

**Article title**

Pharmacist interventions in osteoporosis management: a systematic review

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**Online Resource 5** Complete extracted study results

Study	Participant characteristics (Sample size, age, %female)	Outcomes Measured	Results	Statistical Significance
<b>Studies targeting diagnosis and treatment</b>				
<i>Interventions: patients only</i>				
McDonough et al. [24]	<u>Sample size</u> IG: 8 pharmacies 70 participants CG: 7 pharmacies 26 participants  <u>Age (years)</u> Not reported  <u>% Female</u> IG: 74 CG: 58	A) Central BMD via DEXA B) Bisphosphonate therapy C) Estrogen therapy D) Calcium: supplement E) Calcium: reported low diet intake F) Awareness of need for bone density test G) Discussion with pharmacist GIOP Risk undertaken H) Discussion with pharmacist regarding need for DEXA	A) CG 39.2% vs IG 19.6% <sup>a</sup> B) CG 10.5% vs IG 9.1% <sup>a</sup> C) CG 0.0% vs IG 3.5% <sup>a</sup> D) CG -6.9% vs IG 17.1% <sup>a</sup> E) CG -15.0% vs IG -16.3% <sup>a</sup> F) CG 13.9% vs IG 19.3% <sup>a</sup> G) Stated as increase in both groups <sup>a</sup> H) Stated as increase in both groups <sup>a</sup>	A) Not statistically different: p-value not reported B) Not statistically different: p-value not reported C) Not statistically different: p-value not reported D) Statistically different: p-value <0.05 E) Not statistically different: p-value not reported F) Not statistically different: p-value not reported G) Not statistically different: p-value not reported H) Not statistically different: p-value not reported
Yuksel et al. [31]	<u>Sample size</u> 15 pharmacies IG: 129 participants	A) Follow-up with physician: osteoporosis specific appointment	A) CG 22/133 (17%) vs IG 45/129 (35%) B) CG 13/133 (10%) vs IG 28/129 (22%) C) CG 3/133 (2%) vs IG 6/129 (5%)	A) Statistically different: p-value <0.001 B) Statistically different (RR 2.2, 95% CI 1.2-4.1): p-value=0.011

	<p>CG: 133 participants</p> <p><u>Age (years)</u> IG: median 61 (range 56-70) CG: median 62 (range 57-71)</p> <p><u>% Female</u> IG: 62 CG: 67</p>	<p>B) Central BMD via DEXA C) Osteoporosis therapy D) Calcium: additional patients reaching RDI E) Vitamin D: additional patients reaching RDI F) Knowledge level: % answered correctly</p>	<p>D) CG 25/133 (19%) vs IG 39/129 (30%) E) CG 22/133 (17%) vs IG 24/129 (19%) F) CG 54% vs IG 57%</p>	<p>C) Not Statistically different (RR 2.1, 95% CI 0.5-8.1): p-value=0.298 D) Statistically different (RR 1.6, 95% CI 1.0-2.5): p-value=0.011 E) Not statically different (RR 1.1, 95% CI 0.7-1.9) p-value=0.66 F) Not statically different: p-value=0.31</p>
Brookhart et al. [29]	<p><u>Sample size</u> IG: 58 CG: 52</p> <p><u>Age (years)</u> IG: 53±SD11 CG: 53±SD13</p> <p><u>% Female</u> 100</p>	<p>A) Knowledge level: overall score</p>	<p>A) CG 44%<sup>b</sup> vs IG 77%<sup>b</sup></p>	<p>A) Statistically different: p-value &lt;0.001</p>
Sabna et al. [33]	<p><u>Sample size</u> IG: 14 CG: 15</p> <p><u>Age (years)</u> IG: mean 34±SD8 CG: mean 34±SD9</p> <p><u>% Female</u> 100</p>	<p>A) Central BMD via DEXA: change in spine T-score B) Central BMD via DEXA: change in Femoral Neck T-score</p>	<p>A) CG MD 0.08 ±SD 0.78 vs IG MD 0.44 ±SD 1.65 B) CG MD 0.05 ±SD 0.02 vs IG MD 0.87 ±SD 0.07</p>	<p>A) Statistically different: p-value &lt;0.01 B) Statistically different: p-value &lt;0.01</p>
Crockett et al. [27]	<p><u>Sample size</u> IG: 6 pharmacies 119 participants CG: 6 pharmacies 98 participants</p> <p><u>Age (years)</u> IG: mean 57 (range 36-78) CG: mean 58 (range 40-84)</p> <p><u>% Female</u> IG:87 CG: 83</p>	<p>A) Follow-up with physician B) Calcium: increase of intake C) Vitamin D: increase of intake</p>	<p>A) CG 3/22 (13.6%) vs IG 2/7 (28.6%) B) CG 29/38 (76%) vs IG 37/45 (82%) C) CG 4/7 (57%) vs IG 18/21 (86%)</p>	<p>A) Not statistically different: p-value not reported B) Not statistically different: p-value not reported C) Not statistically different: p-value not reported</p>

<p>McConaha et al. [28]</p>	<p><u>Sample size</u> IG: 44 CG: 43</p> <p><u>Age (years)</u> IG: mean 57 (range 44-65) CG: mean 57 (range 47-65)</p> <p><u>% Female</u> 100</p>	<p>A) Follow-up with physician B) Central BMD via DEXA C) Osteoporosis therapy D) Calcium: diet intake increased E) Vitamin D: started/increased supplement</p>	<p>A) CG 20/33 (60.6%) vs IG 20/39 (51.3%) B) CG 14/33 (42.4%) vs IG 14/39 (35.9%) C) CG 0/33 (0%) vs IG 4/39 (10.2%) D) CG 24/33 (72.7%) vs IG 28/39 (71.8%) E) CG 30/33 (90.9%) vs IG 27/39 (69.2%)</p>	<p>A) Not statically different: p-value=0.428 B) Not statically different: p-value = 0.571 C) Not statically different: p-value = 0.058 D) Not statistically different: p-value = 0.930 E) Statically different: p-value 0.024</p>
<p><i>Interventions: involving physicians</i></p>				
<p>Solomon et al. [23]</p>	<p><u>Sample size</u> IG: 222 physicians 997 participants CG: 212 physicians 976 participants</p> <p><u>Age (years)</u> IG: mean 68±SD9 CG: mean 69 ±SD8</p> <p><u>% Female</u> IG: 90 CG: 94</p>	<p>A) Central BMD via DEXA B) Osteoporosis therapy</p>	<p>Overall A) CG 86/976 (9%) vs IG 126/997 (13%) B) CG 36/976 (4%) vs IG 59/997 (6%)</p> <p>≥65-year women A) CG 81/861 (9%) vs IG 115/819 (14%) B) CG 35/861 (4%) vs IG 54/819 (7%)</p> <p>Men or women with fracture A) CG 4/95 (4%) vs IG 11/134 (8%) B) CG 1/95 (1%) vs IG 6/134 (4%)</p> <p>Men or women using glucocorticoids A) CG 19/199 (10%) vs IG 23/237 (10%) B) CG 15/199 (8%) vs IG 14/237 (6%)</p> <p>C) Adherence: median Medication Possession Ratio (MPR)<sup>f</sup> C) CG 73% (IQR 0-93%) vs IG 74% (IQR 19-93%) D) CG 79 (IQR 31-158) vs IG 85 (58-174)</p>	<p>Overall A) Statistically different: (Unadjusted RR 1.43, 95% CI 1.06-1.94, Adjusted RR 1.48 95% CI 1.08-2.04) Unadjusted p-value=0.02, Adjusted p-value 0.01 B) Statistically different (Unadjusted RR 1.60, 95% CI 1.04-2.49, Adjusted RR 1.73, 95% CI 1.09-2.75) Unadjusted P-value= 0.03, Adjusted p-value=0.02</p> <p>≥65-year women A) Statistically different (Unadjusted RR 1.49, 95% CI 1.09-2.04, Adjusted RR 1.48, 95% CI 1.07-2.04) Unadjusted p-value=0.02, Adjusted p-value 0.02 B) Statistically different (Unadjusted RR 1.67, 95% CI 1.05-2.65, Adjusted RR 1.65, 95% CI 1.04-2.62) Unadjusted p-value=0.03, Adjusted p-value=0.03</p> <p>Men or women with fracture A) Statistically different (adjusted) (Unadjusted RR 1.95, 95% CI 0.64-6.00, Adjusted RR 2.86, 95% CI 1.15-7.07) Unadjusted p-value=0.20, Adjusted p-value=0.02 B) Not statistically different (Unadjusted RR 4.41, 95% CI 0.52-37, Adjusted RR 10.67, 95% CI 0.81-141) Unadjusted p-value=0.20, Adjusted p-value=0.07</p> <p>Men or women using glucocorticoids A) Not statistically different (Unadjusted RR 1.02, 95% CI 0.57-1.82, Adjusted RR 1.05, 95% CI 0.57-1.93) Unadjusted p-value=0.9, Adjusted p-value=0.9 B) Not statistically different (Unadjusted RR 0.77, 95% CI 0.38-1.58, Adjusted RR 0.92, 95% CI 0.45-1.87) Unadjusted p-value=0.5, Adjusted p-value= 0.8</p> <p>C) Not statically different: p-value = 0.18 D) Not statically different: p-value not reported</p>

		D) Adherence: median days until medication discontinuation <sup>c</sup>		
Tso et al. [30]	<u>Sample size</u> IG (1): 2197 IG (2): 2197 CG: 2197  <u>Age (years)</u> IG (1): mean 80 (range 66-104) IG (2): mean 80 (range 66-105) CG: mean 80 (range 66-105)  <u>% Female</u> 100	A) Central BMD via DEXA B) Osteoporosis therapy	Intent to treat: 4 months from intervention A) CG 117/2,197 (5.3%) vs IG (1) 124/2,197 (5.6%) vs IG(2) 179/2,197 (8.1%) B) CG 116/21,197 (5.3%) vs IG(1) 126/2,197 (5.7%) vs IG(2) 153/2,197 (7.0%)	Intent to treat: 4 months from intervention A) Statistically different: CG vs IG(2) p-value<0.001; Statistically different IG(1) vs IG(2) p-value=0.001; Not statistically different CG vs IG(1) p-value not reported. B) Statistically different CG vs IG(2) p-value=0.019; Not statistically different IG(1) vs IG(2) p-value=0.095; Not statistically different CG vs IG(1) p-value not reported
			Intent to treat: 6 months from fracture index date A) CG 187/2,197 (8.5%) vs IG (1) 175/2,197 (8.0%) vs IG(2) 238/2,197 (10.8%) B) CG 127/2,197 (5.8%) vs IG(1) 128/2,197 (5.8%) vs IG(2) 150/2,197 (6.8%)	Intent to treat: 6 months from fracture index date A) Statistically different: CG vs IG(2) p-value=0.009; Statistically different IG(1) vs IG(2) p-value=0.001; Not statistically different CG vs IG(1) p-value not reported B) Not statistically different: CG vs IG(2) p-value=0.153; Not statistically different IG(1) vs IG(2) p-value=0.173; Not statistically different CG vs IG(1) p-value not reported
			Per protocol: 4 months from intervention A) CG 112/1,833 (6.1%) vs IG(1) 36/498 (7.2%) vs IG(2) 126/1,369 (9.2%) B) CG 107/1,833 (5.8%) vs IG(1) 26/498 (5.2%) vs IG(2) 113/1,369 (8.3%)	Per protocol: 4 months from intervention A) Statistically different: CG vs IG(2) p-value=0.001; Comparison with IG(1) not possible due to failing to meet sample size B) Statistically different: CG vs IG(2) p-value<0.008; Comparison with IG(1) not possible due to failing to meet sample size
			Per protocol: 6 months from fracture index date A) CG 171/1,833 (9.3%) vs IG(1) 41/498 (8.2%) vs IG(2) 156/1,369 (11.4%) B) CG 115/1,833 (6.3%) vs IG(1) 25/498 (5.0%) vs IG(2) 102/1,369 (7.5%)	Per protocol: 6 months from the fracture index date A) Not statistically different: CG vs IG(2) p-value=0.148; Comparison with IG(1) not possible due to failing to meet sample size B) Not statistically different: CG vs IG(2) p-value=0.059; Comparison with IG(1) not possible due to failing to meet sample size
Klop et al. [32]	<u>Sample size</u> IG: 343 CG: 352  <u>Age (years)</u> IG: 66±SD17 CG: 69±SD15  <u>% Female</u> IG:55 CG:55	A) Osteoporosis therapy: % commenced therapy B) Calcium: % commenced therapy C) Vitamin D: % commenced therapy	A) CG 8.0% vs IG 11.4% B) CG 2.6% vs IG 5.3 % C) CG 1.7% vs IG 3.5%	A) Not statistically different (Unadjusted HR 1.47, CI 0.91-2.39; Adjusted HR 1.54, CI 0.95-2.50) B) Not statistically different (Unadjusted HR 2.06, CI 0.93-4.59; Adjusted HR 2.12, CI 0.95-4.72) C) Not statistically different (Unadjusted HR 2.05, CI 0.77-5.47; Adjusted HR 2.08, CI 0.78-5.55)
			Men A) CG 5.1% vs IG 12.8%	Men A) Statistically different (Unadjusted HR 2.53, CI 1.11-5.74; Adjusted HR 2.55, CI 1.12-5.80)
			≥ 70 years A) CG 4.9% vs IG 13.4%	≥ 70 years A) Statistically different (Unadjusted HR 2.88, CI 1.33-6.23; Adjusted HR 2.99, CI 1.38-6.47)
<i>Interventions: multidisciplinary care team</i>				
	<u>Sample size</u>		Intent to treat	Intent to treat

Kennedy et al. [25]	<p>IG: 19 facilities 2185 participants CG: 21 facilities 3293 participants</p> <p><u>Age (years)</u> IG: mean 84±SD11 CG: mean 85±SD11</p> <p><u>% Female</u> IG: 70 CG: 71</p>	<p>A) Osteoporosis therapy: change in prescribing B) Calcium: supplement: change in prescribing C) Vitamin D: supplement change in prescribing</p>	<p>A) Between group difference 3.4% (95% CI 2.6-4.2%) B) Between group difference 7.0% (95% CI 6.2-7.9%) C) Between group difference 14.7% (95% CI 13.1-16.2%)</p> <p>Per Protocol A) Between group difference 2.9% (95% CI 1.7-4.1%) B) Between group difference 13.1% (95% CI 12.0-14.2%) C) Between group difference 27.0% (95% CI 25.5-28.5%)</p>	<p>A) Not statically different (Unadjusted OR 1.17, 95% CI 0.91-1.51; Adjusted OR 1.12, 95% CI 0.87-1.44) B) Statistically different (Unadjusted OR 1.33, 95% CI 1.01-1.74, Adjusted OR 1.33, 1.01-1.77) C) Statistically different (Unadjusted OR 1.82, 95% CI 1.12-2.96, Adjusted OR 1.85, 95% CI 1.13-3.06)</p> <p>Per protocol A) Not statically different (Unadjusted OR 1.20 95% CI 0.90-1.60, Adjusted OR 1.16, 95% CI 0.87-1.53) B) Statistically different (Unadjusted OR 1.57, 95% CI 1.12-2.21, Adjusted OR 1.58, 95% CI 1.11-2.24) C) Statistically different (Unadjusted OR 3.06, 95% CI 2.18-4.29, Adjusted OR 3.14, 95% CI 2.22-4.45)</p>
<b>Studies targeting adherence</b>				
Kooij et al. [26]	<p><u>Sample size</u> IG: 25 pharmacies 319 participants CG: 28 pharmacies 252 participants</p> <p><u>Age (years)</u> IG: mean 66±SD14 CG: mean 67±SD13</p> <p><u>% Female</u> IG: 79 CG: 74</p>	<p>A) Adherence: mean MPR as continuous outcome B) Adherence: refill rate ≥80%</p>	<p>Intent to treat A) CG 73.3 (SD 38.1) vs IG 75.2 (SD 38.4) B) CG 169/252 (67.1%) vs IG 224/319 (70.2%)</p> <p>Per protocol A) CG 73.3 (SD 38.1) vs IG 84.3 (SD 31.7) B) CG 169/252 (67.1%) vs IG 112/137 (81.8%)</p>	<p>Intent to treat A) Not statistically different (RD -0.54, 95% CI -9.43-6.14) B) Not statistically different (OR 1.0, 95% CI 0.57-1.49)</p> <p>Per protocol A) Statistically different (RD 10.2, 95% CI 1.98-16.4) B) Statistically different (OR 2.15, 95% CI 1.32-3.57)</p>
Lai et al. [34]	<p><u>Sample size</u> IG: 100 CG: 98</p> <p><u>Age (years)</u> IG: mean 65 ±SD9 CG: mean 67 ±SD10</p> <p><u>% Female</u> 100</p>	<p>A) Adherence: direct report B) Adherence: pill count C) Adherence: self-record D) Knowledge level: median score<sup>d</sup></p>	<p>3 months A) CG mean 94.96 ±SD 7.01 vs IG mean 93.21 ±SD 10.26 B) CG mean 97.30 ±SD 5.35 vs IG mean 96.57 ±SD 7.23 C) 97.38 ±SD 5.33 vs Intervention mean 96.85 ±SD 6.52 D) CG 62.50% vs IG 72.50%</p> <p>6 months A) CG mean 93.98 ±SD 9.92 vs IG mean 93.24 ±SD 9.17 B) CG mean 97.01 ±SD 7.22 vs IG mean 98.83 ±SD 3.02 C) CG mean 96.79 ±SD 7.97 vs IG mean 98.91 ±SD 3.23 D) CG 65.00% vs IG 75.00%</p>	<p>3 months A) Not statistically different: p-value = 0.369 B) Not Statistically different: p-value = 0.547 C) Not statistically different: p-value=0.495 D) Statistically different: p-value &lt;0.001</p> <p>6 months A) Not statistically different: p-value = 0.343 B) Statistically different: p-value = 0.028 C) Statistically different: p-value=0.015 D) Statistically different: p-value &lt;0.001</p>

			12 months A) CG mean 94.27 ±SD 12.27 ± vs IG mean 94.73 ± SD 6.56 B) CG mean 96.46 ±SD 10.17 vs IG mean 97.70 ±SD 4.68 C) CG mean 96.17 ±SD 10.95 vs IG mean 97.97 ±SD 5.25 D) CG 68.75% vs IG 78.75%	12 months A) Not statistically different: p-value = 0.216 B) Not statistically different: p-value= 0.322 C) Statistically different: p-value= 0.047 D) Statistically different: p-value <0.001
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<sup>a</sup>% change from baseline, <sup>b</sup> Approximate % scores calculated from the graph (no tabulated results), <sup>c</sup> secondary analysis reported by Shu et al (2009) [20], <sup>d</sup> secondary outcome reported by Lai et al 2013 [19]

CG- Comparator Group; IG- Intervention Group; CI- Confidence Interval; HR-Hazard Ratio; IQR- Interquartile range; MD- Mean Deviation; OR- Odds ratio; RR-relative risk; RD-Risk difference; SD-Standard Deviation