The impact of dementia education and training on health and social care staff knowledge, attitudes and confidence: A cross-sectional study

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TITLE: The impact of dementia education and training on health and social care staff knowledge, attitudes and confidence: A cross-sectional study

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WORD COUNT = 3721

ABSTRACT

Objectives: The aim of this study was to establish the impact of dementia education and training on the knowledge, attitudes and confidence of health and social care staff. The study also aimed to identify the most effective features (content and pedagogical) of dementia education and training.

Design: Cross sectional survey study.

Settings: Health and social care staff in the UK including acute care, mental health community care trusts, primary care, and care homes.

Participants: All health and social care staff who had completed dementia education and training meeting the minimal standards as set by Health Education England, within the past five years were invited to participate in an online survey. A total of 668 health and social care staff provided informed consent and completed an online survey, and responses from 553 participants were included in this study. The majority of the respondents were of white British ethnicity (94.4%) and identified as female (88.4%).

Outcomes: Knowledge, attitude and confidence of health and social care staff.

Results: Hierarchical multiple regression analysis was conducted. Staff characteristics, education and training content variables and pedagogical factors were found to account for 18% of the variance in staff knowledge, 22% of variance in attitude (knowledge), 14% of variance in staff comfort (attitude) and 29% of variance in staff confidence. The most effective features of dementia education and training included face to face delivery in combination with simulation based learning or e-learning.

Conclusion: The results suggest that dementia education and training has some limited impact on health and social care staff outcomes. Whilst training content variables were important when

attempting to improve staff knowledge, more consideration should be given to pedagogical factors when training is aiming to improve staff attitude and confidence.

ARTICLE SUMMARY

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This study explores the impact of a diverse range of dementia education and training packages.

- The study explores the impact of pedagogical factors as well as content based variables

- The sample of health and social care professionals included in this study is not representative of the dementia care workforce in the UK.

- The cross-sectional design of the study limits inferences with regards to the impact of dementia education and training on staff outcomes.

KEY WORDS

Dementia; Alzheimer's Disease, Training, Health care, Social care

BACKGROUND

There are approximately 50 million people living with dementia worldwide and this is set to increase to 75 million by 2030 and 131.5 million by the year 2050. [1] This increase in the number of people living with dementia is primarily thought to be due to improving health care. Better health care has led to an increased life expectancy, therefore there is a greater proportion of older people worldwide. Each year, there are 9.9 million new cases of dementia in the world. The cost of dementia is estimated to be 1 trillion US dollars which is attributed to the cost of informal care, social care and direct medical care. Direct medical care is thought to account for 20% of the global dementia costs and social care accounts for a further 40%. The rising number of people affected by dementia and the increasing cost has led to a number of countries developing national dementia strategies. These strategies include the need for a health and social care workforce that is appropriately trained and skilled to deliver good dementia care.

Within the UK, there are currently 850, 000 people living with dementia, with the cost of care predicted to be £26 billion. [2] Research estimates that in England up to 40% of patients in hospitals are living with dementia [3] and up to 80% of residents in care homes are living with dementia. [4] Inadequate and poor care leads to a reduced quality of life for people living with dementia and a higher overall cost to the NHS, due to avoidable hospital admissions [5] and longer hospital stays. Therefore, a key feature of English National Dementia Strategies [6-8] is the focus upon dementia education and training for the health and social care workforce, in order to deliver good person-centred care. The 'dementia workforce' is defined as any individual who may have contact with people living with dementia in health and social care settings from the point of diagnosis to end of life care. The need for a clear evidence base for effective features of dementia education and training for health and social care staff has also been identified.

As part of a national programme of work around implementation of quality dementia education and training, Health Education England developed a Dementia Training Standards Framework [9] ('The Framework' hereafter). This set the 'gold standard' for training content, with regard to identifying the knowledge and skills needed to deliver good dementia care. It is comprised of three Tiers. Tier 1 is 'Dementia Awareness' and is to be completed by all staff working in any post in health and social care. Staff with regular contact with people with dementia complete Tier 2 training, and Tier 3 provides advanced skills for leaders in dementia care. The Framework consists of 14 subjects in total. Each subject comprises of several learning outcomes that staff are required to accomplish in order to deliver good quality and effective dementia care. Whilst the Framework provides comprehensive guidance for key content for dementia education and training, it does not take into account pedagogical considerations of training.

There has been a growing body of research exploring the impact of dementia education on staff knowledge and skills. Some studies [10-12] have demonstrated that dementia education and training can improve staff knowledge, confidence, foster positive attitudes and produce better outcomes for people living with dementia. In contrast, some studies have demonstrated that dementia training lacks efficacy and has no impact on staff or patient outcomes. [13-15] A recent review by Surr et al [16] identified 152 studies exploring the impact of dementia education and training. The findings of this comprehensive review suggest that dementia education can be efficacious if pedagogical factors are considered. The review suggests that training and education was found to be most effective if staff considered the training to be relevant to their role, involved active face to face participation, underpinned practice based learning with theory, the training was delivered by an experienced facilitator, was at least eight hours in duration and provided structured guidelines for care practice. The review highlights that

the dementia workforce is diverse and has heterogeneous training and education needs. This

makes identifying effective training components highly complex. Previous studies exploring the

impact of dementia education and training have primarily focused on a single training

programme with little focus on pedagogical considerations, and with a select group of health and

social care staff.

The aim of this study is to explore the impact of dementia education and training on

health and social care staff in the UK and to identify the most effective features (content and

pedagogical) of dementia training. It aimed to include a diverse range of dementia education and

training packages and staff working across different service settings that provide dementia care.

METHOD

Study design:

This study is a survey based cross-sectional observational study.

Setting:

This study was conducted in the UK. Data collection occurred via an online survey completed by

health and social care (working in acute care, community mental health care trust, primary care,

pharmacies and care homes) staff.

Procedure:

This study received ethical approval from Leeds Beckett University (Ref 27387). A national

audit of dementia education and training was conducted in 2017 to establish if current training

programmes met the learning outcomes set out by Health Education England's Dementia

Training Standards Framework. The findings of the audit are described by Smith et al [17]. In

total 614 respondents (Care Providers, Training providers and Commissioners) reported on 382

training packages in the national audit, 183 respondents reported one or more packages that met

the criteria for being a package of interest. These 183 respondents were asked to circulate an

invite to an online staff survey measuring knowledge, attitudes and confidence, to all participants

that had completed the training package(s) of interest they had reported. The survey was

administered using a web based tool, SNAP (see https://www.snapsurveys.com/), which enables

surveys to be individualised, which allowed the names of the specific packages of interest to be

added to the survey distributed by each audit respondent. The survey was promoted by including

university and Health Education England logos on the invite and survey, clearly defined

completion times, follow up emails, and an offer of a prize draw entry.

Participants:

All health and social care staff who had completed one of the training packages of interest in the

past five years and who were still contactable by the audit respondents, were approached to

participate. Survey participants were required to be 18 years or over, and be able to read and

write in English. No other eligibility criteria were applied.

Measures:

The survey comprised of questions concerning:

- Staff characteristics (gender, age, ethnicity, length in role, job role).

- Reaction to each training course completed, measured on a five-point Likert Scale (one = strongly disagree to five = strongly agree), with a high score indicating a positive reaction.

   1. Satisfaction (How satisfied were you with the training you received?)

   2. Relevance (How relevant was the training to your role/training needs?)

   3. Understanding (How easy was the material to understand?)

   4. Recommendation (How likely are you to recommend the training to colleagues?)

- Knowledge in dementia scale.[18] This measure of knowledge about dementia contains 16 items which respondents categorise as True, False, or Don't know (scored as 0.5). The scale has been demonstrated to have satisfactory internal reliability with Cronbach alpha of 0.72 reported. Possible scores range from 0-21.

- The Dementia Attitudes Scale. [19] This attitude scale consists of two subscales: dementia knowledge (e.g. people with dementia can enjoy life) and comfort (e.g. I feel confident around people with dementia), each containing 10 items. Both subscales have been reported to have good internal reliability with Cronbach alphas reported as 0.83 and 0.85 respectively. The items are rated on a seven-point Likert scale. Possible scores range from 10-70 for each subscale.

- The Confidence in Dementia Scale. [18] This is a nine item scale assessing staff confidence in providing care to people with dementia. The items are measured on a five-point Likert scale and have been found to demonstrate excellent internal reliability with a Cronbach alpha of 0.9. Possible scores range from nine to 45.

Data analysis:

SPSSv22 was used to analyse all quantitative data. Descriptive statistics were produced for demographic data and staff outcomes of knowledge, attitudes and confidence. Hierarchical regression analysis was performed to examine the amount of variance in staff outcomes explained by contextual factors and training. Dummy variables were created for categorical variables (such as staff role) before being entered into the regression model. Where there were adequate numbers of responses in relation to training packages, these packages were included in the regression analyses. The training packages were re-categorised and new variables created based on number of learning outcomes, number of subjects, tier level (1-3) and whether the training covered specific subjects. Of the 14 different subject areas included in the Framework,

only one (pharmacological interventions), was not covered by at least one of the included training packages. A sample size estimation was calculated using recommendations by Tabachnick and Fidel [20] which state the formula $50 + 8m$ whereby m is the number of independent variables. A total of 36 independent variables were created suggesting a sample size of 338 would be sufficient for hierarchical regression. Preliminary analysis was conducted to ensure no violation of the assumptions of normality, linearity, multi-collinearity, and homoscedasticity. The variables were entered into the hierarchical regression model in the following three steps:

Step 1: Staff characteristics including, gender, age, ethnicity, staff role and length of time in role.

Step 2: Pedagogical variables including duration of training, mode of delivery, when completed, where completed and number of training courses completed.

Step 3: Content variables including training tier, number of learning outcomes, number of subjects, and subject areas covered.

Patient and Public Involvement:

Patient and public involvement (PPI) was an important aspect of this study and considered to be experts by experience [21] and were involved from the conception and design of the study to dissemination of the outcomes. The core PPI group consisted of three people living with dementia and eight family members, and met 15 times over the lifetime of the study. Throughout the study, as recommended by Mathie et al [22] and Ocloo et al [23] there was a particular emphasis on the active involvement of experts by experience, particularly in aspects of the research process which are less frequently seen in PPI, such as design, data collection, and analysis. Within the work package reported in this article, experts by experience took active part in the following aspects: designing survey materials, ensuring appropriate language was used, and interpretation of the findings.

RESULTS

Participants:

A total of 668 participants who had participated in at least one of the training packages of interest, completed the survey, representing 60 training packages in total. Due to a low response rate for some packages, to permit robust analysis, only packages with ten or more respondents were included in subsequent data analysis. This resulted in 18 dementia education and training packages with a total of 553 respondents being included in the final sample. Approximately 88.4% of the sample identified as female and 94.4% as white British. Further staff characteristics are presented in table 1.

Insert Table 1 here.

Impact of dementia training on staff knowledge

The knowledge scores for the overall sample ranged from 7.5 to 16 (out of a potential score of 21) and the average score achieved was 13.80 (SD = 1.86). The final hierarchical model accounted for 18% of the variance in staff knowledge ($F = 2.77$, $p < .01$). Staff characteristics accounted for 6% of the variance, pedagogical variables accounted for 4% and content variables accounted for 8% of the variance in staff knowledge. An examination of the co-efficients suggests older age and having more than two years of experience in role were variables that accounted for a significant amount of variance in staff knowledge. Having completed either face to face delivery of training, e-learning, or simulation based training, training which covered a higher number of learning outcomes across the Framework, and completion of tier one training had a larger impact on staff knowledge. Interestingly those who had only completed subjects covering health and wellbeing, and families and carers as partners in dementia care had lower levels of staff knowledge. Those who had completed leadership subjects in addition to other

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subjects demonstrated higher levels of knowledge. Knowledge hierarchical regression results are

presented in Table 2.

Insert Table 2 here

Impact of training on attitudes (knowledge)

Participant scores ranged from 12-56 (highest score possible is 70) with regards to the

knowledge subscale from the O'Connor Attitude measure, with an average score of 51.68 (SD =

5.08). The final hierarchical regression model accounted for 22% of the variance in staff

attitudinal knowledge (F = 3.80, p < .01). Staff characteristics accounted for 3% of the variance,

pedagogical variables accounted for 8% and content variables accounted for 11% of the variance

in staff attitudinal knowledge. Similar variables accounted for a significant amount of variance in

staff attitudinal knowledge as they did factual knowledge: older age, having more than two years

of experience in role, face to face delivery of training, mentoring, simulation based training, and

completion of tier two training. Again, those who had completed health and wellbeing, and

families and carers as partners in dementia care accounted for lower levels of staff attitudinal

knowledge. Attitudinal knowledge hierarchical regression results are presented in Table 3.

Insert Table 3 here

Impact of training on attitudes (staff comfort)

Attitude (with regards to comfort levels) scores ranged from 12-56 (highest possible

score is 70) with an average score of 51.51 (SD = 5.08). The final hierarchical regression model

accounted for 14% of the variance in how comfortable staff perceived themselves to be in

delivering dementia care. Staff characteristic accounted for 3% of the variance, pedagogical

variables accounted for 7% and content variables accounted for 4% of the variance in staff

comfort levels. Significant determinants of staff comfort included: ethnicity (being white

British), face to face delivery of training, e learning, number of courses attended, and completion

of tier three training. Those who had completed health and wellbeing training again had lower

levels of comfort, however, those who had completed equality and diversity training were found

to have higher levels of comfort. Attitude (comfort) hierarchical regression results are presented

in Table 4.

Insert table 4 here.

Impact of training on staff confidence

With regards to staff confidence, scores ranged from 11 to 45 (highest possible score is 45), with

an average score of 35.31 (SD = 7.64). The final hierarchical model accounted for 29% of the

variance in staff confidence. Staff characteristics accounted for 10% of the variance, pedagogical

factors accounted for 11% and content variables accounted for 8% of the variance in staff

confidence. Only staff characteristics were found to significantly determine variance in staff

confidence. Those who were older in age, had more than one year experience and were either

clinical (qualified or non qualified) or management level staff were more likely to have high

levels of staff confidence. Staff confidence hierarchical regression results are presented in Table

5.

Insert Table 5 here.

DISCUSSION

The purpose of this study was to establish the impact of dementia education and training

on the knowledge, attitudes and confidence of health and social care staff. The findings suggest

that dementia education and training has limited impact on the knowledge, attitudes and

confidence of health and social care staff. Although the final regression models including staff

characteristics, pedagogical factors and training content variables were statistically significant,

they accounted for less than 30% of the variance in staff outcomes, suggesting other factors beyond dementia education and training have greater impact on staff knowledge, attitudes and confidence.

The final models indicated that experience was an important influencing factor, with older staff age and longer time in role, being important determinants of staff knowledge, attitudes and confidence. With regards to pedagogical factors, training courses that made use of face to face teaching, with a combination of simulation based learning or e learning, were the most likely to have an impact on staff outcomes. Training content was found to have limited impact on staff outcomes, with perhaps the most interesting finding being that completion of tier one dementia education and training was most impactful for staff knowledge as measured by the KIDE [18], tier two training was most impactful on staff attitudes and tier three was associated with greater staff confidence. The results also suggest that whilst training content variables are important when attempting to improve staff knowledge, more consideration should be given to pedagogical factors when training is aiming to improve staff attitude and confidence.

Smith et al [17] highlight in their recent audit of dementia education and training that approximately 77% of dementia education and training programmes cover learning outcomes associated with the subjects: Health and Wellbeing, and Families and Carers as Partners. The current findings suggest that staff who had completed these subjects had lower levels of knowledge and more negative attitudes than those who had completed other subjects. Those who had completed learning outcomes associated with equality and diversity and also leadership were more likely to have better knowledge and attitudes. The audit suggested that only 33% of reported dementia education and training in England covers learning outcomes associated with leadership. Furthermore, Smith et al. [17] report that approximately 70% of dementia education and training programmes met the Tier one learning outcomes as set out by Dementia Core Skills

Framework [9], and less than 40% met the requirements for Tier two and Tier three. The findings from the current study suggest that Tier 2 and Tier 3 training is required to develop a dementia care workforce that fosters positive attitudes and is confident in providing high quality dementia care. However, this may also be confounded by level of contact, that is those who have completed Tier 2 or Tier 3 training are more likely to spend more time with people living with dementia. The more positive attitudes and confidence may be due to experience as opposed to level of training.

The findings of this study echo findings of previous studies reporting limited impact of dementia education and training on staff outcomes [13-15]. However much past research has focused on specific training programmes with an emphasis on the content of the training programme. Whilst the current results suggest that there was a limited impact on staff outcomes as a result of training, this may be due to the included training programmes being primarily focused on learning outcomes and subjects rather than on pedagogical factors. The results suggest that for training to be impactful beyond staff knowledge development, pedagogical factors, such as mode of delivery, need to be considered. The results demonstrate that the most impactful training programmes were those that were delivered face to face with some form of simulation based learning, mentoring and or e-learning. These findings are in-line with those reported by Surr et al. [16] in their systematic review. The review highlighted that the most effective dementia education and training packages were those that were delivered face to face by an experienced trainer, included practice based learning underpinned by theory and clear guidelines for clinical practice. The review highlighted the difficulty of establishing a single effective training programme for a diverse care workforce. We echo those observations as the current findings suggest that diverse pedagogical and subject content factors were of importance for staff at varying levels of experience.

The findings of the current study should be interpreted with caution. The main limitation of the study is the homogenous staff sample who were mainly older, white British women, who had worked in clinical roles for over 10 years. This limits the generalisability of the findings to the dementia care workforce, who are considered to be heterogeneous. The survey had a low response rate which may have been due to organisations not being able to reach relevant staff, due to staff either moving away or the organisation not keeping a record of who had completed the training. The survey was only available in the English language and was also reported to be lengthy to complete, potentially further limiting responses from participants from diverse backgrounds. Furthermore, the design of the study limited the possibilities of controlling for all possible confounding factors, due to a small sample size and a large number of independent variables. It was not possible to explore interactional effects via structural equation modelling or multi-level modelling due to the limited sample of respondents. Findings related to impact on staff confidence should also be interpreted with caution as a ceiling effect was observed. A further limitation is that we were unable to obtain collection of outcome data pre- and post-training and therefore, it is not possible to determine whether staff knowledge, attitudes and skills were a direct result of attendance at the reported dementia education or training programme.

Despite the above limitations, a large enough sample of staff was recruited to explore the impact of training and the features of impactful training. The findings have clear implications for all health and social care staff who are required to undergo some form of dementia education and training. The study also has implications for policy makers and training commissioners. It is a requirement of the National Dementia Strategy [6] to develop an informed dementia care workforce. This study suggests that training providers and commissioners need to move beyond subject learning outcomes and also consider pedagogical factors and depth of education to have a

truly significant impact on staff attitudes and confidence. Further research is required to establish the specific needs of distinct health and social care staff for example the training needs of working in acute hospital care will differ from those working in care home settings.

The findings of this study suggest that currently dementia education and training has some limited impact on the knowledge, attitudes and confidence of health and social care staff. The pedagogical factors of training such as mode of delivery are important in ensuring training is effective in changing attitudes and confidence as well as staff knowledge. Dementia education and training providers/commissioners should consider staff characteristics and pedagogical factors as well as subject content when providing dementia education and training to the dementia care workforce.

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Table 1. Demographic characteristics of health and social care staff included in the study

Characteristic	Sub Characteristic	N	Percentage
Gender	Male	63	11.39
	Female	489	88.4
Ethnicity	White British	552	94.4
	Pakistani	2	0.4
	Indian	5	0.9
	Black African/Caribbean	6	1.1
	Mixed ethnicity	7	1.3
	Arab	1	0.2
	Not stated	4	0.7
Age	18-24 years	27	4.9
	25-29 years	42	7.6
	30-34 years	45	8.1
	35-39 years	55	9.9
	40-44 years	60	10.8
	45-49 years	89	16.1
	50-54 years	102	18.4
	55-59 years	87	15.7
	60-64 years	29	5.2
	65 years and over	15	2.7
Role	Ancillary/clerical	39	7.1
	Unqualified clinical/care	108	19.5
	Qualified clinical	194	35.1
	Unit/facility manager	26	4.7
	Senior manager	65	11.8
	Other	121	21.9
Time in role	Less than 1 years	15	2.7
	1-2 years	45	8.1
	3-4 years	50	9
	5-9 years	94	17
	10-19 years	141	25.5
	20 and over years	197	35.6

Table 2. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff knowledge.

Variables	B	SE	Beta (Standardised)	P value
Female	.368	.262	.063	.161
Age	-.125	.042	-.154	.003
Ethnicity (white British)	-.011	.052	-.009	.839
Less than 1 year experience	-1.147	.528	-.102	.030
1-2 years	-1.272	.360	-.190	.000
3-4 year	-.174	.341	-.027	.610
5-9 years	-.472	.269	-.095	.079
10 plus years	-.534	.226	-.124	.019
Role: Ancillary	.031	.363	.004	.932
Role: Clinical	.099	.251	.021	.692
Role: Manager	.391	.422	.043	.354
Role: Senior manager	.053	.301	.009	.860
Role: Other	-.209	.256	-.046	.416
Course length	.002	.008	.016	.779
Face to face learning	-5.640	2.169	-.712	.010
E learning	2.489	1.243	.314	.046
Mentoring	-.056	.424	-.013	.896
Simulation	3.461	.919	.893	.000
Completion: 1-2 years ago	-.118	.192	-.029	.540
More than 3 years ago	.567	.363	.074	.119
Number of courses	-.151	.232	-.040	.514
Number of learning outcomes	.003	.313	.001	.991
Number of subjects	.071	.034	.956	.038
Tier	-.984	.625	-.930	.116
Awareness	-4.377	1.283	-1.190	.001
Diagnosis	2.493	1.641	.653	.129
Communication	-.510	1.977	-.076	.796
Health and wellbeing	.651	.794	.105	.413
Living well with dementia	-4.510	1.333	-.682	.001
Families	2.932	1.930	.763	.129
Equality	-2.896	1.229	-.496	.019
Law	-4.350	2.356	-.438	.066
Leadership	1.205	.733	.237	.101

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Table 3. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff knowledge (attitude sub-scale).

Variables	B	SE	Beta (Standardised)	P value
Female	1.047	.705	.065	.138
Age	-.236	.114	-.105	.038
Ethnicity (white British)	-.024	.141	-.007	.866
Less than 1 year experience	-3.637	1.421	-.117	.011
1-2 years	-2.010	.970	-.108	.039
3-4 year	-.871	.919	-.048	.344
5-9 years	-.337	.723	-.024	.641
10 plus years	-1.008	.609	-.084	.099
Role: Ancillary	.926	.976	.047	.343
Role: Clinical	.556	.675	.042	.411
Role: Manager	1.391	1.135	.056	.221
Role: Senior manager	.121	.811	.008	.881
Role: Other	-.701	.690	-.055	.310
Course length	-.014	.021	-.037	.505
Face to face learning	12.535	5.837	.570	.032
E learning	1.667	3.346	.076	.619
Mentoring	3.293	1.141	.269	.004
Simulation	12.247	2.472	1.139	.000
Completion: 1-2 years ago	-.587	.517	-.052	.257
More than 3 years ago	.353	.976	.017	.718
Number of courses	.869	.624	.082	.165
Number of learning outcomes	-.131	.842	-.011	.876
Number of subjects	.115	.092	.558	.211
Tier	-1.078	1.682	-.367	.522
Awareness	-8.951	3.454	-.877	.010
Diagnosis	4.185	4.416	.395	.344
Communication	8.549	5.319	.456	.109
Health and wellbeing	-2.785	2.138	-.162	.193
Living well with dementia	-13.959	3.588	-.761	.000
Families	3.542	5.194	.332	.496
Equality	-10.931	3.307	-.675	.001
Law	-2.710	6.342	-.098	.669
Leadership	2.341	1.971	.166	.236

Table 4. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff comfort (attitude sub-scale).

Variables	B	SE	Beta (Standardised)	P value
Female	-.792	.810	-.045	.328
Age	.017	.130	.007	.896
Ethnicity (white British)	.369	.162	.105	.023
Less than 1 year experience	1.368	1.632	.040	.403
1-2 years	-.289	1.114	-.014	.795
3-4 year	-.920	1.055	-.047	.384
5-9 years	-.031	.830	-.002	.970
10 plus years	-.572	.700	-.044	.414
Role: Ancillary	-.160	1.121	-.007	.887
Role: Clinical	-.305	.776	-.021	.694
Role: Manager	-1.040	1.304	-.038	.425
Role: Senior manager	-.544	.932	-.031	.560
Role: Other	.822	.792	.060	.300
Course length	-.007	.024	-.016	.779
Face to face learning	-16.595	6.706	-.693	.014
E learning	-7.606	3.844	-.317	.048
Mentoring	1.597	1.311	.120	.224
Simulation	-3.883	2.840	-.331	.172
Completion: 1-2 years ago	.790	.593	.064	.184
More than 3 years ago	.000	1.122	.000	1.000
Number of courses	-1.111	.717	-.096	.122
Number of learning outcomes	2.333	.968	.186	.016
Number of subjects	-.165	.105	-.736	.118
Tier	2.107	1.932	.659	.276
Awareness	10.642	3.968	.957	.008
Diagnosis	-4.585	5.073	-.397	.367
Communication	6.454	6.111	.316	.291
Health and wellbeing	-3.009	2.456	-.161	.221
Living well with dementia	11.148	4.122	.558	.007
Families	-8.726	5.967	-.751	.144
Equality	.868	3.799	.049	.819
Law	15.096	7.286	.502	.039
Leadership	-2.011	2.265	-.131	.375

Table 5. Summary of hierarchical regression to establish impact of staff characteristics, training content and pedagogical factors on staff confidence.

Variables	B	SE	Beta (Standardised)	P value
Female	1.588	.974	.068	.104
Age	-.405	.157	-.124	.010
Ethnicity (white British)	-.068	.195	-.014	.729
Less than 1 year experience	-3.991	1.965	-.089	.043
1-2 years	-1.906	1.340	-.071	.156
3-4 year	-2.027	1.270	-.078	.111
5-9 years	-.533	.999	-.027	.594
10 plus years	-.213	.842	-.012	.801
Role: Ancillary	-3.823	1.349	-.133	.005
Role: Clinical	.852	.934	.045	.362
Role: Manager	1.606	1.569	.044	.307
Role: Senior manager	-.209	1.121	-.009	.853
Role: Other	-2.317	.953	-.127	.015
Course length	.012	.029	.021	.688
Face to face learning	1.547	8.071	.049	.848
E learning	4.581	4.626	.144	.323
Mentoring	1.861	1.578	.105	.239
Simulation	4.508	3.418	.290	.188
Completion: 1-2 years ago	.416	.714	.026	.560
More than 3 years ago	-.442	1.350	-.014	.743
Number of courses	.860	.863	.056	.319
Number of learning outcomes	.015	1.165	.001	.990
Number of subjects	.113	.127	.381	.371
Tier	-1.617	2.326	-.381	.487
Awareness	-1.465	4.775	-.099	.759
Diagnosis	-.151	6.105	-.010	.980
Communication	4.147	7.355	.153	.573
Health and wellbeing	.158	2.956	.006	.957
Living well with dementia	-2.670	4.961	-.101	.591
Families	.437	7.181	.028	.951
Equality	-6.774	4.572	-.289	.139
Law	5.218	8.768	.131	.552
Leadership	.972	2.726	.048	.722

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	Page 1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	Page 1
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	#3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	#4	Present key elements of study design early in the	Page 5

paper

Setting	[#5](#5)	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Eligibility criteria	[#6a](#6a)	Give the eligibility criteria, and the sources and methods of selection of participants.	Page 6
	[#7](#7)	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources / measurement	[#8](#8)	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	Page 6
Bias	[#9](#9)	Describe any efforts to address potential sources of bias	Page 7
Study size	[#10](#10)	Explain how the study size was arrived at	Page 7
Quantitative variables	[#11](#11)	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	Page 7
Statistical methods	[#12a](#12a)	Describe all statistical methods, including those used to control for confounding	Page 7
Statistical methods	[#12b](#12b)	Describe any methods used to examine subgroups and interactions	Page 7
Statistical methods	[#12c](#12c)	Explain how missing data were addressed	Page 7
Statistical methods	[#12d](#12d)	If applicable, describe analytical methods taking account of sampling strategy	NA
Statistical methods	[#12e](#12e)	Describe any sensitivity analyses	NA

Results

Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	
Participants	#13b	Give reasons for non-participation at each stage	NA Reasons for non participation were not collected
Participants	#13c	Consider use of a flow diagram	NA
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	Page 9
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	Number of participants included in all analysis Page 10 onwards
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	Page 10
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 10
Main results	#16b	Report category boundaries when continuous variables were categorized	Page 8/9/10
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	#17	Report other analyses done—e.g., analyses of	NA

subgroups and interactions, and sensitivity analyses

Discussion

Key results	[#18](#)	Summarise key results with reference to study objectives	Page 11
Limitations	[#19](#)	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	Page 13
Interpretation	[#20](#)	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	Page 13
Generalisability	[#21](#)	Discuss the generalisability (external validity) of the study results	Page 13

Other Information

Funding	[#22](#)	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 1

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The impact of dementia education and training on health and social care staff knowledge, attitudes and confidence: A cross-sectional study

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TITLE: The impact of dementia education and training on health and social care staff

knowledge, attitudes and confidence: A cross-sectional study

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COMPETING INTERESTS STATEMENT: None to declare

AUTHOR CONTRIBUTIONS:

SP: Co-led the survey work package with SS. SP was involved with study conception, study

design, led data analysis and authored the manuscript.

SS: Co-led the survey work package with SP, was involved with study conception, design and

provision of editorial input into the manuscript.

CS: CSs developed and disseminated survey materials, contributed to data management and

editorial input into the manuscript.

JO contributed to design, data interpretation and provision of editorial input into the manuscript.

AC led the involvement of experts by experience, contributed to the design of the study and

provided editorial input into the manuscript.

AD is an expert by experience who was involved with all aspects of this study.

CAS: Was Chief Investigator and contributed to study conception, design, data interpretation and

provision of editorial input into the manuscript.

ACKNOWLEDGMENTS:

We would like to acknowledge and thank all the organisations and individuals that supported this

study. We would also like to acknowledge Ms Michelle Drury for supporting survey

dissemination.

DATA SHARING STATEMENT: Data may be made available from the authors upon

reasonable request.

WORD COUNT = 3721

ABSTRACT

Objectives: The aim of this study was to establish the impact of dementia education and training on the knowledge, attitudes and confidence of health and social care staff. The study also aimed to identify the most effective features (content and pedagogical) of dementia education and training.

Design: Cross sectional survey study. Data collection occurred in 2017.

Settings: Health and social care staff in the UK including acute care, mental health community care trusts, primary care, and care homes.

Participants: All health and social care staff who had completed dementia education and training meeting the minimal standards as set by Health Education England, within the past five years were invited to participate in an online survey. A total of 668 health and social care staff provided informed consent and completed an online survey, and responses from 553 participants were included in this study. The majority of the respondents were of white British ethnicity (94.4%) and identified as female (88.4%).

Outcomes: Knowledge, attitude and confidence of health and social care staff.

Results: Hierarchical multiple regression analysis was conducted. Staff characteristics, education and training content variables and pedagogical factors were found to account for 29% of variance in staff confidence (F = 4.13, p <.001), 22% of variance in attitude (knowledge) (F = 3.80, p <001), 18% of the variance in staff knowledge (F = 2.77, p<.01) and 14% of variance in staff comfort (attitude) (F = 2.11, p <.01).

Conclusion: The results suggest that dementia education and training has limited impact on health and social care staff learning outcomes. Whilst training content variables were important when attempting to improve staff knowledge, more consideration should be given to pedagogical factors when training is aiming to improve staff attitude and confidence.

ARTICLE SUMMARY

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This study explores the impact of a diverse range of dementia education and training packages.

- The study explores the impact of pedagogical factors as well as content based variables

- The sample of health and social care professionals included in this study is not representative of the dementia care workforce in the UK.

- The cross-sectional design of the study limits inferences with regards to the impact of dementia education and training on staff learning outcomes.

KEY WORDS

Dementia; Alzheimer's Disease, Training, Health care, Social care

BACKGROUND

There are approximately 50 million people living with dementia worldwide and this is set to increase to 75 million by 2030 and 131.5 million by the year 2050. [1] This increase in the number of people living with dementia is primarily thought to be due to improving health care. Better health care has led to an increased life expectancy, therefore there is a greater proportion of older people worldwide. The rising number of people affected by dementia and the increasing cost has led to a number of countries developing national dementia strategies. These strategies include the need for a health and social care workforce that is appropriately trained and skilled to deliver good dementia care.

Within the UK, there are currently 850, 000 people living with dementia, with the cost of care predicted to be £26 billion. [2] Research estimates that in England up to 40% of patients in hospitals are living with dementia [3] and up to 80% of residents in care homes are living with dementia. [4] Inadequate and poor care leads to a reduced quality of life for people living with dementia and a higher overall cost to the NHS, due to avoidable hospital admissions [5] and longer hospital stays. Therefore, a key feature of English National Dementia Strategies [6-8] is the focus upon dementia education and training for the health and social care workforce, in order to deliver good person-centred care. The 'dementia workforce' is defined as any individual who may have contact with people living with dementia in health and social care settings from the point of diagnosis to end of life care. The need for a clear evidence base for effective features of dementia education and training for health and social care staff has also been identified [8].

As part of a national programme of work around implementation of quality dementia education and training, Health Education England developed a Dementia Training Standards Framework [9] ('The Framework' hereafter). This set the 'gold standard' for training content, with regard to identifying the knowledge and skills needed to deliver good dementia care. It is

comprised of three Tiers. Tier 1 is 'Dementia Awareness' and is to be completed by all staff

working in any post in health and social care. Staff with regular contact with people with

dementia complete Tier 2 training, and Tier 3 provides advanced skills for leaders in dementia

care. The Framework consists of 14 subjects in total. Each subject comprises of several learning

outcomes that staff are required to accomplish in order to deliver good quality and effective

dementia care. Whilst the Framework provides comprehensive guidance for key content for

dementia education and training, it does not take into account pedagogical considerations of

training.

There has been a growing body of research exploring the impact of dementia education

on staff knowledge and skills. Some studies [10-17] have demonstrated that dementia education

and training can improve staff knowledge, confidence, foster positive attitudes and produce

better outcomes for people living with dementia. In contrast, some studies have demonstrated

that dementia training lacks efficacy and has no impact on staff or patient outcomes. [18-20] A

recent review by Surr et al [21] identified 152 studies exploring the impact of dementia

education and training. The findings of this comprehensive review suggest that dementia

education can be efficacious if pedagogical factors are considered. The review suggests that

training and education was found to be most effective if staff considered the training to be

relevant to their role, involved active face to face participation, underpinned practice based

learning with theory, the training was delivered by an experienced facilitator, was at least eight

hours in duration and provided structured guidelines for care practice. The review highlights that

the dementia workforce is diverse and has heterogeneous training and education needs. This

makes identifying effective training components highly complex. Previous studies (with the

exception of Jack-Waugh et al., 2018) exploring the impact of dementia education and training

have primarily focused on a single training programme with limited focus on pedagogical

considerations, and with a select group of health and social care staff.

The aim of this study is to explore the impact of dementia education and training on

health and social care staff in the UK and to identify the most effective features (content and

pedagogical) and other factors of dementia training. It aimed to include a diverse range of

dementia education and training packages and staff working across different service settings that

provide dementia care.

METHOD

Study design:

This study is a survey based cross-sectional observational study.

Setting:

This study was conducted in England. Data collection occurred in 2017 via an online survey

completed by health and social care (working in acute care, community mental health care trust,

primary care, pharmacies and care homes) staff.

Procedure:

This study received ethical approval from Leeds Beckett University (Ref 27387). An audit of

dementia education and training in England was conducted in 2017 to establish if current training

programmes met the learning outcomes set out by Health Education England's Dementia

Training Standards Framework. The findings of the audit are described by Smith et al [22]. In

total 614 respondents (Care Providers, Training providers and Commissioners) reported on 382

training packages in the audit, 183 respondents reported one or more packages that met the

criteria for being a package of interest. These 183 respondents were asked to circulate an invite

to an online staff survey measuring knowledge, attitudes and confidence, to all participants that

had completed the training package(s) of interest they had reported. The survey was administered

using a web based tool, SNAP (see https://www.snapsurveys.com/), which enables surveys to be

individualised, which allowed the names of the specific packages of interest to be added to the

survey distributed by each audit respondent. The survey was promoted by including university

and Health Education England logos on the invite and survey, clearly defined completion times,

follow up emails, and an offer of a prize draw entry.

Participants:

All health and social care staff who had completed one of the training packages of interest in the

past five years and who were still contactable by the audit respondents, were approached to

participate. Survey participants were required to be 18 years or over, and be able to read and

write in English. No other eligibility criteria were applied.

Measures:

The survey comprised of questions concerning:

- Staff characteristics (gender, age, ethnicity, length in role, job role).

- Reaction to each training course completed, measured on a five-point Likert Scale (one =
  strongly disagree to five = strongly agree), with a high score indicating a positive
  reaction.

    1. Satisfaction (How satisfied were you with the training you received?)

    2. Relevance (How relevant was the training to your role/training needs?)

    3. Understanding (How easy was the material to understand?)

    4. Recommendation (How likely are you to recommend the training to colleagues?)

Measures of staff knowledge, attitudes and confidence were selected on the basis on the scales

validity and reliability.

- Knowledge in dementia scale.[23] This measure of knowledge about dementia contains 16 items which respondents categorise as True, False, or Don't know (scored as 0.5). The scale has been demonstrated to have satisfactory internal reliability with Cronbach alpha of 0.72 reported. Possible scores range from 0-21.

- The Dementia Attitudes Scale. [24] This attitude scale consists of two subscales: dementia knowledge (e.g. people with dementia can enjoy life) and comfort (e.g. I feel confident around people with dementia), each containing 10 items. Both subscales have been reported to have good internal reliability with Cronbach alphas reported as 0.83 and 0.85 respectively. The items are rated on a seven-point Likert scale. Possible scores range from 10-70 for each subscale.

- The Confidence in Dementia Scale. [23] This is a nine item scale assessing staff confidence in providing care to people with dementia. The items are measured on a five-point Likert scale and have been found to demonstrate excellent internal reliability with a Cronbach alpha of 0.9. Possible scores range from nine to 45.

Data analysis:

SPSSv22 was used to analyse all quantitative data. Descriptive statistics were produced for demographic data and staff outcomes of knowledge, attitudes and confidence. Hierarchical regression analysis was performed to examine the amount of variance in staff outcomes explained by contextual factors and training. Dummy variables were created for categorical variables (such as staff role) before being entered into the regression model. Where there were adequate numbers of responses in relation to training packages, these packages were included in the regression analyses. The training packages were re-categorised and new variables created based on number of learning outcomes, number of subjects, tier level (1-3) and whether the training covered specific subjects. Of the 14 different subject areas included in the Framework,

only one (pharmacological interventions), was not covered by at least one of the included training packages. A sample size estimation was calculated using recommendations by Tabachnick and Fidel [25] which state the formula $50 + 8m$ whereby m is the number of independent variables. A total of 36 independent variables were created suggesting a sample size of 338 would be sufficient for hierarchical regression. Preliminary analysis was conducted to ensure no violation of the assumptions of normality, linearity, multi-collinearity, and homoscedasticity. The variables were entered into the hierarchical regression model in the following three steps:

Step 1: Staff characteristics including, gender, age, ethnicity, staff role and length of time in role.

Step 2: Pedagogical variables including duration of training, mode of delivery, when completed, where completed and number of training courses completed.

Step 3: Content variables including training tier, number of learning outcomes, number of subjects, and subject areas covered.

Patient and Public Involvement:

Patient and public involvement (PPI) was an important aspect of this study and considered to be experts by experience [26] and were involved from the conception and design of the study to dissemination of the outcomes. The core PPI group consisted of three people living with dementia and eight family members, and met 15 times over the lifetime of the study. Throughout the study, as recommended by Mathie et al [27] and Ocloo et al [28] there was a particular emphasis on the active involvement of experts by experience, particularly in aspects of the research process which are less frequently seen in PPI, such as design, data collection, and analysis. Within the work package reported in this article, experts by experience took active part in the following aspects: designing survey materials, ensuring appropriate language was used, and interpretation of the findings.

RESULTS

Participants:

A total of 668 participants who had participated in at least one of the training packages of interest, completed the survey, representing 60 training packages in total. A total of 68 respondents had completed more than one of the training packages included within the survey.

Due to a low response rate for some packages, to permit robust analysis, only packages with ten or more respondents were included in subsequent data analysis. This resulted in 18 dementia education and training packages with a total of 553 respondents being included in the final sample. Approximately 88.4% of the sample identified as female and 94.4% as white British. Further staff characteristics are presented in table 1.

Of the 18 packages included in the analysis, 16 were delivered as face to face, two incorporated e-learning, three included mentoring and two utilised simulation. Six of the packages were categorised as Tier 1, 10 were Tier 2, and two were Tier 3. All packages met at least 75% of learning outcomes set out in the 'Framework'. The most popular subject covered by the training packages was person centred dementia care (15) and communication, interaction, and behaviour in dementia care (15), followed by dementia awareness (11), Living well with dementia and promoting independence (8), Law, ethics and safeguarding (6), Families and carers as partners in dementia care(4), dementia identification, assessment and diagnosis (3), Health and wellbeing in dementia care (3), Equality, diversity and inclusion in dementia care (2), Dementia risk reduction and prevention (1), End of life dementia care (1), Research and evince based dementia care (1), Leadership in transforming dementia care (1), and finally no package focused on the subject of pharmacological interventions in dementia care.

As all the training packages were rated as highly satisfactory, easy to understand, highly relevant and recommendable, reaction data was not further analysed.

Insert Table 1 here.

Impact of training on staff confidence

With regards to staff confidence, scores ranged from 11 to 45 (highest possible score is 45), with an average score of 35.31 (SD = 7.64). The final hierarchical model (F = 4.13, p < .001) accounted for 29% of the variance in staff confidence. Pedagogical factors accounted for 11%, staff characteristics accounted for 10% of the variance, and content variables accounted for 8% of the variance in staff confidence. Only staff characteristics were found to significantly determine variance in staff confidence. Those who were older in age, had more than one year experience and were either clinical (qualified or non qualified) or management level staff were more likely to have high levels of staff confidence. Staff confidence hierarchical regression results are presented in Table 2.

Insert Table 2 here.

Impact of training on attitudes (knowledge)

Participant scores ranged from 12-56 (highest score possible is 70) with regards to the knowledge subscale from the O'Connor Attitude measure, with an average score of 51.68 (SD = 5.08). The final hierarchical regression model accounted for 22% of the variance in staff attitudinal knowledge (F = 3.80, p < .01). Content variables accounted for 11% of the variance, pedagogical variables accounted for 8% and staff characteristics accounted for 3% of the variance in staff attitudinal knowledge. Similar variables accounted for a significant amount of variance in staff attitudinal knowledge as they did factual knowledge: older age, having more than two years of experience in role, face to face delivery of training, mentoring, simulation

based training, and completion of tier two training. Again, those who had completed health and

wellbeing, and families and carers as partners in dementia care accounted for lower levels of

staff attitudinal knowledge. Attitudinal knowledge hierarchical regression results are presented in

Table 3.

Insert Table 3 here

Impact of dementia training on staff knowledge

The knowledge scores for the overall sample ranged from 7.5 to 16 (out of a potential score of

21) and the average score achieved was 13.80 (SD = 1.86). The final hierarchical model

accounted for 18% of the variance in staff knowledge (F = 2.77, p <.01). That is only 18% of

staff knowledge is accounted for by the variables entered into the model. Content variables

accounted for 8%, staff characteristics accounted for 6% of the variance, pedagogical variables

accounted for 4% of the variance in staff knowledge. An examination of the co-efficients

suggests older age and having more than two years of experience in role were variables that

accounted for a significant amount of variance in staff knowledge. Having completed either face

to face delivery of training, e-learning, or simulation based training, training which covered a

higher number of learning outcomes across the Framework, and completion of tier one training

had a larger impact on staff knowledge. Interestingly those who had only completed subjects

covering health and wellbeing, and families and carers as partners in dementia care had lower

levels of staff knowledge. Those who had completed leadership subjects in addition to other

subjects demonstrated higher levels of knowledge. Knowledge hierarchical regression results are

presented in Table 4.

Insert Table 4 here

Impact of training on attitudes (staff comfort)

Attitude (with regards to comfort levels) scores ranged from 12-56 (highest possible

score is 70) with an average score of 51.51 (SD = 5.08). The final hierarchical regression model

(F = 2.11, p < .01) accounted for 14% of the variance in how comfortable staff perceived

themselves to be in delivering dementia care. Pedagogical variables accounted for 7%, content

variables accounted for 4% of the variance and staff characteristic accounted for 3% of the

variance in staff comfort levels. Significant determinants of staff comfort included: ethnicity

(being white British), face to face delivery of training, e learning, number of courses attended,

and completion of tier three training. Those who had completed health and wellbeing training

again had lower levels of comfort, however, those who had completed equality and diversity

training were found to have higher levels of comfort. Attitude (comfort) hierarchical regression

results are presented in Table 5.

Insert table 5 here.

DISCUSSION

The purpose of this study was to establish the impact of dementia education and training

on the knowledge, attitudes and confidence of health and social care staff. The findings suggest

that dementia education and training in general has limited impact on the knowledge, attitudes

and confidence of health and social care staff. Although the final regression models including

staff characteristics, pedagogical factors and training content variables were statistically

significant, they accounted for less than 30% of the variance in staff outcomes, suggesting other

factors beyond dementia education and training have greater impact on staff knowledge, attitudes

and confidence.

The final models indicated that experience was an important influencing factor, with older staff age and longer time in role, being important determinants of staff knowledge, attitudes and confidence. With regards to pedagogical factors, training courses that made use of face to face teaching, with a combination of simulation based learning or e learning, were the most likely to have an impact on staff outcomes. Training content was found to have limited impact on staff outcomes. Completion of tier one dementia education and training was most impactful for staff knowledge as measured by the KIDE [23], tier two training was most impactful on staff attitudes and tier three was associated with greater staff confidence. This suggests the 'Tiers' are fulfilling their goals with higher learning leading to reflection, attitudinal change and confidence. It is also an important finding in that it indicates that if health and social care staff are to have the right knowledge, attitudes and confidence to deliver good dementia care they need to be provided with training at higher Tiers than just Tier 1 dementia awareness. The results also suggest that whilst training content variables are important when attempting to improve staff knowledge, more consideration should be given to pedagogical factors when training is aiming to improve staff attitude and confidence.

Smith et al. [22] report that approximately 70% of dementia education and training programmes they audited met only the Tier one learning outcomes as set out by Dementia Core Skills Framework [9], and less than 40% met the requirements for Tier two and Tier three. The findings from the current study suggest that Tier 2 and Tier 3 training is required to develop a dementia care workforce that fosters positive attitudes and is confident in providing high quality dementia care. However, this may also be confounded by experience and contact with people living with dementia. That is the positive attitude and confidence may be due to experience as opposed to the level of training.

The findings of this study echo findings of previous studies reporting some positive but limited impact of dementia education and training on staff outcomes [10-17]. However much past research has focused on specific training programmes with an emphasis on the content of the training programme. Whilst the current results suggest that there was a limited impact on staff outcomes as a result of training, this may be due to the included training programmes being primarily focused on learning outcomes and subjects rather than on pedagogical factors. The results suggest that for training to be impactful beyond staff knowledge development, pedagogical factors, such as mode of delivery, need to be considered. The results demonstrate that the most impactful training programmes were those that were delivered face to face with some form of simulation based learning, mentoring and or e-learning. These findings are in-line with those reported by Surr et al. [21] in their systematic review. The review highlighted that the most effective dementia education and training packages were those that were delivered face to face by an experienced trainer, included practice based learning underpinned by theory and clear guidelines for clinical practice. The review highlighted the difficulty of establishing a single effective training programme for a diverse care workforce. We echo those observations as the current findings suggest that diverse pedagogical and subject content factors were of importance for staff at varying levels of experience.

Likewise, it is also important to note that there are a range of other factors that appear to be more influential than training in ensuring provision of person-centred dementia care. These include organisation and individual level factors [29] including the organisational climate and support for delivery of good quality care [30-32] alongside individual staff feelings of stress, burnout [30] and desire to deliver person-centred care. [33]. This indicates that training needs to be part of an overall organisational strategy that seeks to ensure individual staff are supported within a

positive organisational climate conducive to delivery of person-centred dementia care. Used alone it is unlikely to have an impact on care quality or outcomes for people with dementia.

The findings of the current study should be interpreted with caution. The main limitation of the study is the homogenous staff sample who were mainly older, white British women, who had worked in clinical roles for over 10 years. This limits the generalisability of the findings to the dementia care workforce, who are considered to be heterogeneous. The survey had a low response rate which may have been due to organisations not being able to reach relevant staff, due to staff either moving away or the organisation not keeping a record of who had completed the training. The survey was only available in the English language and was also reported to be lengthy to complete, potentially further limiting responses from participants from diverse backgrounds. The survey utilised measures that had previously been used within specific settings such as acute care. This may have had an impact on the results but it is worth noting that the measures continued to demonstrate good reliability despite being used in diverse settings. Furthermore, the design of the study limited the possibilities of controlling for all possible confounding factors, due to a small sample size and a large number of independent variables. It was not possible to explore interactional effects via structural equation modelling or multi-level modelling due to the limited sample of respondents. Findings related to impact on staff confidence should also be interpreted with caution as a ceiling effect was observed. A further limitation is that we were unable to obtain collection of outcome data pre- and post-training and therefore, it is not possible to determine whether staff knowledge, attitudes and skills were a direct result of attendance at the reported dementia education or training programme.

Despite the above limitations, a large enough sample of staff was recruited to explore the impact of training and the features of impactful training. The findings have clear implications for all health and social care staff who are required to undergo some form of dementia education

and training. The study also has implications for policy makers and training commissioners. It is

a requirement of the National Dementia Strategy [6] to develop an informed dementia care

workforce. This study suggests that training providers and commissioners need to move beyond

subject learning outcomes and also consider pedagogical factors and depth of education to have a

truly significant impact on staff attitudes and confidence. Further research is required to establish

the specific needs of distinct health and social care staff for example the training needs of

working in acute hospital care will differ from those working in care home settings. A targeted

approach is required whereby health care professionals have access to strong Tier 2 and Tier 3

training which is relevant to their role.

The findings of this study suggest that currently dementia education and training has some

limited impact on the knowledge, attitudes and confidence of health and social care staff. The

pedagogical factors of training such as mode of delivery are important in ensuring training is

effective in changing attitudes and confidence as well as staff knowledge. Dementia education

and training providers/commissioners should consider staff characteristics and pedagogical

factors as well as subject content when providing dementia education and training to the

dementia care workforce.

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Table 1. Demographic characteristics of health and social care staff included in the study

Characteristic	Sub Characteristic	N	Percentage
Gender	Male	63	11.39
	Female	489	88.4
Ethnicity	White British	552	94.4
	Pakistani	2	0.4
	Indian	5	0.9
	Black African/Caribbean	6	1.1
	Mixed ethnicity	7	1.3
	Arab	1	0.2
	Not stated	4	0.7
Age	18-24 years	27	4.9
	25-29 years	42	7.6
	30-34 years	45	8.1
	35-39 years	55	9.9
	40-44 years	60	10.8
	45-49 years	89	16.1
	50-54 years	102	18.4
	55-59 years	87	15.7
	60-64 years	29	5.2
	65 years and over	15	2.7
Role	Ancillary/clerical	39	7.1
	Unqualified clinical/care	108	19.5
	Qualified clinical	194	35.1
	Unit/facility manager	26	4.7
	Senior manager	65	11.8
	Other	121	21.9
Time in role	Less than 1 years	15	2.7
	1-2 years	45	8.1
	3-4 years	50	9
	5-9 years	94	17
	10-19 years	141	25.5
	20 and over years	197	35.6

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Table 2. Summary of hierarchical regression to establish impact of staff characteristics, training content and pedagogical factors on staff confidence.

Variables	B	SE	Beta (Standardised)	P value
Female	1.588	.974	.068	.104
Age	-.405	.157	-.124	.010
Ethnicity (white British)	-.068	.195	-.014	.729
Less than 1 year experience	-3.991	1.965	-.089	.043
1-2 years	-1.906	1.340	-.071	.156
3-4 year	-2.027	1.270	-.078	.111
5-9 years	-.533	.999	-.027	.594
10 plus years	-.213	.842	-.012	.801
Role: Ancillary	-3.823	1.349	-.133	.005
Role: Clinical	.852	.934	.045	.362
Role: Manager	1.606	1.569	.044	.307
Role: Senior manager	-.209	1.121	-.009	.853
Role: Other	-2.317	.953	-.127	.015
Course length	.012	.029	.021	.688
Face to face learning	1.547	8.071	.049	.848
E learning	4.581	4.626	.144	.323
Mentoring	1.861	1.578	.105	.239
Simulation	4.508	3.418	.290	.188
Completion: 1-2 years ago	.416	.714	.026	.560
More than 3 years ago	-.442	1.350	-.014	.743
Number of courses	.860	.863	.056	.319
Number of learning outcomes	.015	1.165	.001	.990
Number of subjects	.113	.127	.381	.371
Tier	-1.617	2.326	-.381	.487
Awareness	-1.465	4.775	-.099	.759
Diagnosis	-.151	6.105	-.010	.980
Communication	4.147	7.355	.153	.573
Health and wellbeing	.158	2.956	.006	.957
Living well with dementia	-2.670	4.961	-.101	.591
Families	.437	7.181	.028	.951
Equality	-6.774	4.572	-.289	.139
Law	5.218	8.768	.131	.552
Leadership	.972	2.726	.048	.722

Table 3. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff knowledge (attitude sub-scale).

Variables	B	SE	Beta (Standardised)	P value
Female	1.047	.705	.065	.138
Age	-.236	.114	-.105	.038
Ethnicity (white British)	-.024	.141	-.007	.866
Less than 1 year experience	-3.637	1.421	-.117	.011
1-2 years	-2.010	.970	-.108	.039
3-4 year	-.871	.919	-.048	.344
5-9 years	-.337	.723	-.024	.641
10 plus years	-1.008	.609	-.084	.099
Role: Ancillary	.926	.976	.047	.343
Role: Clinical	.556	.675	.042	.411
Role: Manager	1.391	1.135	.056	.221
Role: Senior manager	.121	.811	.008	.881
Role: Other	-.701	.690	-.055	.310
Course length	-.014	.021	-.037	.505
Face to face learning	12.535	5.837	.570	.032
E learning	1.667	3.346	.076	.619
Mentoring	3.293	1.141	.269	.004
Simulation	12.247	2.472	1.139	.000
Completion: 1-2 years ago	-.587	.517	-.052	.257
More than 3 years ago	.353	.976	.017	.718
Number of courses	.869	.624	.082	.165
Number of learning outcomes	-.131	.842	-.011	.876
Number of subjects	.115	.092	.558	.211
Tier	-1.078	1.682	-.367	.522
Awareness	-8.951	3.454	-.877	.010
Diagnosis	4.185	4.416	.395	.344
Communication	8.549	5.319	.456	.109
Health and wellbeing	-2.785	2.138	-.162	.193
Living well with dementia	-13.959	3.588	-.761	.000
Families	3.542	5.194	.332	.496
Equality	-10.931	3.307	-.675	.001
Law	-2.710	6.342	-.098	.669
Leadership	2.341	1.971	.166	.236

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Table 4. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff knowledge.

Variables	B	SE	Beta (Standardised)	P value
Female	.368	.262	.063	.161
Age	-.125	.042	-.154	.003
Ethnicity (white British)	-.011	.052	-.009	.839
Less than 1 year experience	-1.147	.528	-.102	.030
1-2 years	-1.272	.360	-.190	.000
3-4 year	-.174	.341	-.027	.610
5-9 years	-.472	.269	-.095	.079
10 plus years	-.534	.226	-.124	.019
Role: Ancillary	.031	.363	.004	.932
Role: Clinical	.099	.251	.021	.692
Role: Manager	.391	.422	.043	.354
Role: Senior manager	.053	.301	.009	.860
Role: Other	-.209	.256	-.046	.416
Course length	.002	.008	.016	.779
Face to face learning	-5.640	2.169	-.712	.010
E learning	2.489	1.243	.314	.046
Mentoring	-.056	.424	-.013	.896
Simulation	3.461	.919	.893	.000
Completion: 1-2 years ago	-.118	.192	-.029	.540
More than 3 years ago	.567	.363	.074	.119
Number of courses	-.151	.232	-.040	.514
Number of learning outcomes	.003	.313	.001	.991
Number of subjects	.071	.034	.956	.038
Tier	-.984	.625	-.930	.116
Awareness	-4.377	1.283	-1.190	.001
Diagnosis	2.493	1.641	.653	.129
Communication	-.510	1.977	-.076	.796
Health and wellbeing	.651	.794	.105	.413
Living well with dementia	-4.510	1.333	-.682	.001
Families	2.932	1.930	.763	.129
Equality	-2.896	1.229	-.496	.019
Law	-4.350	2.356	-.438	.066
Leadership	1.205	.733	.237	.101

Table 5. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff comfort (attitude sub-scale).

Variables	B	SE	Beta (Standardised)	P value
Female	-.792	.810	-.045	.328
Age	.017	.130	.007	.896
Ethnicity (white British)	.369	.162	.105	.023
Less than 1 year experience	1.368	1.632	.040	.403
1-2 years	-.289	1.114	-.014	.795
3-4 year	-.920	1.055	-.047	.384
5-9 years	-.031	.830	-.002	.970
10 plus years	-.572	.700	-.044	.414
Role: Ancillary	-.160	1.121	-.007	.887
Role: Clinical	-.305	.776	-.021	.694
Role: Manager	-1.040	1.304	-.038	.425
Role: Senior manager	-.544	.932	-.031	.560
Role: Other	.822	.792	.060	.300
Course length	-.007	.024	-.016	.779
Face to face learning	-16.595	6.706	-.693	.014
E learning	-7.606	3.844	-.317	.048
Mentoring	1.597	1.311	.120	.224
Simulation	-3.883	2.840	-.331	.172
Completion: 1-2 years ago	.790	.593	.064	.184
More than 3 years ago	.000	1.122	.000	1.000
Number of courses	-1.111	.717	-.096	.122
Number of learning outcomes	2.333	.968	.186	.016
Number of subjects	-.165	.105	-.736	.118
Tier	2.107	1.932	.659	.276
Awareness	10.642	3.968	.957	.008
Diagnosis	-4.585	5.073	-.397	.367
Communication	6.454	6.111	.316	.291
Health and wellbeing	-3.009	2.456	-.161	.221
Living well with dementia	11.148	4.122	.558	.007
Families	-8.726	5.967	-.751	.144
Equality	.868	3.799	.049	.819
Law	15.096	7.286	.502	.039
Leadership	-2.011	2.265	-.131	.375

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Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	Page 1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	Page 1
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	#3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	#4	Present key elements of study design early in the	Page 5

paper

Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	Page 6
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	Page 6
Bias	#9	Describe any efforts to address potential sources of bias	Page 7
Study size	#10	Explain how the study size was arrived at	Page 7
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	Page 7
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	Page 7
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	Page 7
Statistical methods	#12c	Explain how missing data were addressed	Page 7
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	NA
Statistical methods	#12e	Describe any sensitivity analyses	NA

Results

Participants	[#13a](#)	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.		
Participants	[#13b](#)	Give reasons for non-participation at each stage	NA Reasons for non participation were not collected	
Participants	[#13c](#)	Consider use of a flow diagram	NA	
Descriptive data	[#14a](#)	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	Page 9	
Descriptive data	[#14b](#)	Indicate number of participants with missing data for each variable of interest	Number of participants included in all analysis Page 10 onwards	
Outcome data	[#15](#)	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	Page 10	
Main results	[#16a](#)	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 10	
Main results	[#16b](#)	Report category boundaries when continuous variables were categorized	Page 8/9/10	
Main results	[#16c](#)	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA	
Other analyses	[#17](#)	Report other analyses done—e.g., analyses of	NA	

subgroups and interactions, and sensitivity analyses

Discussion

Other Information

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The impact of dementia education and training on health and social care staff knowledge, attitudes and confidence: A cross-sectional study

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TITLE: The impact of dementia education and training on health and social care staff knowledge, attitudes and confidence: A cross-sectional study

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ABSTRACT

Objectives: The aim of this study was to establish the impact of dementia education and training on the knowledge, attitudes and confidence of health and social care staff. The study also aimed to identify the most effective features (content and pedagogical) of dementia education and training.

Design: Cross sectional survey study. Data collection occurred in 2017.

Settings: Health and social care staff in the UK including acute care, mental health community care trusts, primary care, and care homes.

Participants: All health and social care staff who had completed dementia education and training meeting the minimal standards as set by Health Education England, within the past five years were invited to participate in an online survey. A total of 668 health and social care staff provided informed consent and completed an online survey, and responses from 553 participants were included in this study. The majority of the respondents were of white British ethnicity (94.4%) and identified as female (88.4%).

Outcomes: Knowledge, attitude and confidence of health and social care staff.

Results: Hierarchical multiple regression analysis was conducted. Staff characteristics, education and training content variables and pedagogical factors were found to account for 29% of variance in staff confidence (F = 4.13, p <.001), 22% of variance in attitude (knowledge) (F = 3.80, p <001), 18% of the variance in staff knowledge (F = 2.77, p<.01) and 14% of variance in staff comfort (attitude) (F = 2.11, p <.01).

Conclusion: The results suggest that dementia education and training has limited impact on health and social care staff learning outcomes. Whilst training content variables were important

when attempting to improve staff knowledge, more consideration should be given to pedagogical factors when training is aiming to improve staff attitude and confidence.

ARTICLE SUMMARY

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This study explores the impact of a diverse range of dementia education and training packages.

- The study explores the impact of pedagogical factors as well as content based variables

- The sample of health and social care professionals included in this study is not representative of the dementia care workforce in the UK.

- The cross-sectional design of the study limits inferences with regards to the impact of dementia education and training on staff learning outcomes.

KEY WORDS

Dementia; Alzheimer's Disease, Training, Health care, Social care

BACKGROUND

There are approximately 50 million people living with dementia worldwide and this is set to increase to 75 million by 2030 and 131.5 million by the year 2050. [1] This increase in the number of people living with dementia is primarily thought to be due to improving health care. Better health care has led to an increased life expectancy, therefore there is a greater proportion of older people worldwide. The rising number of people affected by dementia and the increasing cost has led to a number of countries developing national dementia strategies. These strategies include the need for a health and social care workforce that is appropriately trained and skilled to deliver good dementia care.

Within the UK, there are currently 850, 000 people living with dementia, with the cost of care predicted to be £26 billion. [2] Research estimates that in England up to 40% of patients in hospitals are living with dementia [3] and up to 80% of residents in care homes are living with dementia. [4] Inadequate and poor care leads to a reduced quality of life for people living with dementia and a higher overall cost to the NHS, due to avoidable hospital admissions [5] and longer hospital stays. Therefore, a key feature of English National Dementia Strategies [6-8] is the focus upon dementia education and training for the health and social care workforce, in order to deliver good person-centred care. The 'dementia workforce' is defined as any individual who may have contact with people living with dementia in health and social care settings from the point of diagnosis to end of life care. The need for a clear evidence base for effective features of dementia education and training for health and social care staff has also been identified [8].

As part of a national programme of work around implementation of quality dementia education and training, Health Education England developed a Dementia Training Standards Framework [9] ('The Framework' hereafter). This set the 'gold standard' for training content, with regard to identifying the knowledge and skills needed to deliver good dementia care. It is

comprised of three Tiers. Tier 1 is 'Dementia Awareness' and is to be completed by all staff working in any post in health and social care. Staff with regular contact with people with dementia complete Tier 2 training, and Tier 3 provides advanced skills for leaders in dementia care. The Framework consists of 14 subjects in total. Each subject comprises of several learning outcomes that staff are required to accomplish in order to deliver good quality and effective dementia care. Whilst the Framework provides comprehensive guidance for key content for dementia education and training, it does not take into account pedagogical considerations of training.

There has been a growing body of research exploring the impact of dementia education on staff knowledge and skills. Some studies [10-17] have demonstrated that dementia education and training can improve staff knowledge, confidence, foster positive attitudes and produce better outcomes for people living with dementia. In contrast, some studies have demonstrated that dementia training lacks efficacy and has no impact on staff or patient outcomes. [18-20] A recent review by Surr et al [21] identified 152 studies exploring the impact of dementia education and training. The findings of this comprehensive review suggest that dementia education can be efficacious if pedagogical factors are considered. The review suggests that training and education was found to be most effective if staff considered the training to be relevant to their role, involved active face to face participation, underpinned practice based learning with theory, the training was delivered by an experienced facilitator, was at least eight hours in duration and provided structured guidelines for care practice. The review highlights that the dementia workforce is diverse and has heterogeneous training and education needs. This makes identifying effective training components highly complex. Previous studies (with the exception of Jack-Waugh et al., 2018) exploring the impact of dementia education and training

have primarily focused on a single training programme with limited focus on pedagogical

considerations, and with a select group of health and social care staff.

The aim of this study is to explore the impact of dementia education and training on

health and social care staff in the UK and to identify the most effective features (content and

pedagogical) and other factors of dementia training. It aimed to include a diverse range of

dementia education and training packages and staff working across different service settings that

provide dementia care.

METHOD

Study design:

This study is a survey based cross-sectional observational study.

Setting:

This study was conducted in England. Data collection occurred in 2017 via an online survey

completed by health and social care (working in acute care, community mental health care trust,

primary care, pharmacies and care homes) staff.

Procedure:

This study received ethical approval from Leeds Beckett University (Ref 27387). An audit of

dementia education and training in England was conducted in 2017 to establish if current training

programmes met the learning outcomes set out by Health Education England's Dementia

Training Standards Framework. The findings of the audit are described by Smith et al [22]. In

total 614 respondents (Care Providers, Training providers and Commissioners) reported on 382

training packages in the audit, 183 respondents reported one or more packages that met the

criteria for being a package of interest. These 183 respondents were asked to circulate an invite

to an online staff survey measuring knowledge, attitudes and confidence, to all participants that

had completed the training package(s) of interest they had reported. The survey was administered

using a web based tool, SNAP (see https://www.snapsurveys.com/), which enables surveys to be individualised, which allowed the names of the specific packages of interest to be added to the survey distributed by each audit respondent. The survey was promoted by including university and Health Education England logos on the invite and survey, clearly defined completion times, follow up emails, and an offer of a prize draw entry.

Participants:

All health and social care staff who had completed one of the training packages of interest in the past five years and who were still contactable by the audit respondents, were approached to participate. Survey participants were required to be 18 years or over, and be able to read and write in English. No other eligibility criteria were applied.

Measures:

The survey comprised of questions concerning:

- Staff characteristics (gender, age, ethnicity, length in role, job role).

- Reaction to each training course completed, measured on a five-point Likert Scale (one = strongly disagree to five = strongly agree), with a high score indicating a positive reaction.

    1. Satisfaction (How satisfied were you with the training you received?)

    2. Relevance (How relevant was the training to your role/training needs?)

    3. Understanding (How easy was the material to understand?)

    4. Recommendation (How likely are you to recommend the training to colleagues?)

Measures of staff knowledge, attitudes and confidence were selected on the basis that the scales had previously demonstrated good validity and reliability.

- Knowledge in dementia scale. [23] This measure of knowledge about dementia contains 16 items which respondents categorise as True, False, or Don't know (scored as 0.5). The scale has been demonstrated to have satisfactory internal reliability with Cronbach alpha of 0.72 reported. Possible scores range from 0-21.

- The Dementia Attitudes Scale. [24] This attitude scale consists of two subscales: dementia knowledge (e.g. people with dementia can enjoy life) and comfort (e.g. I feel confident around people with dementia), each containing 10 items. Both subscales have been reported to have good internal reliability with Cronbach alphas reported as 0.83 and 0.85 respectively. The items are rated on a seven-point Likert scale. Possible scores range from 10-70 for each subscale.

- The Confidence in Dementia Scale. [23] This is a nine item scale assessing staff confidence in providing care to people with dementia. The items are measured on a five-point Likert scale and have been found to demonstrate excellent internal reliability with a Cronbach alpha of 0.9. Possible scores range from nine to 45.

Data analysis:

SPSSv22 was used to analyse all quantitative data. Descriptive statistics were produced for demographic data and staff outcomes of knowledge, attitudes and confidence. Hierarchical regression analysis was performed to examine the amount of variance in staff outcomes explained by contextual factors and training. Dummy variables were created for categorical variables (such as staff role) before being entered into the regression model. Where there were adequate numbers of responses in relation to training packages, these packages were included in the regression analyses. The training packages were re-categorised and new variables created based on number of learning outcomes, number of subjects, tier level (1-3) and whether the training covered specific subjects. Of the 14 different subject areas included in the Framework,

only one (pharmacological interventions), was not covered by at least one of the included

training packages. A sample size estimation was calculated using recommendations by

Tabachnick and Fidel [25] which state the formula $50 + 8m$ whereby m is the number of

independent variables. A total of 36 independent variables were created suggesting a sample size

of 338 would be sufficient for hierarchical regression. Preliminary analysis was conducted to

ensure no violation of the assumptions of normality, linearity, multi-collinearity, and

homoscedasticity. The variables were entered into the hierarchical regression model in the

following three steps:

Step 1: Staff characteristics including, gender, age, ethnicity, staff role and length of time in role.

Step 2: Pedagogical variables including duration of training, mode of delivery, when completed,

where completed and number of training courses completed.

Step 3: Content variables including training tier, number of learning outcomes, number of

subjects, and subject areas covered.

Patient and Public Involvement:

Patient and public involvement (PPI) was an important aspect of this study and considered to be

experts by experience [26] and were involved from the conception and design of the study to

dissemination of the outcomes. The core PPI group consisted of three people living with

dementia and eight family members, and met 15 times over the lifetime of the study. Throughout

the study, as recommended by Mathie et al [27] and Ocloo et al [28] there was a particular

emphasis on the active involvement of experts by experience, particularly in aspects of the

research process which are less frequently seen in PPI, such as design, data collection, and

analysis. Within the work package reported in this article, experts by experience took active part

in the following aspects: designing survey materials, ensuring appropriate language was used,

and interpretation of the findings.

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RESULTS

Participants:

A total of 668 participants who had participated in at least one of the training packages of interest, completed the survey, representing 60 training packages in total. Due to a low response rate for some packages, to permit robust analysis, only packages with ten or more respondents were included in subsequent data analysis. This resulted in 18 dementia education and training packages with a total of 553 respondents being included in the final sample. Approximately 88.4% of the sample identified as female and 94.4% as white British. Further staff characteristics are presented in table 1.

Of the 18 packages included in the analysis, 16 were delivered as face to face (of which one incorporated e-learning, three included mentoring and one utilised simulation). One training package was delivered solely as an e-learning package and one as simulation based learning. Six of the packages were categorised as Tier 1, 10 were Tier 2, and two were Tier 3. All packages met at least 75% of learning outcomes set out in the 'Framework'. The most popular subject covered by the training packages was person centred dementia care (15) and communication, interaction, and behaviour in dementia care (15), followed by dementia awareness (11), Living well with dementia and promoting independence (8), Law, ethics and safeguarding (6), Families and carers as partners in dementia care(4), dementia identification, assessment and diagnosis (3), Health and wellbeing in dementia care (3), Equality, diversity and inclusion in dementia care (2), Dementia risk reduction and prevention (1), End of life dementia care (1), Research and evidence based dementia care (1), Leadership in transforming dementia care (1), and finally no package included the subject of pharmacological interventions in dementia care.

Insert Table 1 here.

Impact of training on staff confidence

With regards to staff confidence, scores ranged from 11 to 45 (highest possible score is 45), with an average score of 35.31 (SD = 7.64). The final hierarchical model (F = 4.13, p < .001) accounted for 29% of the variance in staff confidence. Pedagogical factors accounted for 11%, staff characteristics accounted for 10% of the variance, and content variables accounted for 8% of the variance in staff confidence. Only staff characteristics were found to significantly determine variance in staff confidence. Those who were older in age, had more than one year experience and were either clinical (qualified or non qualified) or management level staff were more likely to have high levels of staff confidence. Staff confidence hierarchical regression results are presented in Table 2.

Insert Table 2 here.

Impact of training on attitudes (knowledge)

Participant scores ranged from 12-56 (highest score possible is 70) with regards to the knowledge subscale from the O'Connor Attitude measure, with an average score of 51.68 (SD = 5.08). The final hierarchical regression model accounted for 22% of the variance in staff attitudinal knowledge (F = 3.80, p < .01). Content variables accounted for 11% of the variance, pedagogical variables accounted for 8% and staff characteristics accounted for 3% of the variance in staff attitudinal knowledge. Similar variables accounted for a significant amount of variance in staff attitudinal knowledge as they did factual knowledge: older age, having more than two years of experience in role, face to face delivery of training, mentoring, simulation based training, and completion of tier two training. Again, those who had completed health and wellbeing, and families and carers as partners in dementia care accounted for lower levels of staff attitudinal knowledge. Attitudinal knowledge hierarchical regression results are presented in Table 3.

Insert Table 3 here

Impact of dementia training on staff knowledge

The knowledge scores for the overall sample ranged from 7.5 to 16 (out of a potential score of

21) and the average score achieved was 13.80 (SD = 1.86). The final hierarchical model

accounted for 18% of the variance in staff knowledge (F = 2.77, p <.01). That is only 18% of

staff knowledge is accounted for by the variables entered into the model. Content variables

accounted for 8%, staff characteristics accounted for 6% of the variance, pedagogical variables

accounted for 4% of the variance in staff knowledge. An examination of the co-efficients

suggests older age and having more than two years of experience in role were variables that

accounted for a significant amount of variance in staff knowledge. Having completed either face

to face delivery of training, e-learning, or simulation based training, training which covered a

higher number of learning outcomes across the Framework, and completion of tier one training

had a larger impact on staff knowledge. Interestingly those who had only completed subjects

covering health and wellbeing, and families and carers as partners in dementia care had lower

levels of staff knowledge. Those who had completed leadership subjects in addition to other

subjects demonstrated higher levels of knowledge. Knowledge hierarchical regression results are

presented in Table 4.

Insert Table 4 here

Impact of training on attitudes (staff comfort)

Attitude (with regards to comfort levels) scores ranged from 12-56 (highest possible

score is 70) with an average score of 51.51 (SD = 5.08). The final hierarchical regression model

(F = 2.11, p < .01) accounted for 14% of the variance in how comfortable staff perceived

themselves to be in delivering dementia care. Pedagogical variables accounted for 7%, content

variables accounted for 4% of the variance and staff characteristic accounted for 3% of the

variance in staff comfort levels. Significant determinants of staff comfort included: ethnicity (being white British), face to face delivery of training, e learning, number of courses attended, and completion of tier three training. Those who had completed health and wellbeing training again had lower levels of comfort, however, those who had completed equality and diversity training were found to have higher levels of comfort. Attitude (comfort) hierarchical regression results are presented in Table 5.

Insert table 5 here.

DISCUSSION

The purpose of this study was to establish the impact of dementia education and training on the knowledge, attitudes and confidence of health and social care staff. The findings suggest that dementia education and training in general has limited impact on the knowledge, attitudes and confidence of health and social care staff. Although the final regression models including staff characteristics, pedagogical factors and training content variables were statistically significant, they accounted for less than 30% of the variance in staff outcomes, suggesting other factors beyond dementia education and training have greater impact on staff knowledge, attitudes and confidence. The literature suggests there are a range of factors that may also influence staff feelings of confidence and competence to deliver dementia care these include 1) organizational climate and factors [29] for example, the provision of practical support to implement care practices [30,32], promotion of staff autonomy and trust [30] and how the organization supports implementation of training into practice and the delivery of good dementia care [31]; 2) individual factors [29] for example staff burnout [30] and staff attitudes (more positive attitude and intentions to implement PCC lead to greater confidence) confident [33].

The final models indicated that experience was an important influencing factor, with older staff age and longer time in role, being important determinants of staff knowledge, attitudes and confidence. With regards to pedagogical factors, training courses that made use of face to face teaching, with a combination of simulation based learning or e learning, were the most likely to have an impact on staff outcomes. Training content (learning outcomes) was found to have limited impact on staff outcomes, completion of tier one dementia education and training was most impactful for staff knowledge as measured by the KIDE [23], tier two training was most impactful on staff attitudes and tier three was associated with greater staff confidence. This suggests the 'Tiers' are fulfilling their goals with higher learning leading to reflection, attitudinal change and confidence. The results also suggest that whilst training content variables such as learning outcomes are important when attempting to improve staff knowledge, more consideration should be given to pedagogical factors when training is aiming to improve staff attitude and confidence.

Smith et al. [22] report that approximately 70% of dementia education and training programmes meet only the Tier one learning outcomes as set out by Dementia Core Skills Framework [9], and less than 40% met the requirements for Tier two and Tier three. The findings from the current study suggest that Tier 2 and Tier 3 training is required to develop a dementia care workforce that fosters positive attitudes and is confident in providing high quality dementia care. However, this may also be confounded by experience and contact with people living with dementia. That is the positive attitude and confidence may be due to experience as opposed to the level of training.

The findings of this study echo findings of previous studies reporting some positive but limited impact of dementia education and training on staff outcomes [10-17]. However much

past research has focused on specific training programmes with an emphasis on the learning outcomes of the training programme. Whilst the current results suggest that there was a limited impact on staff outcomes as a result of training, this may be due to the included training programmes being primarily focused on learning outcomes and subjects rather than on pedagogical factors. The results suggest that for training to be impactful beyond staff knowledge development, pedagogical factors, such as mode of delivery, need to be considered. The results demonstrate that the most impactful training programmes were those that were delivered face to face with some form of simulation based learning, mentoring and or e-learning. These findings are in-line with those reported by Surr et al. [21] in their systematic review. The review highlighted that the most effective dementia education and training packages were those that were delivered face to face by an experienced trainer, included practice based learning underpinned by theory and clear guidelines for clinical practice. The review highlighted the difficulty of establishing a single effective training programme for a diverse care workforce. We echo those observations as the current findings suggest that diverse pedagogical and subject content factors were of importance for staff at varying levels of experience.

The findings of the current study should be interpreted with caution. The main limitation of the study is the homogenous staff sample who were mainly older, white British women, who had worked in clinical roles for over 10 years. This limits the generalisability of the findings to the dementia care workforce, who are considered to be heterogeneous. The survey had a low response rate which may have been due to organisations not being able to reach relevant staff, due to staff either moving away or the organisation not keeping a record of who had completed the training. The survey was only available in the English language and was also reported to be lengthy to complete, potentially further limiting responses from participants from diverse backgrounds. The survey utilised measures that had previously been used within specific settings

such as acute care. This may have had an impact on the results but it is worth noting that the measures continued to demonstrate good reliability despite being used in diverse settings. Furthermore, the design of the study limited the possibilities of controlling for all possible confounding factors, due to a small sample size and a large number of independent variables. It was not possible to explore interactional effects via structural equation modelling or multi-level modelling due to the limited sample of respondents. Findings related to impact on staff confidence should also be interpreted with caution as a ceiling effect was observed. A further limitation is that we were unable to obtain collection of outcome data pre- and post-training and therefore, it is not possible to determine whether staff knowledge, attitudes and skills were a direct result of attendance at the reported dementia education or training programme.

Despite the above limitations, a large enough sample of staff was recruited to explore the impact of training and the features of impactful training. The findings have clear implications for all health and social care staff who are required to undergo some form of dementia education and training. The study also has implications for policy makers and training commissioners. It is a requirement of the National Dementia Strategy [6] to develop an informed dementia care workforce. This study suggests that training providers and commissioners need to move beyond subject learning outcomes and also consider pedagogical factors and depth of education to have a truly significant impact on staff attitudes and confidence. Further research is required to establish the specific needs of distinct health and social care staff for example the training needs of working in acute hospital care will differ from those working in care home settings. A targeted approach is required whereby health care professionals have access to strong Tier 2 and Tier 3 training which is relevant to their role.

In general, the findings of this study suggest that currently dementia education and training

has some limited impact on the knowledge, attitudes and confidence of health and social care

staff. The pedagogical factors of training such as mode of delivery are important in ensuring

training is effective in changing attitudes and confidence as well as staff knowledge. Dementia

education and training providers/commissioners should consider staff characteristics and

pedagogical factors as well as subject content/learning outcomes when providing dementia

education and training to the dementia care workforce.

AUTHOR CONTRIBUTIONS:

SP: Co-led the survey work package with SS. SP was involved with study conception, study

design, led data analysis and authored the manuscript.

SS: Co-led the survey work package with SP, was involved with study conception, design and

provision of editorial input into the manuscript.

CS: CSs developed and disseminated survey materials, contributed to data management and

editorial input into the manuscript.

JO contributed to design, data interpretation and provision of editorial input into the manuscript.

AC led the involvement of experts by experience, contributed to the design of the study and

provided editorial input into the manuscript.

AD is an expert by experience who was involved with all aspects of this study.

CAS: Was Chief Investigator and contributed to study conception, design, data interpretation and

provision of editorial input into the manuscript.

ACKNOWLEDGMENTS:

We would like to acknowledge and thank all the organisations and individuals that supported this

study. We would also like to acknowledge Ms Michelle Drury for supporting survey

dissemination.

DATA SHARING STATEMENT: Data may be made available from the authors upon

reasonable request.

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Table 1. Demographic characteristics of health and social care staff included in the study

Characteristic	Sub Characteristic	N	Percentage
Gender	Male	63	11.39
	Female	489	88.4
Ethnicity	White British	552	94.4
	Pakistani	2	0.4
	Indian	5	0.9
	Black African/Caribbean	6	1.1
	Mixed ethnicity	7	1.3
	Arab	1	0.2
	Not stated	4	0.7
Age	18-24 years	27	4.9
	25-29 years	42	7.6
	30-34 years	45	8.1
	35-39 years	55	9.9
	40-44 years	60	10.8
	45-49 years	89	16.1
	50-54 years	102	18.4
	55-59 years	87	15.7
	60-64 years	29	5.2
	65 years and over	15	2.7
Role	Ancillary/clerical	39	7.1
	Unqualified clinical/care	108	19.5
	Qualified clinical	194	35.1
	Unit/facility manager	26	4.7
	Senior manager	65	11.8
	Other	121	21.9
Time in role	Less than 1 years	15	2.7
	1-2 years	45	8.1
	3-4 years	50	9
	5-9 years	94	17
	10-19 years	141	25.5
	20 and over years	197	35.6

Table 2. Summary of hierarchical regression to establish impact of staff characteristics, training content and pedagogical factors on staff confidence.

Variables	B	SE	Beta (Standardised)	P value
Female	1.588	.974	.068	.104
Age	-.405	.157	-.124	.010
Ethnicity (white British)	-.068	.195	-.014	.729
Less than 1 year experience	-3.991	1.965	-.089	.043
1-2 years	-1.906	1.340	-.071	.156
3-4 year	-2.027	1.270	-.078	.111
5-9 years	-.533	.999	-.027	.594
10 plus years	-.213	.842	-.012	.801
Role: Ancillary	-3.823	1.349	-.133	.005
Role: Clinical	.852	.934	.045	.362
Role: Manager	1.606	1.569	.044	.307
Role: Senior manager	-.209	1.121	-.009	.853
Role: Other	-2.317	.953	-.127	.015
Course length	.012	.029	.021	.688
Face to face learning	1.547	8.071	.049	.848
E learning	4.581	4.626	.144	.323
Mentoring	1.861	1.578	.105	.239
Simulation	4.508	3.418	.290	.188
Completion: 1-2 years ago	.416	.714	.026	.560
More than 3 years ago	-.442	1.350	-.014	.743
Number of courses	.860	.863	.056	.319
Number of learning outcomes	.015	1.165	.001	.990
Number of subjects	.113	.127	.381	.371
Tier	-1.617	2.326	-.381	.487
Awareness	-1.465	4.775	-.099	.759
Diagnosis	-.151	6.105	-.010	.980
Communication	4.147	7.355	.153	.573
Health and wellbeing	.158	2.956	.006	.957
Living well with dementia	-2.670	4.961	-.101	.591
Families	.437	7.181	.028	.951
Equality	-6.774	4.572	-.289	.139
Law	5.218	8.768	.131	.552
Leadership	.972	2.726	.048	.722

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Table 3. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff knowledge (attitude sub-scale).

Variables	B	SE	Beta (Standardised)	P value
Female	1.047	.705	.065	.138
Age	-.236	.114	-.105	.038
Ethnicity (white British)	-.024	.141	-.007	.866
Less than 1 year experience	-3.637	1.421	-.117	.011
1-2 years	-2.010	.970	-.108	.039
3-4 year	-.871	.919	-.048	.344
5-9 years	-.337	.723	-.024	.641
10 plus years	-1.008	.609	-.084	.099
Role: Ancillary	.926	.976	.047	.343
Role: Clinical	.556	.675	.042	.411
Role: Manager	1.391	1.135	.056	.221
Role: Senior manager	.121	.811	.008	.881
Role: Other	-.701	.690	-.055	.310
Course length	-.014	.021	-.037	.505
Face to face learning	12.535	5.837	.570	.032
E learning	1.667	3.346	.076	.619
Mentoring	3.293	1.141	.269	.004
Simulation	12.247	2.472	1.139	.000
Completion: 1-2 years ago	-.587	.517	-.052	.257
More than 3 years ago	.353	.976	.017	.718
Number of courses	.869	.624	.082	.165
Number of learning outcomes	-.131	.842	-.011	.876
Number of subjects	.115	.092	.558	.211
Tier	-1.078	1.682	-.367	.522
Awareness	-8.951	3.454	-.877	.010
Diagnosis	4.185	4.416	.395	.344
Communication	8.549	5.319	.456	.109
Health and wellbeing	-2.785	2.138	-.162	.193
Living well with dementia	-13.959	3.588	-.761	.000
Families	3.542	5.194	.332	.496
Equality	-10.931	3.307	-.675	.001
Law	-2.710	6.342	-.098	.669
Leadership	2.341	1.971	.166	.236

Table 4. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff knowledge.

Variables	B	SE	Beta (Standardised)	P value
Female	.368	.262	.063	.161
Age	-.125	.042	-.154	.003
Ethnicity (white British)	-.011	.052	-.009	.839
Less than 1 year experience	-1.147	.528	-.102	.030
1-2 years	-1.272	.360	-.190	.000
3-4 year	-.174	.341	-.027	.610
5-9 years	-.472	.269	-.095	.079
10 plus years	-.534	.226	-.124	.019
Role: Ancillary	.031	.363	.004	.932
Role: Clinical	.099	.251	.021	.692
Role: Manager	.391	.422	.043	.354
Role: Senior manager	.053	.301	.009	.860
Role: Other	-.209	.256	-.046	.416
Course length	.002	.008	.016	.779
Face to face learning	-5.640	2.169	-.712	.010
E learning	2.489	1.243	.314	.046
Mentoring	-.056	.424	-.013	.896
Simulation	3.461	.919	.893	.000
Completion: 1-2 years ago	-.118	.192	-.029	.540
More than 3 years ago	.567	.363	.074	.119
Number of courses	-.151	.232	-.040	.514
Number of learning outcomes	.003	.313	.001	.991
Number of subjects	.071	.034	.956	.038
Tier	-.984	.625	-.930	.116
Awareness	-4.377	1.283	-1.190	.001
Diagnosis	2.493	1.641	.653	.129
Communication	-.510	1.977	-.076	.796
Health and wellbeing	.651	.794	.105	.413
Living well with dementia	-4.510	1.333	-.682	.001
Families	2.932	1.930	.763	.129
Equality	-2.896	1.229	-.496	.019
Law	-4.350	2.356	-.438	.066
Leadership	1.205	.733	.237	.101

Table 5. Summary of hierarchical regression to establish impact of staff characteristics,

training content and pedagogical factors on staff comfort (attitude sub-scale).

Variables	B	SE	Beta (Standardised)	P value
Female	-.792	.810	-.045	.328
Age	.017	.130	.007	.896
Ethnicity (white British)	.369	.162	.105	.023
Less than 1 year experience	1.368	1.632	.040	.403
1-2 years	-.289	1.114	-.014	.795
3-4 year	-.920	1.055	-.047	.384
5-9 years	-.031	.830	-.002	.970
10 plus years	-.572	.700	-.044	.414
Role: Ancillary	-.160	1.121	-.007	.887
Role: Clinical	-.305	.776	-.021	.694
Role: Manager	-1.040	1.304	-.038	.425
Role: Senior manager	-.544	.932	-.031	.560
Role: Other	.822	.792	.060	.300
Course length	-.007	.024	-.016	.779
Face to face learning	-16.595	6.706	-.693	.014
E learning	-7.606	3.844	-.317	.048
Mentoring	1.597	1.311	.120	.224
Simulation	-3.883	2.840	-.331	.172
Completion: 1-2 years ago	.790	.593	.064	.184
More than 3 years ago	.000	1.122	.000	1.000
Number of courses	-1.111	.717	-.096	.122
Number of learning outcomes	2.333	.968	.186	.016
Number of subjects	-.165	.105	-.736	.118
Tier	2.107	1.932	.659	.276
Awareness	10.642	3.968	.957	.008
Diagnosis	-4.585	5.073	-.397	.367
Communication	6.454	6.111	.316	.291
Health and wellbeing	-3.009	2.456	-.161	.221
Living well with dementia	11.148	4.122	.558	.007
Families	-8.726	5.967	-.751	.144
Equality	.868	3.799	.049	.819
Law	15.096	7.286	.502	.039
Leadership	-2.011	2.265	-.131	.375

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	Page 1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	Page 1
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	#3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	#4	Present key elements of study design early in the	Page 5

		paper		
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	Page 6
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	Page 6
Bias	#9	Describe any efforts to address potential sources of bias	Page 7
Study size	#10	Explain how the study size was arrived at	Page 7
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	Page 7
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	Page 7
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	Page 7
Statistical methods	#12c	Explain how missing data were addressed	Page 7
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	NA
Statistical methods	#12e	Describe any sensitivity analyses	NA

Results

Participants	[#13a](#)	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	
Participants	[#13b](#)	Give reasons for non-participation at each stage	NA Reasons for non participation were not collected
Participants	[#13c](#)	Consider use of a flow diagram	NA
Descriptive data	[#14a](#)	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	Page 9
Descriptive data	[#14b](#)	Indicate number of participants with missing data for each variable of interest	Number of participants included in all analysis Page 10 onwards
Outcome data	[#15](#)	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	Page 10
Main results	[#16a](#)	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 10
Main results	[#16b](#)	Report category boundaries when continuous variables were categorized	Page 8/9/10
Main results	[#16c](#)	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	[#17](#)	Report other analyses done—e.g., analyses of	NA

subgroups and interactions, and sensitivity analyses

Discussion

Key results	[#18](#)	Summarise key results with reference to study objectives	Page 11
Limitations	[#19](#)	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	Page 13
Interpretation	[#20](#)	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	Page 13
Generalisability	[#21](#)	Discuss the generalisability (external validity) of the study results	Page 13

Other Information

Funding	[#22](#)	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 1

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