Research paper

Characteristics of patients receiving district-nursing assistance for anticoagulant therapy: A descriptive cohort study

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ABSTRACT

Background: Changes between health sectors and contact with multiple professionals are indisputable conditions for many frail elderly patients in anticoagulant therapy. This constitutes a risk factor. We aimed to describe the characteristics of patients receiving district-nursing assistance for their anticoagulant therapy in two Danish municipalities, with a specific focus on the complexity related to the number of professionals involved, number of hospital admissions, polypharmacy and co-morbidity.
Method: We performed a descriptive cohort study of patients receiving district-nursing assistance for their oral anticoagulant therapy. Data were retrieved from municipal patient records and validated by district nurses.
Results: The cohort included 467 patients; 44.8% were men, 54.2% were women; their mean age was 81.1 years. Four out of five lived in their own home, the remaining lived in nursing homes or comparable facilities. During the inclusion period, 46.7% had no hospital admissions, whereas 10.1% had three or more admissions. Besides anticoagulant therapy, 96,6% of the patients received more than three medications. We found an increased mean age among mentally impaired individuals with more than three additional medications and for whom the indications for anticoagulant therapy was stated as unknown, compared to the total sample.
Conclusion: Danish patients in anticoagulant therapy who receive district-nursing assistance related to the therapy are characterized by physical and mental frailty, polypharmacy, multiple readmissions, multiple sector shifts, and multiple health professionals involved in single patient pathways.
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1. Background

Changes between health sectors and contact with multiple health professionals are indisputable conditions for many frail elderly patients [1], including those in anticoagulant therapy with a vitamin K antagonist (VKA).

A distinctive feature of anticoagulant therapy is a narrow therapeutic range, requiring an extraordinary high level of professional monitoring and attention [2,3].

Studies have shown neither patient age [4] nor formal education to be associated with the quality of anticoagulant therapy [5], while an association between less time in therapeutic range [5] and polypharmacy[1] has been demonstrated. Domiciliary

monitoring reduces time in therapeutic range, compared to monitoring by general practitioner (GP) or in hospital [6].

Hospital discharge is known to entail a risk of adverse drug events (ADEs), with polypharmacy, anticoagulant therapy and monitoring problems as the most frequent issues [7]. Insufficient communication due to the low continuity of care that is associated with multiple sector shifts, in combination with the high number of professionals involved in the treatment, has been found to constitute a further risk factor for ADEs [8–11]. A study of automated dose dispensing has shown that GPs and community pharmacies were notified of changes in drug dispensing in only 13.6% of cases [12].

Elderly and vulnerable patients in long-term anticoagulation therapy encounter many difficulties in relation to managing treatment with frequent blood testing and changes in dosage; often having to rely on their equally vulnerable spouses for support [13].

The complexity and lability of anticoagulant therapy and a fear of adverse advents may result in under-treatment, in particular of

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[1] Polypharmacy defined by the WHO as "*the administration of many drugs at the same time or the administration of an excessive number of drugs*", http://www.who.int/medicines/areas/rational_use/en/.

elderly patients [14], despite the strong association between anticoagulant therapy and reduced mortality [15] and the fact that the greatest risk of warfarin-related bleeding is dependency rather than age [4].

Both patient- and system-associated solutions may be needed to ensure medication safety [16]. A stronger focus on socioeconomic factors, collaboration and patient education is recommended in anticoagulant treatment [17], as successful outcomes rely on the patient's compliance, effective communication and knowledge of the patient's home environment [18].

As a better understanding of the true level of complexity experienced by these patients is required, this study aimed to describe the characteristics of the most vulnerable group of patients receiving district-nursing assistance to manage their anticoagulant therapy. We were particularly interested in mapping the complexity associated with the number of health care professionals involved, the number of hospital admissions, polypharmacy, and co-morbidity.

2. Methods

We performed a descriptive cohort study of all patients receiving district-nursing assistance for their oral anticoagulant therapy in two Danish municipalities (coded A and B) between December 2013 and December 2014. Data were collected retrospectively in December 2014, using web-based database software (SurveyXact.dk).

2.1. Sample

The patients resided in either of the two included municipalities and received district-nursing assistance related to their anticoagulant therapy.

2.2. Variables

Analyses were performed on a large number of variables:

- age;
- gender;
- physical and mental ability (*impaired/not impaired*);
- indication for anticoagulant therapy;
- type of anticoagulant therapy;
- duration of anticoagulant therapy;
- frequency of monitoring;
- location of blood testing, management of anticoagulant therapy (hospital, GP clinic or hospital-based anticoagulant clinic);
- type of district assistance related to anticoagulant therapy;
- categories of health professional involved in anticoagulant therapy;
- additional pharmacotherapy;
- delivering pharmacy;
- number of hospital admissions during the 12-month inclusion period.

According to the type of district-nursing assistance in relation to the therapy, we distinguished between the dispensation of medicine (counting or preparing prescribed medicine in dosage boxes) and its administration (providing and helping the patient taking the dispensed medicine).

We developed a database, which was pilot-tested on 20 patients (ten from each municipality). This resulted in minor adjustments with no material effect on the final analyses.

Data were retrieved from municipal patient records and, if necessary, validated by district nurses. Two municipal employees entered the data were into the database; initial inter-rater disagreement was resolved during the pilot testing.

2.3. Analyses

The results are described by proportions and analysed by chi-square and Wilcoxon rank-sum testing using Stata, version 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

2.4. Ethical considerations

All participants signed an informed consent form with information on the aim of the study, the protection of privacy, and that participation was voluntary and withdrawal would have no consequences for their therapy. During entry, all data for each patient were coded by a unique number used for identification in the analyses, thus precluding identification by the researchers.

The study was approved by the Danish Data Protection Agency (no: 2008-58-0035). No further ethical approval was required according to Danish legislation.

3. Results

3.1. Population and demographics

The cohort included 467 patients, 321 and 146 from municipality A and municipality B, respectively, corresponding to approximately 2.9 per thousand of each of the two populations.

Men numbered 214 (44.8%), women 253 (54.2%), their mean age was 81.1 years, SD 9.7 (80.1 years for men, SD 8.7 and 81.9 years for women, SD 10.5). Of the included patients, 80.1% were characterized by impaired physical ability, 35.6% by impaired mental ability. A total of 80.5% lived in their own home; the remainder lived in a nursing home or a comparable municipal facility, with only minor differences for the two municipalities. In the inclusion period, 46.7% had not been admitted to hospital, while 10.1% had had three or more admissions, see Table 1.

3.2. Polypharmacy

Besides anticoagulant therapy, 96.6% of the included patients received more than three medications; 20.1% had between four and six additional medications, and 76.5% had seven or more additional medications. These medications were prepacked (automated dose dispensation) for 13.3% of the included patients.

3.3. Anticoagulant therapy

By the time of inclusion, 77.3% of the patients had been in anticoagulant therapy for more than 12 months, 96.0% had been treated with warfarin, 4% with phenprocoumon (Marcoumar©). The patients had been prescribed anticoagulant therapy for a variety of indications, such as cerebral vascular disease, heart failure or vascular disease. In 14.6% of cases, the indication for anticoagulant therapy was stated as *unknown*; details are shown in Table 2.

3.4. Managing anticoagulant therapy

Anticoagulant therapy requires frequent blood monitoring for control of the international normalized ratio (INR) and dosage adjustments (the daily number of tablets). For the studied group of frail elderly patients, management also included blood testing, medicine dispensing and administration of therapy.