Capture the fracture by SMS

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Keywords
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Schlüsselwörter
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Summary
In this observational study a SMS reminder system was tested to improve patient adherence to osteoporosis drug therapy. 399 of 1323 osteoporosis fracture patients could be documented. 66% of patients who received a SMS recommendation arranged an appointment with their primary care physician. A large proportion of the physicians followed these recommendations. As more elderly patients declined to participate, the SMS tool seems to be useful in younger seniors (<70 years).

Zusammenfassung
In dieser Beobachtungsstudie wurde ein SMS-Erinnerungssystem getestet, welches die Adhärenz von Patienten gegenüber einer medikamentösen Osteoporosetherapie verbessern soll. 399 der 1323 Patienten mit osteoporotischen Frakturen konnten dokumen
tiert werden. 66% der Patienten, die eine Erinnerung per SMS erhielten, vereinbarten einen Termin mit ihrem Hausarzt. Ein großer Anteil der Ärzte folgte den Empfehlungen. Da mehr ältere Patienten die Teilnahme ablehnten, scheint das SMS-Tool eher für jüngere Senioren (<70 Jahre) sinnvoll zu sein.

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Introduction
A lot of research in osteoporosis has been done in the last 20 years and plenty of novel therapies were introduced to the market. Although evidence based osteoporosis diagnostic and treatment algorithms were developed and smoothly adopted by the medical societies, several studies show that their adoption in daily medical practice is suboptimal (1–4).

In a large prospective Swiss survey of patients older than 50 years who presented to the emergency ward with a fragility fracture only 24% of women and 13.8% of men were subsequently appropriately treated with a bone active substance (3). A finding that is consistent with underdiagnosis and undertreatment of osteoporosis reported in other countries (4). Considering that only evidence based guidelines that are used in daily practice will eventually result in an improved outcome in terms of fracture incidence reduction, there is a large unmet need for improving physician and patient adherence to diagnostic and therapeutic recommendations.

Various different reasons from restricted access to osteoporosis drugs to a lack of osteoporosis awareness contribute to this treatment gap (5). Physicians might have different focuses in managing elderly patients with multimorbidity in primary care. Further, the wide variation in specialists involved in the care of osteoporosis fracture patients such as orthopedic surgeons, rheumatologists, endocrinologists, geriatricians and primary care physicians (PCP) may induce inconsistent patient care and a suboptimal voice to "defend" the interests of osteoporosis (5).

In the same time communication technology has developed rapidly from the first mobile phone, internet and email to smart phones with WhatsApp. The tool of SMS (short message service) text messages increased adherence to treatment in several studies such as HIV therapy, asthma and hypertension (6–9) and improved rates of healthcare appointment attendance (10). To our knowledge, no study has investigated the effect of a mobile text message in the management of osteoporosis fracture patients yet.

Aim
The aim of this study was to test if SMS is a useful tool to improve adherence to drug therapy in osteoporosis patients. We evaluated whether a mobile text message to osteoporosis fracture patients changed actions taken by the primary care physician (PCP).

Methods
The study was initiated by the Swiss Society Against Osteoporosis (SVGO). After ethical approval (KEK 2012–0047) five osteoporosis centres in Switzerland were asked to participate. Two centres (Triemlihospital Zurich and St. Gallen) agreed to include at least 100 patients over the age of 50 years with a non-traumatic fracture (inclusion criteria). After giving informed consent (exclusion criteria: no mobile phone and trauma fracture) participants were asked to provide their mobile phone numbers and to complete the nine FRAX® tool questions (11). A SMS message was sent one and two months after the fracture to the patient. The SMS message included a clear procedure instruction ac-
Table 1: Baseline characteristics of participants and non-participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>All</th>
<th>Participants</th>
<th>Non-participants</th>
<th>Two-sided P value between groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>1323 (100.0%)</td>
<td>399 (30.2%)</td>
<td>924 (69.8%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Center 2 KSSG (%)</td>
<td>148 (11.2%)</td>
<td>109 (27.3%)</td>
<td>39 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>Center 1 Triemlispital (%)</td>
<td>1175 (88.8%)</td>
<td>290 (72.7%)</td>
<td>885 (95.8%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Men (%)</td>
<td>327 (24.7%)</td>
<td>132 (33.1%)</td>
<td>195 (21.1%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Age (Median, IQR, Jahre)</td>
<td>77.0 (66.0 to 84.0)</td>
<td>66.0 (58.0 to 74.0)</td>
<td>81.0 (72.0 to 86.0)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Fracture VertFx (%)</td>
<td>251 (19.0%)</td>
<td>88 (22.1%)</td>
<td>163 (17.6%)</td>
<td>0.0568</td>
</tr>
<tr>
<td>Fracture RadiusFx (%)</td>
<td>155 (11.7%)</td>
<td>67 (16.8%)</td>
<td>88 (9.5%)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Fracture HumerusFx (%)</td>
<td>142 (10.7%)</td>
<td>35 (8.8%)</td>
<td>107 (11.6%)</td>
<td>0.1232</td>
</tr>
<tr>
<td>Fracture HipFx (%)</td>
<td>270 (20.4%)</td>
<td>55 (13.8%)</td>
<td>215 (23.3%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Fracture OtherOPFx (%)</td>
<td>384 (29.0%)</td>
<td>129 (32.3%)</td>
<td>255 (27.6%)</td>
<td>0.0755</td>
</tr>
<tr>
<td>Fracture NonOPFx (%)</td>
<td>118 (8.9%)</td>
<td>24 (6.0%)</td>
<td>94 (10.2%)</td>
<td>0.0119</td>
</tr>
</tbody>
</table>

Descriptive statistics was calculated (mean and 95% confidence interval for normally distributed variables median and interquartile range for non-normally distributed variables). Non-normality of distribution was tested by Shapiro-Wilk Test 2. Exploratory tests for statistically significant differences (significance threshold two-sided p<0.05) between post hoc defined subgroups were used. Depending on the different variables the following tests were used: Mann-Whitney U-test, Proportions with categorical/dichotomous variables: z-test.

Results

1323 fracture patients treated in centre 1 Triemlispital Zurich (n=1175, 88.8%) and centre 2 Kantonsspital St. Gallen (n=148, 11.2%) were asked to participate between January 2013 and January 2015. 924 patients refused to participate due to several reasons. 399 patients and the post fracture treatment initiated by the PCP were evaluated. Participants, median age 66 (58–74) years were significantly younger than non-participants, median age 81 (72–86) years, p<0.0001. Only a small proportion of the femoral fracture patients agreed to participate (13.8% vs 23.3%, p<0.0001). The major fractures contributed to 60% of all screened fractures (Table 1).

About 49% of patients were above the drug intervention threshold based on the current SV Go guidelines (12).

One Patient died and could not be interviewed. Data for FRAX® calculation of 10 participants was not available (Table 2).

Table 2 FRAX® scores of participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAX® Risk for Major fractures (median, IQR)</td>
<td>16.0 (10.0–26.0)</td>
</tr>
<tr>
<td>FRAX® Risk for hip fracture (median, IQR)</td>
<td>4.0 (1.5–9.3)</td>
</tr>
<tr>
<td>Frax® Treshold above (n/N, %)</td>
<td>193/398 (48.5%)</td>
</tr>
<tr>
<td>Frax® Treshold below (n/N, %)</td>
<td>195/398 (49.0%)</td>
</tr>
<tr>
<td>Frax® Treshold missing (n/N, %)</td>
<td>10/398 (2.5%)</td>
</tr>
</tbody>
</table>

Table 3 SMS-messages sent to the fracture patients according to the guidelines of the SVGo

<table>
<thead>
<tr>
<th>Variable</th>
<th>n/N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS message 1 (%)</td>
<td>51/399 (12.8%)</td>
</tr>
<tr>
<td>SMS message 2 (%)</td>
<td>196/399 (49.1%)</td>
</tr>
<tr>
<td>SMS message 3 (%)</td>
<td>108/399 (27.1%)</td>
</tr>
<tr>
<td>SMS message 4 (%)</td>
<td>24/399 (6.0%)</td>
</tr>
<tr>
<td>SMS message unknown (%)</td>
<td>20/399 (5.0%)</td>
</tr>
</tbody>
</table>

1 = We recommend no additional diagnostic procedure or drug therapy
2 = We recommend an osteoporosis assessment with densitometry and drug treatment according to guidelines
3 = We recommend anti-osteoporosis drug treatment
4 = We recommend a new evaluation of the current antosteoporotic drug therapy

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messages only 67% arranged an appointment. 33% of participants did not organize a PCP appointment, reasons for this non-compliance were not evaluated.

Subgroup analysis of the participants, who organized an appointment, documented the following results:

a) PCPs followed the recommendation “No need for osteoporosis assessment” (message 1) in 84% (27/32) of cases.

b) PCPs followed the recommendation “Need for osteoporosis assessment” (message 2) in 52% of cases.

c) PCPs followed the advice “Recommendation for antiosteoporotic drug therapy” (message 3) in 75% of cases.

d) PCPs followed the recommendation “Evaluation of the current drug therapy” (message 4) in 100% of cases.

Discussion

The aim of this Swiss study was to test if a short text message is a useful tool to improve adherence to drug therapy in osteoporosis patients. Patients who presented to the hospital with a fracture were categorized in terms of treatment necessity using the FRAX® assessment tool and the Swiss threshold guidelines (13–15). A SMS with a clear recommendation was sent to the patient and patients were interviewed about their actions and the actions of their PCP.

The study participants were significantly younger than the non-participants. One explanation might be that the non-participants were significantly older and probably not using mobile phones and SMS technology. Other SMS reminder studies in chronic diseases (hypertension, HIV, asthma) were mainly done in a younger population (7–9).

The major fractures (humerus, radius, vertebral, hip) contributed to 60% of all screened fractures, this is in line with other studies (16, 17).

One third of patients did not schedule an appointment with their PCP, reasons of which were not evaluated. The other two thirds of patients organized an appointment with their PCP. Most of the PCPs followed the recommendations.

In conclusion it would be appropriate to send the SMS not only to the patient but also to the PCP. Alternatively, treatment recommendations could be included in the discharge letter sent to the PCP. In general, treatment recommendations need an excellent cooperation and communication between the different service providers in the hospital such as orthopedic surgeons, traumatologists, rheumatologists and geriatricians. There is still an ongoing need to establish fracture liaison services (18, 19).

As some of the antiosteoporotic therapies could be given by parenteral administration, the initiation of the drug therapy could already be started in the hospital in addition to the instruction of a muscle strengthening and balance exercise program (20, 21). However, this needs the financial adaption of the fracture DRGs, which should also include the appropriate medications.

As treatment guidelines and cost effectiveness data differ from country to country, some treatment proposals could be added to the FRAX® assessment tool (22, 23).

This study has some limitations. First there was no control group by design and secondly not all elderly participants had a cell phone. This limitation restricts the feasibility to those provided with the required technology and constitutes a bias as older patients are less likely to have a cell phone but more likely to need intervention. In addition elderly patients may have cognitive deficits understanding the SMS.

This observational study shows that short and simple SMS recommendations were generally well followed by the recipient younger than 70 years and typically lead to consistent action taken by the treating physician. Therefore we think that the SMS reminder system seems to be an appropriate tool for patients younger than 70 years.

In addition our findings emphasize the importance of patient empowerment and self-involvement for driving physician behavior. This is consistent with earlier reports indicating that patients, who assumed responsibility for their bone health engaged in more health related behaviors than those who believed that somebody else is in charge (22).

Acknowledgment

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Conflict of interest

((der Publisher bitte angeben, ob ein Conflict of Interest besteht))

Compliance with ethical guidelines

((der Publisher bitte die Angaben ergänzen: ethical approval (KEK 2012–0047)))

References

11. FRAX WHO Fracture Risk Assessment Tool.
12. SVGO Osteoporose Empfehlungen.