has positive associations with positive affect (pleasure, interest) - though not positive mood measured on another measure. RBS scores have negative associations with measures of negative affect (anxiety/fear) and mood (sadness). That is, the way staff carry out care affects affect and mood.  |
| **Miu & Chan (2014). Quality=**+**; Comment.** Most relevant to this review are the relationships between restraint, analgesics, and psychotropics with pain. Each item for each scale was analysed separately so there is a very large number of statistics. It is unclear why certain variables were controlled and there is a lack of details around some variables. |
| Residents: N=309; 59.5% female; M Age=85 (SD=7.5); M MMSE=9.6 (6.3); Median co-morbidities=3; 33% on psychotropic drugs. |  | Restraint: % restrained (physical).Analgesics: % taking analgesics (>4 days in past week); level of analgesic (none, non-opioids, weak opioids, strong opioids).Psychotropics: % taking psychotropics (antipsychotic, hypnotic, anxiolytic, antidepressant). | Pain: PAINAD-C (pain=≥2).Residents (as predictors): Age; gender; MMSE; Charlson Comorbidity Index; M no. of analgesic drugs taken per resident; type of dementia; mobility level (% that can walk unaided, walk with aids, chair bound, bed bound); % people with depression; behaviour symptoms (wandering, verbal disruption, physical aggression, regressive behaviour, hallucinations); communicative/uncommunicative. | 61.5% of their sample are in pain and only 30.7% are having analgesics, most commonly paracetamol. Associations between pain and lower MMSE, being male, mobility level, being treated with psychotropics, use of restraint, being aggressive, and being uncommunicative. Logistic Regression, (adjusted for mobility, treatment with psychotropics, and uncommunicative) leaves MMSE cognitive level, use of restraint, being aggressive and male independently associated with the presence of pain. |
| **Reed et al (2005). Quality=**++**; Comment.** Very large no. of staff/environmental predictor variables with food and fluid intake, collected very comprehensively. |
| Residents:N=407 (N=335 for food intake, N=326 for fluid intake); 79% female; M Age=85; 12% mild cognitive impairment, 25% moderate, 27% severe, and 37% very severe. | Training: Proportion of direct care and supervisory staff with formal training in detection and treatment of resident nutrition/hydration problems; do staff feel adequately trained to asses and treat drinking and eating?Eating environment: (a) Residents eating in dining area; (b) Non-institutional features (e.g. not eating off a tray); (c) Low noise level; (d) Pureed food; (f) Residents receiving thickened fluids; (e) Family present; (f) No. of residents grouped together. Facility: Ownership type (non-profit/for-profit; type (nursing home/ residential care); size. | Food and Fluid Intake: SMO (Low food intake=less than 75% of the meal eaten; low fluid intake=less than 8 fluid oz consumed at a meal.Assessment of eating/drinking problems: (a) Professional assessment for eating difficulty; (b) Written assessment for eating difficulty; (c) Professional assessment for drinking difficulty; (d) Written assessment for drinking difficulty; (e) Perceived presence of eating difficulty by staff; (f) Perceived presence of drinking difficulty by staff. Treating of eating/drinking problems: (a) Professionally treated for eating problems; (b) Informally treated for eating problems; (c) Professionally treated for drinking problems; (d) Informally treated for drinking problems; (e) Perceived success (eating); (f) Perceived success (drinking).Observed Staff Assistant during meal: (a) Residents monitored; (b) Residents encouraged; (c) Residents physically assisted; (d) Residents per staff ratio. | Residents (as predicators): At least 1 of 13 mouth and throat problems; affect; behaviour; depression; activity involvement; pain; MMSE or MDS cognition scale; mobility; residents’ difficulty eating and drinking; observed dependency in eating (SMO). | High prevalence of low food (54%) and fluid (51%) intake. Amongst treatment types, residents whom staff monitor are less likely to have both low food and fluid intake; Places with low staff ratios (more residents per staff member) associated with lower fluid intake. Staff who felt their intervention was successful during feeding had better fluid intake. Residents eating in the dining room rather than bedroom were less likely to have low food/fluids and eating in more naturalistic dining rooms less likely to have low fluid and food intake. Non alert resident associated with low food intake. Small facilities were less likely to have low food intake. Also true for for-profit facilities. Residents in for-profit facilities less likely to have low intake (food and fluid). |
| **Schreiner *et al.* (2005). Quality=**+**; Comment.** Observations of structured activity versus ordinary time, measured somewhat at convenient times. Unclear how they randomly selected participants from the larger unit and some statements about the results have been made without reporting the statistics. |
| Residents:N=32; 87.5% female; M Age=83 (range: 68-94); Modal MMSE score was 0, indicating severe cognitive impairment. | Facility: Structured recreational activity vs ordinary time (McCann -location; directed activity). |  | Mood/Affect: FAE.Level of consciousness: McCann.Behaviour: McCann. | Affect: Significant differences in positive affect (happy, interested) during recreation time and ordinary time. Most ordinary time was spent not interacting with other residents.Behaviour: Almost half of all observed behaviours during ordinary time were ‘Null Behaviours’.Level of consciousness: Residents were significantly more likely to have their eyes open during recreation time. |
| **Sjögren *et al.* (2012). Quality=**++**; Comment.** Simple staff survey looking at person-centred care with QOL variables. |
| Residents: N=1471; 69.88% female; M Age=85 (SD=7.5); "All had cognitive impairment".Staff:N=1237; M Age=45.8 (SD=11.2); 95.18% female; RN=35 (3.1%), EN=910 (80.1%), Nurses Assistant=120(10.6%), No formal qualifications=42, other education=29M yrs. experience=15.9 (SD=10.4); 598 (SD=56) continuing dementia education; Regular supervision=234 (SD=20.9). |  | PCC: P-CAT. | Quality of life: QUALID.Pain: PAINAD.Depression: Cornell.Challenging Behaviours: CMAI.ADLs: MDDAS.Cognitive Impairment: GRS. | Residents in units with higher levels of PCC were rated as having higher QOL and better ability to perform ADLs. Significant associations between high organisational and environmental support (from a subscale of the P-CAT) and QOL and ADL ability. No significant associations between PCC and QOL, depressive symptoms, or agitated behaviours. No relationships with ‘Extent of personalizing care’ and no significant differences in pain, depressive symptoms, or agitated behaviours between high and low PCC units. |
| **Sloane *et al.*, (1998). Quality=**+**; Comment.** Environment and staff treatment with challenging behaviours. |
| Residents: N unclear; 53 SCUs; 3723 observations; MDS-COGS M=4.94 (SD=1.31).3.8% of observations missing; 1.9% due to closed doors, remainder presumed because resident was off ward. | Facility: Staffing level; unit size; ownership (non-profit/for-profit); environment (TESS 2+ : low stimulus scale, SCU Environmental Quality Scale). | Medication: No. of medication and psychotropics in past 7 days (MDS).Restraint: % of residents restrained.Staff resident interaction: Several RSOC items and subjective forms: Staff treatment quality scale, subjective rating of nursing attitudes toward visitors/residents, subjective rating of nursing involvement with residents; M proportion of residents engaged in formal/informal activities, proportion of residents interacting with staff (observation).Activity: TESS 2+, % of residents in bed during daytime observations. | Challenging Behaviours: RSOC.Functional status: MDS-ADL. | Correlations: Increased agitation in units with residents with high levels of dependency and more severe cognitive impairment. Lower unit agitation with higher proportion of residents taking antidepressant medication. A large no. of physical environmental features associated with increased agitation. Staff treatment environment associated with high agitation: proportion of residents restrained; staff treatment quality scale (please note: the authors did not comment on this finding and instead discussed a non-significant finding - proportion of residents out of bed during the day – as though it was a significant finding); staff attitudes to visitors/; and ratings of the degree of nursing involvement with residents. Regression: Significant predictors of overall agitation: SCU environment quality scale, and three components of the staff treatment quality scale (proportion of residents restrained, the proportion of residents in bed during the day and M MDS-ADL score). Works for the overall agitation and for weighted rank agitation scores. Additional predictors for the weighted rank agitation scores: unit size (less agitation in smaller units) and M no. of disease diagnoses (more diagnoses associated with higher agitation). |
| **van Beek (2013). Quality=**++**; Comment.** Very interesting/novel approach to looking at the influence of networks on the way staff behave towards residents. |
| Staff:N=474 (380 communication networks questionnaire, 391 boundary crossing questionnaire); 37 facilities; 55% of staff in units; M Age=38 (range: 16-63); 95% female. | Communication Networks: ‘Please report for each colleague how often you speak to him or her about your work or things that happen at work’. 5 categories ranging from a few times a day to less than two times a month/never. Boundary-crossing networks: Presence or absence of boundary crossing networks: Staff were asked if they knew residents through others and how many ties (steps) existed between them and this resident.Staff: Age; gender; years on unit; position (permanent/ part time); Identification with organisation, identification with dementia unit; work motivation.Facility: No. of nursing staff; structure (psychogeriatric unit, group project). | Behaviour of staff to residents: At 3 time points throughout the day. 32-item observation list focused on different aspects of care defined by Rantz *et al.* (1998). 6 items related to staff behaviour towards residents: starting a friendly conversation with residents, taking sufficient time for residents, calling residents by their name, treating residents with respect, actively caring for residents, and residents and nursing staff smiling at each other and seeming at ease with each other. |  | In units with higher percentage of boundary crossing networks staff treated residents with more respect and staff/residents were more at ease with each other. Nursing staff that identified with the facility were motivated to provide more care. Highly motivated staff were more likely to smile at residents and seemed more at ease with them. That is, higher cross border networks are associated with better staff behaviour toward residents. Similarly, more extensive communication networks amongst staff are associated with better behaviour towards residents, but this is mediated by their identification with the facility and motivation. |
| **Zuidema *et al.* (2010). Quality=**+**; Comment.** Large, representative sample though there is a lot of missing data for the key variable of interest: time spent on direct care.  |
| Residents:N=1289; 80% female; M Age=83 (SD=8.1); GDS mod severe 20%, GDS severe 52%, GDS very severe 28%. Psychoactive medication 66%: antipsychotics (38%), antidepressants (28%), anxiolytics (16%), hypnotics/sedatives (15%) and dementia drugs (1%). | Staff: Staff/resident ratio.Facility: No. of patients per unit or lounge room; presence of an walking circuit.Data on SCU environmental correlates (e.g. presence of a walking circuit) were provided by the head of the SCU. | Time spent on resident care: Hours spent on direct resident care is the time spent by staff on resident care during the working days divided by the no. of residents.Medication: Prescribed psychoactive medication on the day of assessment (antipsychotics, anxiolytics, hypnotics/sedatives, antidepressants). | Challenging Behaviours: CMAI (physically aggressive, verbally agitated); NPI-NH (agitation, disinhibition, irritability).Mood/Affect: NPI-NH (depression, anxiety; apathy).Behavioural symptoms: CMAI (physically non-aggressive behaviour), NPI-NH (delusions hallucinations). | Higher antipsychotic and antidepressant use was associated with increased symptoms across all behaviour/affect clusters. Antidepressants were associated with NPI-NH depression/anxiety. Only two significant environmental correlates: SCU with high symptom level with agitation/ irritability and time spent on resident care with NPI-NH apathy. |
| **Zuidema *et al.* (2011). Quality=**+**; Comment.** As above. |
| Residents:N=1289; 80% female; M Age=83 (8.1); GDS moderate severe 20%, GDS severe 52%, GDS very severe 28%. | Staff: Staff/resident ratio, staff distress (adapted NPI-NH).Facility: No. of patients per unit or lounge room; presence of a walking circuit. | Medication: Prescribed psychoactive medication on the day of assessment (antipsychotics, anxiolytics, hypnotics/sedatives, antidepressants). | Residents (as predictors): Challenging behaviours (NPI-NH into 6 clusters: delusions/hallucinations, agitation/disinhibition/irritability depression, anxiety, apathy, and sleep disturbance). | Staff distress because of agitation is associated with antipsychotic and anxiolytic drug use. Low staff/resident ratio associated with high antidepressant use. Walking circuits predict nothing, but no. of residents per living room associated with hypnotics. With regard to neuropsychiatric symptoms, higher antipsychotic use associated with delusions/hallucinations, apathy and agitation. Hypnotic use was associated iwth sleep disturbance and higher levels of antidepressant was associated with agitation. |

**3MS=**Modified Mini-Mental State Examination (Teng and Chui, 1987); **AARS**=Apparent Affect Rating Scale (Lawton *et al.*, 1996); **ADRQL**=The Alzheimer’s Disease-Related Quality of Life Scale (Rabins *et al.*, 1999); **Barthel**=The Barthel Self-Care Rating Scale (Sherwood *et al.*, 1977); Barthel ADL=Barthel Index of Activities of Daily Living (Mahoney and Barthel, 1965); **BMI**=Body Mass Index; **Brief Pain Inventory** **modified verbal form** (Gibson *et al.*, 2004); **CCQ=**Swedish Creative Climate Questionnaire (Ekvall, 1996); **CASCADE**=Choices, Attitudes and Strategies for Care of Advanced Dementia at the End-of-Life (Mitchell *et al.*, 2006); **CDR=**Clinical Dementia Rating Scale (Hughes *et al.*, 1982); **CDR-C=**Clinical Dementia Rating Scale, Chinese version (Lin and Liu, 2003); **Charlson Comorbidity Index** (Charlson *et al.*, 1987); **CQ index**=Consumer Quality index for Long Term Care (Triemstra *et al.*, 2010); **CMAI–SF**=Cohen Mansfield Agitation Inventory – Short Form (Cohen-Mansfield and Marx, 1989); **CMAI**=Cohen Mansfield Agitation Inventory (Cohen-Mansfield, 1986); Cornell=Cornell Scale for Depression in Dementia (Alexopoulos *et al.*, 1998); **DCM**=Dementia Care Mapping (Kitwood and Bredin, 1997); **DEOLD**=Dutch End of Life in Dementia (Van der Steen *et al.*, 2012); **DMPT**=Dementia Mood Picture Test (Tappen and Barry, 1995); **EdFED**=Edinburgh Feeding Evaluation in Dementia scale (Watson, 1994); **FAE**=Facial Affect Expression category based on Philadelphia Geriatric Centre Affect Rating Scale (Lawton *et al.*, 1996); **FTQ**=Feeling-Tone Questionnaire (Toner *et al.*, 1999); **GDS**=Global Deterioration Scale (Reisberg *et al.*, 1982); **GRS=**Geriatric Rating Scale (Gottfries *et al.*, 1982); **IBM**: Interaction Behavior Measure (McCrosky and Wright, 1971); **IBM-M**=Modified Interaction Behavior Measure (Burgener, 1990); **IRI**: Interpersonal Reactivity Index (Davis, 1980); FIRO-B=Fundamental Interpersonal relations Orientation – Behavior (Schultz, 1966); **JCQ=**Job Content Questionnaire – Dutch Translation (De Jonge *et al.*, 2000); **JSAS**=Job Strain Assessment Scale(Karasek and Theorell, 1990**)**; **JSQ S21/26**=Job Satisfaction Questionnaire S21/26 (Meliá, 1998); **QoL-AD**=Quality of Life-Alzheimer’s Disease (Logsdon *et al.*, 1999); **QUALCARE=**Quality of Care Scale (Phillips *et al.*, 1990)**; QUALID=**Quality of life in Late-Stage Dementia (Swedish Version: Falk *et al.*, 2007; Weiner *et al.*, 2000); **MAQ**=Maastricht Autonomy Questionnaire (De Jonge, 1995); **MAS=**Modified version of the Alienation Scale (Morgan and Stanton, 1997); **Maslach**=Maslach Burnout Inventory (Maslach *et al.*, 1996); **MAS-R**=Multi-focus Assessment Scale-Revised (Crockett *et al.*, 1991); **McCann**=The McCann observational instrument (McCann *et al.*, 1997); **MDDAS**=Multi-dimensional Dementia Assessment Scale (Sandman *et al.*, 1988); **MDS**=Minimum Data Set (Hawes *et al.*, 1997); **MDS-ADL**=Minimum Data Set– Activities of Daily Living Scale (Morris *et al.*, 1999); **MDS-COGS**=Minimum Data Set - Cognition Scale (Hartmaier *et al.*, 1994); **MDS-CPS=**Minimum Data Set - Cognitive Performance Scale (Morris *et al.*, 1994); **MDS-DRS**=Depression Rating Scale from MDS (Burrows *et al.*, 2000); **MMSE**=Mini Mental State Examination (Folstein *et al.*, 1975); **MNA-SF**=Mini Nutritional Assessment Screening Form (Rubenstein *et al.*, 2001); **NPI-NH**= Neuropsychiatric Inventory: Nursing Home Version (Cummings *et al.*, 1994); **NPI-Q**=NeuroPsychiatric Inventory Questionnaire (Kaufer *et al.*, 2000); **OARS ADL**=Older American Resource Services Activities of Daily Living Scale (Fillenbaum, 1988); **PAINAD**=Pain Assessment in Advanced Dementia Scale (Warden *et al.*, 2003); **PAINAID-C=**Pain Assessment in Advanced Dementia Scale, Chinese version (Lin *et al.*, 2010b); **PAS-AD**=Patient Activity Scale–Alzheimer’s Disease (Albert *et al.*, 1996); **PEAP**=Professional Environmental Assessment Protocol (Norris-Baker *et al.*, 1999); **P-CAT**=Person Centred Care Assessment Tool (Edvardsson *et al.*, 2010; Swedish Version: Sjögren *et al.*, 2012); **PGC-PIS**=Philadelphia Geriatric Center Pain Intensity Scale (Parmelee *et al.*, 1991); **PSMS**=Physical Self Maintenance Scale (Lawton and Brody, 1969); **QOD-LTC=**Quality of Dying in Long-Term care (Munn *et al.*, 2007); **QUALCARE**=QUALCARE Scale: (Phillips *et al.*, 1990); **RAGE=**Rating Scale for Aggressive Behaviour in the Elderly (Patel and Hope, 1992); **RBS**=Relational Behaviours Scale (McGilton, 2004); **RSOC**=Resident and Staff Observation Checklist (Sloane *et al.*, 1991); **SMAF**=Functional Autonomy Measurement System –revised (Hébert, 1997); **SM-EOLD**=Symptom Management-End-of-Life in Dementia (Volicer *et al.*, 2001); **SMO**=Structured Meal Observation (Reed *et al.*, 2005); **TESS 2+=**Therapeutic Environment Screening Scale (Sloane and Mathew, 1990); **TIME**=Toolkit of Instruments to Measure End-of-Life care (Teno, 2004; Teno *et al.*, 2004).

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