ARCHUS ...and Beyond

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ACRONYMS/Abbreviations

- ARCHUS: Aged Residential Care Healthcare Utilisation Study (HRC 10/373)
- ARCHIP: Aged Residential Care Healthcare Implementation Project (HRC 12/884 and Waitemata DHB)
- LTC = RAC = ARC = Rest Homes + Private Hospitals
Because of a high prevalence of complex medical illness, LTC residents are ‘frequent users’ of acute hospital services


65-70% of acute hospitalisations from LTC are avoidable
Background

The care interface is vital - care transitions are disruptive for older people, esp. those with dementia


Older adults hospitalised acutely can decline in a (very) few days, hence need to prevent unnecessary hospitalisation

ARCHUS and ARCHIP are, however, **not** based on the assumptions that:

- [1] RAC residents should not be admitted to public hospitals;
- [2] RAC residents form a disproportionate burden on acute hospitalisations.
From OPAL Study (n=6823)
Boyd, M et al. Age Ageing 2016;45:558-563
Background

- There is evidence from recommendations, uncontrolled trials, retrospective cohort studies and observational studies that we can improve LTC care and/or reduce such admissions by complex interventions

- RCT-based evidence of improvement in patient outcomes does not include assessment of potentially avoidable admissions
Literature review of avoidable hospitalisations from long-term care commented that the measures thus far studied have not been well validated in an LTC population


Despite this, these models have been put in place clinically around the world - with variable effect on admissions

Gravelle et al BMJ 2007;334:31
Our earlier OPAL study (2008) gave us census-type data on over 6800 LTC residents (and on their facilities) of greater Auckland (90% of LTC population)


In ARCHUS Phase 1, those 6800 people were ‘followed’ for 22 months by their NHI.

Potentially avoidable admissions were noted.

These data were employed to model predictors of avoidable admission (both resident-related predictors and facility-related predictors).
ARCHUS Methodology (Phase 2)

- LTC facilities selected (by above modelling for ‘high admission rates’) randomised (18 ‘intervention’ and 18 ‘control’ facilities) – i.e. cluster randomised
- Intervention facilities received evidence-based team input for 9 months:
  - Gerontology nurse specialist (inc education)
  - Geriatrician and Clinical Pharmacist
  - Facility benchmarking of admission rates
  - MDT meetings
- Control facilities received usual care
- Primary outcome: all cause hospitalisations for 14 months (NHI - national data)
ARCHUS Results: Time to First hospital admission

Product-Limit Survival Estimates
With 95% Hall-Wellner Bands

+ Censored
Logrank p=0.3005

Survival Probability

Time to this acute admission

Intervention  No  Yes
ARCHUS Results: Time to Death

Product-Limit Survival Estimates
With 95% Hall-Wellner Bands

+ Censored
Logrank p=0.2056

Survival Probability

Time to death

Intervention
No
Yes
ARCHUS Conclusions

- ARCHUS is a ‘robustly neutral’ study
- It is a well conducted RCT with good attainment, retention and buy-in
- It was adequately powered
- It has shown that the intervention package (GNS education, GNS patient advice, MDT intervention, benchmarking) fails to reduce all cause admissions (inc. avoidable admissions) from LTC
Possible Confounders (1)

- Lack of Power (type 2 error) - No
- Age/gender/ethnicity differences - No
- Effect ‘wears off’ - No
- Lack of NHI matching – No (95% in both groups)
- Long stay vs. short stay residents – No
- RH/PH balance – No
Possible Confounders (2)

- ‘Avoidable admission’ designations - No (for ‘all admissions’ there was no difference in time to first admission)
- Lack of attainment of control study patients - No
- Effect is on bed days rather than admissions - No
- Disease Specific Effect - possibly
Relative risk of admission (active vs. control) by diagnosis
What Might This Mean?: options not all mutually exclusive

- It’s not possible to *(further)* reduce admissions from LTC and we must increase acute provision to cope ($$$$$$)
- It’s not possible to *(further)* reduce admissions from LTC by an ‘outreach’ model and we need to increase LTC facility resource ($$$$
- Intervene ‘harder’ ($$$$
- Intervene longer – relationship building ($$$$
- Use hospital presentations as endpoint (???)
- Intervene ‘smarter’ e.g. *target specific diagnoses*, nurse practitioner intervention
The ‘Big Five’ Study
(Connolly et al. Age Ageing 2016;45:415–20)

- A post-hoc analysis of ARCHUS based on RCT evidence re hospitalisations of community-dwelling older people
- Outcome: acute hospitalisations for ‘big five’ diagnoses (COPD, CHF, IHD, CVD, Pneumonia)
- Re-randomisation analyses were used for endpoints during months 1-14
- For endpoints during months 4-14, proportional hazards models adjusted for within-facility clustering.
Relative risk of admission (active vs. control) by diagnosis
Relative risk of admission (active vs. control) by diagnosis
The ARCHUS intervention resulted in 27% fewer ‘big five’ admissions in intervention group (RR=0.73, 95%CI=0.54-0.99; p=0.043)

....with no significant difference in rate of other acute admissions and no difference in mortality
When considering events occurring after three months (only), the intervention group were 35% (HR=0.65; 95%CI=0.49-0.88; p=0.005) less likely to have a ‘big five’ acute admission than controls.

.... with no differences in likelihood of acute admissions for other diagnoses (p=0.96) and no difference in mortality.
a) To first ‘big five’ admission

![Graph showing event-free probability over time for 'to first 'big five' admission'.]

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b) To death

![Graph showing survival probability over time for 'to death'.]

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ARCHIP Study
(Connolly et al. European Geriatric Medicine 2016;7(S1):S216)

- Is ‘Big Five’ reproducible across a whole district?
- Not an RCT
- Similar protocol to ARCHUS but no benchmarking, more GNS hands-on and no GNS-led formal teaching
- Concentrating (not exclusively) on residents with a Big 5 diagnosis -
ARCHIP Study

- 21 intervention facilities with high admission rates; 42 non-intervention (‘control’) facilities in the study (1,258 and 1,934 beds respectively at study start)

- Intervention facilities were from four geographical clusters in one (Waitemata) DHB. Four small facilities (<30 beds), 9 mid-sized facilities (30-59 beds) and 8 large facilities (>60 beds)

- 12 facilities were part of chain; 9 were stand-alone. Six were part of retirement villages and 15 were not

- Forty-two MDT meetings were completed, 247 residents discussed; 184 (74.5%) of those discussed had a history of one or more of the big five diagnoses prior to MDT
ARCHIP Study

- Before-after repeated measures analysis of ED visits conducted for facilities pre- and post-intervention
- ED admissions 9 months before & 9 months after intervention start (total 29 months - staggered facility enrolment)
- Modelling adjusted for time trend, seasonality, facility size, and cluster effect
ARCHIP Study - Results

- ED presentation rate ratio (all diagnoses) was 0.75 (95% C.I. 0.63, 0.89, p=0.0008), 25% reduction in ED presentations post-intervention.

- A sensitivity model used a shorter, staggered time period centred on intervention start (9 months pre-intervention and 9 months post-intervention) for each facility, and a categorical intervention variable testing intervention effect over time. This showed a 24% ‘reduction’ in ED presentations in months 1-3 post-intervention (p=0.07), 34% reduction in months 4-6 (p=0.01), and 32% reduction in ED presentations in months 7-9 (p=0.03).

- When the higher rates for 3 months immediately pre-intervention were modelled, ED presentation rates reverted to previous levels.
ARCHIP: Emergency Department presentations over study period (centred on intervention start)
ARCHUS is the first RCT in this specific area and shows essentially no effect on ‘all admissions’ of a targeted MDT intervention in LTC

Post-hoc (Big 5) there is a 25-35% reduction (depending on time period analysed) in Big 5 admissions
Taking the results ‘in the round’ we do not believe ARCHIP results represent regression to the mean...

...but and because (similar to Big 5 data - RCT) they emphasise the importance of selecting ‘high admitting’ facilities for intervention

...and concentrating on residents with one or more of the Big 5 diagnoses
Overall Conclusions and Recommendations:

- The very similar level of reduction in ED presentations seen in ARCHIP, suggests that the intervention is applicable in a wider context (outside the ivory tower)...

- ...and that the intervention takes a few months to ‘work’ but then the effect persists for at least 9 months.
Where to from here?

- This is all very well, but are we addressing only a small part of the problem?
The Villages Study – NSCAW (in progress)

- Retirement Village Population (large and growing fast)
- Little known about them
- ? Vulnerable
- ?? In NZ context possibly easier to identify in the community than ‘the frail”
- ?? Accessible
The Villages Study (in progress)

- Study Comprises 3 Phases:
  - Phase 1: ‘Census’ using interRAI (case-validated) and other tools (Demographics, medications, morbidities, ADLs, attitudes etc)
  - Phase 2: trajectories over 2-6 years from nationally collected data (hospitalisations, LTC admissions, mortality)
  - Phase 3: A repeat of ‘ARCHUS’ RCT in the most vulnerable cohort from Phase 1
The Villages Study (in progress)

- Study commenced June 2016

- Early results suggest residents (n = approx 230 currently) are even more ‘medically vulnerable’ than we had anticipated:
  - mean number of comorbidities = 5.9 (range 1-14)
  - mean number of medications = 7.4 (range 0-18)
  - mean age = 82.9yrs (range 69-91 yrs)

These are very similar to data derived from LTC residents in our OPAL Study.
Watch this Space (June 2019)

[Image of an old television with the words "Please Stand By" on the screen]
Acknowledgements

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