field of suicide research, as it offers the potential to listen to the voice of the individual at a critical time prior to death. Clearly, the length of the interval between the last call and the date of death will be a significant factor in selecting those calls which could benefit from examination. A formal analysis of such calls made within a defined time frame using qualitative research methods may provide valuable clues to the caller’s mental state at the time of the call and offer the potential to develop improvements in service response to such callers.

Acknowledgements

We thank the coroners in Hampshire and the Isle of Wight; Anna Walker (formerly Mental Health Lead at NHS Direct, Hampshire) who acted as liaison between NHS Direct and the University of Southampton Mental Health Group and who, with the assistance of Caren Sargent (nurse advisor), matched the names provided by the coroner to records in the NHS Direct database; the NHS Direct Mental Health Team and all other staff at NHS Direct for providing valuable feedback on the preliminary drafts.

Declarations of interest

None.

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Evaluation of an integrated weight management and fitness programme in a high-security psychiatric setting

AIMS AND METHODS

To evaluate a new integrated weight management and fitness service for long-stay psychiatric patients who were obese or overweight with physical health risks. Body size and fitness were measured before and after each 10- to 12-week programme.

RESULTS

The number of patients referred to the programme was 145; 102 were accepted, 95 started a programme and 46 completed it. Analysis was by intention-to-treat. There were significant reductions in weight (P=0.001), body mass index (BMI, P=0.001) and waist size (P=0.001), and considerable improvements in hand strength (left hand, P=0.03; right hand, P=0.015), flexibility (P=0.022), lung function (P=0.001) and aerobic capacity (P=0.001).

CLINICAL IMPLICATIONS

An integrated programme of weight management and fitness is effective in reducing body weight and waist size, and in improving physical fitness in long-stay psychiatric patients. The long-term effect on patient’s health and fitness needs to be monitored and strategies are needed to reduce patient withdrawal.

Obesity is a serious health risk which increases premature mortality and the incidence of diseases such as type 2 diabetes mellitus, cerebrovascular accidents, hypertension, coronary heart disease, arthritis and some forms of cancer. Central deposition of adipose tissue further increases health risk (Lean et al, 1995). Dietary modification and physical activity are key components of weight management programmes (National Institute for Health and Clinical Excellence, 2006; Swanton & Frost, 2007); physical exercise reduces the risk of weight gain, obesity, cardiovascular disease, diabetes and some forms of cancer (Department of Health, 2004).

Obesity contributes to the increased morbidity and premature mortality already known to occur in psychiatric patients (Harris & Barraclough, 1998). Side-effects of psychotropic medication, including weight gain (Gentile, 2006), may also increase physical health risks (Ray et al, 2001; Enger et al, 2004; Joukkamaa et al, 2006).

A survey at Rampton Hospital (Cormac et al, 2005) found high rates of obesity, large waist size and a mean...
increase of weight since admission of 10.62 kg in men and 12.74 kg in women. All patients in Rampton Hospital have complex mental health problems and many have physical comorbidities. In a high-security hospital, access to exercise is limited by restrictions on patient freedom of movement, whereas meals and snacks are provided by the hospital catering service and other food can be purchased from the patients’ shop.

As part of a wider initiative to improve the physical health of psychiatric patients, a weight management and fitness programme was developed at Rampton Hospital to treat patients who were obese or overweight with health risks. The programmes were delivered three times per year, for 10–12 weeks, and consisted of education on weight management and exercise sessions.

Method
Health and fitness indicators were evaluated before and after each programme. The research ethics committee was consulted to confirm that this was a service evaluation and not a research project.

Staff
With a grant of £250,000 from the National Health Service Modernisation Monies, we recruited hospital staff on temporary secondment and formed a ‘healthy lifestyle team’. The team members were a healthy lifestyle instructor (a member of staff with a catering background), three and a half full-time equivalent fitness instructors (three technical instructors and a half-time nursing assistant), security staff, a psychology assistant and an administrator. A consultant forensic psychiatrist (I.C.) led the team with part-time support from a dietician (S.H.), a health promotion nurse and a nurse manager.

Recruitment
Patients were eligible to enter a programme if they were obese or overweight with comorbidities, such as diabetes and hypertension. They were referred to the service by their clinical team who provided information about the patients’ current mental state and capacity to participate. Data were collected by the healthy lifestyle team on patients’ demographics, physical and mental health, past medical history and risk factors.

Patients who agreed to join a programme underwent a structured health and fitness assessment and those accepted were offered a place on the next available programme. They were free to leave the programme at any stage.

On each programme, patients were assigned to groups according to their clinical directorate, which enabled the team to present educational material in the most effective way and to generate peer support. Attendance to at least five educational sessions was considered completion of a programme. Patients could attend subsequent programmes, with the agreement of their clinical team and the healthy lifestyle team.

Education sessions
The dietician developed the educational component and trained the healthy lifestyle instructor, who conducted the weekly education sessions. These provided general information on healthy eating, an introduction to nutrition and The Balance of Good Health (British Nutrition Foundation, 1998), with practical advice on portion size and choosing healthy options from the hospital menu and shop. The sessions were tailored to the intellectual abilities of the patients and motivational techniques were used, such as personal goal setting and praise. The team also used visual and educational aids, replica foods and sports equipment such as exercise balls and badminton racquets.

Fitness sessions
The fitness instructors combined many types of exercises to achieve weight loss and improve body shape, strength and flexibility. Each patient had to take part in a weekly, 1-hour fitness session combined with a weight management education session, plus an optional additional 1-hour fitness session. Activities were tailored to individual patient’s fitness levels and included swimming, guided walking, indoor curling, aerobics, activities with exercise balls, circuit training, badminton and volleyball.

During fitness sessions, the instructors observed the patients closely for signs of overexertion and distress. Fitness measures were applied to assess the impact of the programme and also to provide positive feedback to the patient and to strengthen their motivation. The following measures are widely used on the general population by fitness professionals.

Outcome measures
At the beginning and end of each programme we took measurements of: body mass index (BMI), waist size, resting heart rate, blood pressure, hand strength (left and right hand), flexibility (using the sit-and-reach box), peak expiratory flow, and aerobic capacity (measured with a heart-rate monitor during a sub-maximal test on an exercise bicycle). Hand strength and flexibility are indicators of general fitness and aerobic capacity is an indicator of cardiovascular fitness. Weight was also measured weekly to assist in setting goals for the patients and a mid-term fitness assessment was offered, but these data are not reported here. Fitness assessments were not undertaken if the patient had a significant health risk such as unstable angina.

Analysis
Statistical analysis was carried out on an intention-to-treat basis, using the measurements data from patients accepted on a programme for the first time. When patients dropped out of the programme, their last results were treated as ‘end of evaluation’ results. The Wilcoxon matched pairs signed-rank test was used and all statistical tests were two-tailed.
Results

Recruitment and attrition

Four programmes were run sequentially for 10–12 weeks' duration. A total of 145 referrals were made to the programmes. One hundred and two patients were accepted, 95 patients started a programme and 46 completed five or more sessions. Twenty-five patients joined two programmes and eight patients joined three programmes. Results from attendance at subsequent programmes have not been reported here.

Where data were incomplete, the numbers of patients included in the analysis are given in brackets. This could happen for several reasons, e.g. patients declining to be measured or curtailment in assessment of those with significant physical risk factors (such as hypertension and severe obesity), where tests for aerobic capacity and lung function are contraindicated. Table 1 shows the recruitment and attrition rates for each clinical directorate.

The average number of the combined fitness and education sessions attended was five (s.d.=3.7, range

Table 1. Recruitment and attrition for each patient group

|                  | Male personality disorder | Male learning disability | Male mental illness | Female patients (all disorders) | All patients |
|------------------|----------------------------|--------------------------|--------------------|---------------------------------|--------------|
| Referred to programme | 39                         | 19                       | 36                 | 51                              | 145          |
| Accepted         | 25                         | 15                       | 28                 | 34                              | 102          |
| Started          | 21                         | 14                       | 26                 | 34                              | 95           |
| Completed        | 11                         | 13                       | 15                 | 7                               | 46           |

Table 2. Mean baseline measures for each patient group before a programme

|                          | Male personality disorder | Male learning disability | Male mental illness | Female patients (all disorders) | All patients |
|--------------------------|----------------------------|--------------------------|--------------------|---------------------------------|--------------|
| Weight, kg (n=83)        | 109.8                      | 90.3                     | 105.2              | 106.9                           | 104.1 (22.46)| 69–178       |
| BM1, kg/m² (n=72)        | 32.7                       | 30.0                     | 33.1               | 39.2                            | 34.0 (6.08)  | 24–56        |
| Waist size, cm (n=50)    | 115.8                      | 106.4                    | 114.3              | 127.5                           | 115.6 (13.35)| 96–153       |
| Resting heart rate, bpm (n=79) | 81.3                      | 79.0                     | 86.1               | 87.2                            | 83.7 (12.15)| 60–109       |
| Systolic BP, mmHg (n=50) | 126.9                      | 122.4                    | 126.4              | 121.4                           | 124.5 (14.96)| 76–157       |
| Diastolic BP, mmHg (n=50) | 77.7                       | 76.2                     | 80.1               | 81.7                            | 78.9 (10.56)| 47–100       |
| Strength right hand, kg (n=76) | 38.2                      | 34.9                     | 38.4               | 23.1                            | 34.9 (13.1) | 14–79        |
| Strength left hand, kg (n=76) | 38.4                      | 33.3                     | 38.2               | 23.5                            | 34.6 (11.6) | 14–63        |
| Flexibility, cm (n=68)   | 12.9                       | 15.2                     | 12.8               | 14.4                            | 13.6 (7.8)  | 3–34         |
| Peak expiratory flow, l/min (n=77) | 523.7                      | 470.7                    | 561.4              | 436.0                           | 510.0 (99.2) | 200–680 |
| Aerobic capacity level¹ (n=44) | 14                        | 9                        | 7                  | 11                              | 10 (7.8)    | 1–29         |

BMI, body mass index; BP, blood pressure.
1. Beginner: 1–10; intermediate: 11–20; athlete: 21–30.

Table 3. Difference between the means at the end of the programme and at baseline with statistical significance of change for all patients

|                          | Male personality disorder | Male learning disability | Male mental illness | Female patients (all disorders) | All patients |
|--------------------------|----------------------------|--------------------------|--------------------|---------------------------------|--------------|
| Weight, kg (n=83)        | –1.0                       | –1.0                     | –2.0               | –1.0                            | –1.3 (0.7, 1.9)**   |
| BM1, kg/m² (n=72)        | –0.9                       | –1.0                     | –0.7               | +0.2                            | –0.6 (0.6, 1.1)**    |
| Waist size, cm (n=50)    | –1.8                       | –1.7                     | –2.7               | –1.3                            | –2.0 (0.9, 3.0)**    |
| Resting heart rate, bpm (n=79) | –1.3                       | +7.9                     | +1.2               | –0.9                            | +1.4 (–3.8, 0.9)    |
| Systolic BP, mmHg (n=50) | –0.1                       | +0.9                     | +1.7               | –0.1                            | +0.2 (–2.9, 2.6)    |
| Diastolic BP, mmHg (n=50) | +2.1                       | –1.9                     | –3.8               | –0.2                            | –0.8 (–2.5, 3.9)    |
| Strength right hand, kg (n=76) | +1.8                       | 0.0                      | +3.0               | +1.7                            | +1.8 (0.3, 3.3)**    |
| Strength left hand, kg (n=76) | +2.1                       | +0.3                     | +3.0               | +0.1                            | +1.7 (0.5, 2.9)**    |
| Flexibility, cm (n=68)   | +1.1                       | +0.8                     | +0.9               | +0.5                            | +0.9 (0.1, 1.6)**    |
| Peak expiratory flow, l/min (n=77) | +26.3                      | +11.3                    | +19.6              | +20.7                           | +19.9 (9.6, 30.1)**  |
| Aerobic capacity level¹ (n=44) | +3                        | +6                       | +6                 | +4                              | +4 (2.2, 6.2)**    |

BMI, body mass index; BP, blood pressure.
¹. Beginner: 1–10; intermediate: 11–20; athlete: 21–30.
*P<0.05; **P<0.005; ***P<0.001.
Discussion

We have established that patients in a long-stay psychiatric hospital with chronic mental disorders will voluntarily participate in weight and fitness management programmes to their health benefit. Our findings show clinical improvements of weight loss and reduced BMI, reduction in waist size and improved fitness measures (increase in hand strength, flexibility, peak expiratory flow and aerobic capacity). The benefits from weight loss, reduction in waist size and greater aerobic capacity may lessen cardiovascular health risks and prevent the development of cardiac disease and diabetes.

There were problems with adherence to the programmes, which lowered the overall effectiveness. Patients who left their programme early did not necessarily wish to be measured or have a fitness assessment. Male patients responded better to the programme than female patients who had higher rates of withdrawal. Although there are no data on the reasons for these different attitudes, female patients tend to have more complex mental health problems and are generally more obese, which may impact on recruitment and retention. Male patients with learning disability had the lowest rates of withdrawal. Further investigation is needed into gender and diagnostic category differences and whether there is seasonal variation in effectiveness of the programme. We need to establish whether the programmes are effective in the long-term and whether improvements are sustained.

This service was expensive to design, develop and run with the cost of staff salaries and the purchase of equipment. The cost was in excess of £250 000 in the first year of operation with savings of £15 000 in the second year. We did not attempt to quantify the potential savings resulting from reduced patient morbidity as a result of the programme.

We acknowledge that staff commitment, enthusiasm and training were important factors in the success of the service. We had expected that the best achievable outcome would be stabilisation of weight for most patients so the improvements in weight loss and fitness were very encouraging. Such fitness and weight management programmes could be adapted for use in the community, day-hospital and other in-patient settings to improve the physical health of a wide range of people with mental disorders and learning disability.

Declaration of interest

None.

Acknowledgements

This programme was funded by Rampton Hospital as part of a £250 000 NHS Modernisation Fund allocation, extended for a second year.

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