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Author year	Country	Study design	Set-ting	Participants, professional background	Study duration	Objective and intervention setting	Facilitation and group dynamics	Didactic and QI technique	Outcome oriented data	Common characteristics of the cluster (kinship)
Norwegian papers on peer groups										
Gjelstad 2006[1]	Norway	Study protocol	PHC	80 CME groups; 7–8 GPs in each group located in the southern part of Norway	6 months: meetings once a month; the study covered 3 meetings.	Reduce prescription of antibiotics for upper respiratory tract infections and prescription of inappropriate drugs for elderly. Pre-existing CME groups.	Trained tutor serving 3 CME groups, reflection on own prescription strategies, disclosure of areas for individual improvement.	Discussions, reflective thinking on individual prescription data, one-day introductory workshop, audit and feedback, group educational outreach visits, academic detailing.	After one year, improvement of prescription patterns was expected.	Norwegian QC studies on improving drug prescriptions, accompanied by a qualitative study. Brekke provided the baseline study for the trial.
Gjelstad 2013[2]	Norway	Cluster randomised controlled trial	PHC	80 CME groups; 7–8 GPs in each group located in the southern part of Norway	6 months: meetings once a month; the study covered 3 meetings.	As in Gjelstad 2006 Each group acted as blind control for the other groups (Rognstad 2013).	As in Gjelstad 2006	Authors consider the key element in the study to be 'what happens to a general practitioner's prescribing behaviour when they reflect on their prescriptions'.	After one year, reduction of prescription rate of antibiotics and increase of prescription rate of penicillin compared to control groups.	
Straand 2006[3]	Norway	Study protocol	Norwe gian PHC	80 CME groups; 7–8 GPs in each group located in the southern part of Norway	6 months: meetings once a month; the study covered 3 meetings.	Reduce prescription of inappropriate drugs for elderly people and prescription of antibiotics in upper respiratory tract infections. Pre-existing CME groups.	Trained tutor serving 3 CME groups, reflection on own prescription strategies, disclosure of areas for individual improvements.	As in Gjelstad 2006	After one year: reduction of inappropriate prescription patterns to elderly out-patients ≥ 70 years.	

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Brekke 2008[4]	Norway	Cross-sectional study	PHC	454 GPs in 80 CME groups, 85,836 patients	6 months	Baseline data of ongoing CME groups for one year	Ongoing CME groups without intervention	Ongoing CME groups	After 1 year:18.4% of the patients received at least one inappropriate prescription.	Norwegian QC studies on improving drug prescriptions, accompanied by a qualitative study. Brekke provided the baseline study for the trial.
Rogn-stad 2013[5]	Norway	Cluster randomised controlled trial	PHC	80 CME groups; 7–8 GPs in each group located in the southern part of Norway	6 months: meetings once a month; the study covered 3 meetings.	As in Straand 2006 Each group acted as blind control for the other groups (Gjelstad 2013).	Training in drug treatment of elderly people, the rationale for the 13 listed inappropriate drugs, how to facilitate learning within a group setting.	Audit and feedback, tailored feedback, tailored academic detailing, discussions of own prescribing pattern.	After one year, reduction of inappropriate prescriptions for elderly people. Potentially more harmful combinations were more likely to be reduced.	
Frich 2010[6]	Norway	Qualitative study to explore experiences with academic detailing	PHC	39 GPs and 20 tutors who were also GPs, 9 focus groups	6 months: meetings once a month; the study covered 3 meetings.	Qualitative analysis of the RCTs, focusing on three meetings with the CME groups.	Groups have their own cultures; tutors perceived themselves as members of the group.	Consensus discussions, audit and feedback, academic detailing, discussions of their own cases.	Reflective thinking increased; inappropriate results upset some GPs.	
Dutch papers on peer groups										
Geboers 1999[7]	The Nether-lands	Case series	PHC	All staff of 20 general practices (each working as a group) tested the model over a period of 18 months.	18 months. Monthly quality meetings.	Evaluate the feasibility of a model for continuous quality improvement (CQI) in small practices.	Trained facilitators: practice assistants with managerial experience. Involving all staff at regular meetings.	Course on CQI: choose topic, observe practice, compare performance with targets, implement change, plan care and repeat cycle.	After 18 months, this model seemed feasible to the authors.	Dutch QC studies of a continuous quality improvement model.

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Geboers 2001[8]	The Nether-lands	Mixed methods: before-and-after study and qualitative inquiry	PHC	20 practices (each working as a group): 53 physicians and 57 medical practice assistants	18 months. Monthly quality meetings.	Measure the attitude towards CQI model in small practices before and after study.	As in Geboer, 1999	Feedback on practice assessment, introductory meeting, support for adoption of the model.	After 18 months, participants experienced perceived success and were willing to continue.	Dutch QC studies of a continuous quality improvement model.
Engels 2003[9]	The Nether-lands	Controlled before-and-after study	Mid-wives, mainly PHC	255 midwives in 28 groups	Study period 1998 to 2000	Measure CQI effect on clinical practice of midwives in PHC in a before-and-after study.	Three-day training of facilitators. Peer groups of midwives in the same geographical area. Regular group meetings.	Allocated topics with no choice, using the CQI model.	Positive effect on change of clinical practice was noted. Technical skills could not be improved.	
Engels 2006[10]	The Nether-lands	Ran-domised controlled trial	PHC	26 sites in the intervention and 23 sites as controls. Size and composition of groups unknown.	December 2001 - February 2004; inclusion October 2001 - April 2003	Examine the effects of a team-based model for CQI on primary-care practice management in small-scale practices.	Medical practice assistants as facilitators after 3 days' training.	Visitation Instrument for Practice (VIP) provided topics, CQI model with detailed oral and written feedback, monthly team meetings.	Evaluation after one year showed an increased number of CQI projects compared to control group, but the study was statistically underpowered.	

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Verstap-pen 2003[11]	The Nether-lands	Multicentre, randomised controlled trial	PHC	26 QCs consisting of 174 GPs.	6 months baseline followed by 6 months' interventio n.	Determine the effects of a multifaceted strategy aimed at improving test ordering patterns in existing QCs.	Discussion and comparison of feedback reports among colleagues, communication course.	3 consecutive, personal-feedback reports, comparison of results with guidelines, plans for change, discussion of Bayesian rules.	Modest improvement in test ordering when comparing the two intervention groups	Dutch QCs on improving test ordering
Verstap-pen 2004[12]	The Nether-lands	Cluster randomised controlled trial	PHC	27 QCs consisting of 194 GPs.	6 months of baseline followed by 6 months' inter-vention.	A multifaceted strategy aimed at improving test-ordering patterns in pre-existing QCs; 13 QCs followed a new strategy while 14 only received feedback.	Discussion and comparison of feedback reports among colleagues, communication training. 3 meetings.	As in Verstappen 2003	Compared to feedback, the tailored intervention decreased test ordering significantly.	
Verstap-pen 2004[13]	The Nether-lands	Cluster randomised trial	PHC	27 QCs consisting of 194 GPs. 13 QCs used a new strategy while 14 only received feedback	6 months of baseline followed by 6 months' inter-vention.	Determine the effects of a multifaceted strategy in pre-existing QCs aimed at improving test ordering patterns. 3 meetings took place.	Discussion and comparison of feedback reports among colleagues, communication course.	As in Verstappen 2003	Mean costs were reduced by cutting unnecessary tests.	Dutch QCs on improving test ordering
Verstap-pen 2004[14]	The Nether-lands	Cluster randomised trial; surveys	PHC	27 QCs consisting of 194 GPs. Mean group size was 7.4	6 months of baseline followed by 6 months'	A process evaluation of a multifaceted strategy in pre-existing QCs aimed at	Discussion and comparison of feedback reports among colleagues using feedback in pairs,	As in Verstappen 2003	Individual plans for change and group plan changes were made with a high level of	

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					inter-vention.	improving test ordering patterns.	communication course.		satisfaction.	
Smeele 1999[15]	The Nether-lands	Ran-domised controlled trial	PHC	2 QCs, 17 GPs in each group	Pre-measure-ment and post-measure-ment after one year.	Evaluate the effects of a QC programme on guideline adherence. 4 sessions for GPs and 1 session for medical practice assistants.	The group education was conducted in two small groups with 9 and 8 GPs respectively. Facilitator was a GP. Not all GPs participated in all sessions.	Lectures, role-play, skills training, peer review of performance, group consensus discussions and problem-solving of hypothetical situations involving patients.	No significant changes were found for care provided and patient outcomes compared with the control group.	Dutch QC studies on guideline adherence.
Kasje 2006[16]	The Nether-lands	Cluster randomised trial using a balanced incomplete block design.	PHC	10 peer review groups (97 GPs): chronic heart failure. 6 peer review groups (46 GPs): hypertension and diabetes mellitus type 2.	One educa-tional meeting followed by data collection after 6 months	Evaluate the effects of a QC programme on guideline adherence in pre-existing groups. One group received a programme on chronic heart failure, the other on diabetes mellitus type 2.	Facilitators adhered to a specific process.	One meeting: consensus about guideline statements, evaluation of current management of five of their own patients, listing barriers and possible solutions, formulation of personal intentions	No effect was shown. High dropout rate especially in the group dealing with diabetic patients. The programme was not implemented as intended.	

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Van Eijk 2001[17]	The Nether-lands	Ran-domised controlled trial with three parts: individual visits, group visits, and a control group.	GPs and phar-ma-cists in PHC	Individual approach: 70 GPs and 14 pharmacists; Group approach: 52 GPs and 9 pharmacists in five QCs; Control: 68 GPs and their pharmacists.	12 months	Comparison of individual educational visits versus group visits to improve inappropriate prescriptions for elderly people. Pre-existing groups of GPs. 3 visits at 4-month intervals.	There was no description about the process that took place in the groups or at the individual level.	First visit: guidelines about appropriate prescription of drugs for elderly. Second visit: personal prescription habits were highlighted. Third visit: short follow up	The individual and the group approach led to a reduction in the rate of starting inappropriate drugs and to an increase of prescription of appropriate drugs.	Dutch QC studies on improving drug prescriptions involving pharmacists.
Wel-schen 2004[18]	The Nether-lands	Ran-domised controlled trial.	GPs and phar-ma-cists in Dutch PHC	12 peer review groups including 100 GPs with their collaborating pharmacists.	Approx. 6 months. Evalu-ation after 9 months.	Reduce prescription of antibiotics to patients with upper respiratory tract infections in pre-existing groups.	Group education with consensus procedure. One meeting followed by individual feedback after 2 weeks and 6 months.	Group education meeting about guidelines, communication skills training, patient leaflets. After 2 weeks and 6 months, individualised feedback.	Prescription rate for antibiotics was reduced after 9 months. After 15 months, the effect was lasting. Satisfaction among patients remained high.	Dutch QC studies on improving drug prescriptions involving pharmacists.
Problem Based Small Group Learning (PBSGL) in Canada, Scotland and England										
Davis 1999[19]	Canada	Case series	PHC	54 GPs in 4 newly formed groups.	A 2.5-hour workshop	Develop and evaluate a CME programme on osteoporosis for PHC. 54 family physicians participated in 1 of 4 pilot PBSG learning sessions.	GP trained as a facilitator. The facilitator elicited interactive responses using specific predetermined prompting questions.	Practice-based case scenarios to increase awareness of risk factors for osteoporosis.	Participants' satisfaction was high. Participants increased their knowledge scores (not significant because of size of the study).	Papers about Practice Based Small Group Learning in Canada, Scotland and England

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Mc Sherry 2000[20]	Canada	Before-and-after study	PHC	544 GPs in 75 workshops with a mean of 7 GPs in each newly formed group.	A 2-hour workshop with question-naires before and after.	Pilot study to introduce PBSGL groups in PHC. Topic: a patient-centred approach to managing benign prostate problems and evaluate 'intent to change'.	Initial needs assessment, problem-based educational materials, opportunities for participants to develop implementation strategies through discussion with peers.	Educational video case studies illustrating various presentations of prostatism, a handbook with detailed information on the case studies. A toll-free telephone line was provided for scientific and technical support.	Practice behaviours were improved, especially those linked to a patient-centred approach not commonly practised before the workshops.	Papers about Practice Based Small Group Learning in Canada, Scotland and England
Peloso 2000[21]	Canada	Qualitative inquiry over three years	PHC	12–15 GPs, a facilitator and sometimes an expert.	3 years	Discuss a 3-year experience with the small-group format, comprising more than 25 sessions as either learners or facilitators. Facilitators have 20 hours of training. Monthly meetings, each session takes 1.5 to 2 hours.	Sessions took place in the evenings with a meal in a relaxed atmosphere. The group chose their topics. Presentation of own clinical cases. Experts did not lecture but answered questions.	Learner-directed agenda of topics, information from trusted peers, opportunity for feedback. Information from several sources – printed materials, peer discussion, patient questions – the perception of need for change is enhanced.	GPs can discuss topics relevant to day-to-day practice and obtain access to local experts. They compare their practice with that of others. The group and the inter-active format are fun. Experts are comfortable with the format.	

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Herbert 2004[22]	Canada	Ran-domised controlled trial	PHC	200 GPs in 28 pre-existing groups.	6 months, com-parison of data 6 months before and after the inter-vention.	Assess the impacts of individualised prescribing feedback. 4 groups: control, prescribing portrait only, educational module only, both portrait and educational module.	3 representative patient cases were discussed, evidence-based information to guide management. Facilitation 'as usual' in the CME group.	Histograms comparing an individual's prescribing rates with those of the group and of all GPs in the study. A succinct evidence-based message to guide future prescribing.	The group that received both the module and the portrait had the greatest increase in preferred prescriptions.	Papers about Practice Based Small Group Learning in Canada, Scotland and England
Mc Vicar 2006[23]	Scotland	Before-and-after study (pilot)	PHC	5 small groups, 7–9 GPs in each group	12 months	Assess effectiveness of the PBSG approach in developing participants' knowledge, skills and attitudes in interpreting, discussing and applying current medical evidence.	Facilitators establish and maintain a learning environment. They create a culture of openness, honesty and willingness to acknowledge unawareness as a precursor to learning.	Educational material, a tool that triggers reflection, discussion of personal experiences and acknowledge-ment of gaps between current and best practice.	The study was statistically underpowered. Participants highlighted general enjoyment, professional reassurance and personal learning.	

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Armson 2007[24]	Canada	Description of the programme	PHC	4–10 GPs	Meeting of around 90 minutes once or twice a month	Identify gaps between current practice and best available evidence, to encourage reflection on individual practice, and promote changes in patient care, using an educational approach.	The facilitator's tasks are to focus discussion, to encourage the group to identify barriers to the implementation of new know-ledge and to establish a safe, supportive environment for learning.	Facilitation of discussions based on educational material and a tool (log sheet) that triggers reflection. The group starts with personal experiences and reflects on and acknowledges gaps between current practice and best practice.	Groups of various compositions function effectively in this particular small group environ-ment. If the facilitator lost the group's interest, disintegration of the group was likely.	Papers about Practice Based Small Group Learning in Canada, Scotland and England
Kelly 2007[25]	Scotland	Qualitative study: semi-structured interviews	PHC	One-to-one interview to evaluate the process in 5 small pre-existing groups.	Interviews among partici-pants of the Mc Vicar 2006 study	Explore the perceptions and experiences of PBSG participants to gain an understanding of how PBSGL works.	Facilitator opens discussions, clarifies statements, summarises what was said and questions issues, creating a learning environment.	Case discussions make evidence-based material relevant to participants and stimulate reflection. Mutual learning is important. Discussing data with others stimulates reflection.	Participants joined PBSGL groups because of the need to update medical knowledge, to compare personal practice with peer practice.	

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Overton 2009[26]	Scotland	Qualitative approach: theory-driven framework developed by Chen and Rossi	PHC	19 GPs and practice nurses	Interviews among partici-pants of PBSGL groups	Study the experiences of GPs and practice nurses in PBSGL. Data sources: logbooks, e-mail, telephone conversations and one-to-one interviews.	Qualitative study of the process in PBSGL groups: Group cohesion grew and mutual emotional support increased. With increasing trust, open discussions were possible.	Qualitative study of the process in PBSGL groups: case discussions kept people going and different perspectives could be considered. Self-esteem increased, as did mutual respect.	Motivation for joining the groups: preferred learning style, keeping up to date, learning in multi-professional groups, group atmosphere. and increased self-esteem.	Papers about Practice Based Small Group Learning in Canada, Scotland and England
Cunning ham 2011[27]	Scotland	Qualitative study: focus group	PHC	Two focus groups of PBSGL facilitators.	Focus groups	Learn about motivators to become a facilitator in PBSGL groups.	Qualitative study of the process in PBSGL groups	Qualitative study of the process in PBSGL groups	Motivators to become a facilitator were positive past experience of group learning, the chance of career advancement. Support for facilitators after initial training.t.	

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Rial 2013[28]	England	Before-and-after study	Trai-nee GPs in PHC	2 newly-founded groups of seven future GPs.	After 8 months, 4 meetings	Identify whether they were supported in making the transition from trainee to independent practitioner through attending PBSGL groups.	One group member was trained as a facilitator.	Canadian PBSGL approach was used	Improved ability to identify and use evidence in practice, shifting the focus from postgraduate exams towards 'real world' practice. The PBSGL groups still meet.	
QCs in Canada										
Ioan-nidis 2007[29]	Canada	Before-and-after study (pilot)	PHC	5 QCs, 52 physicians, GPs and some osteoporosis specialists	12 months	Assess whether use of QCs could improve family physicians' adherence to osteoporosis guidelines. 3 training meetings for the facilitators, 3 meetings for participants.	QC facilitators were local family physicians recruited and trained specifically to lead study meetings.	Educational material, interactive group meetings, use of local opinion leaders, audit and feedback, reminders, multi-professional collaboration, financial incentives and information distributed to patients.	The intervention seemed to be feasible and was well received among GPs. 84% agreed that the feedback helped them understand their current practice patterns and decide on areas that needed improvement.	Papers on guideline adherence using continuous quality improvement cycles in Canada.

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Ioan-nidis 2008[30]	Canada	Before-and-after study	PHC	340 participants (GPs) in 34 QCs and local opinion leaders	1 year	Increase guideline adherence concerning osteoporosis. 5 meetings (60–90 minutes) for two years.	5 educational meetings	As in Ioannidis 2007	Physicians' awareness of osteoporosis risk factors and appropriate bone mineral density testing increased.	Papers on guideline adherence using continuous quality improvement cycles in Canada
Ioan-nidis 2009[31]	Canada	Before-and-after study	PHC	As in Ioannidis 2008	2 years	As in Ioannidis 2008	As in Ioannidis 2008	As in Ioannidis 2008	Guideline adherence increased	
German QCs										
Szecse-nyi 1994[32]	Germany	Before-and-after study	PHC	10 GPs	2 years	Observation of the initialisation and establishment of a QC. Monthly meetings.	Presentation round, discussion of possible topics, choice of a topic impacting all participants; a GP facilitates the process.	Setting priorities, analysing the situation, developing criteria for improving quality, analysis of present practice, general priorities for necessary changes, comparison with evidence-based literature, change of practice.	GPs are interested in everyday practice-related topics. The gap between existing knowledge and clinical practice is acknowledged.	Papers about establishing QCs in Germany: pilot stage.

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Gerlach 1995[33]	Germany	Survey among 138 QC participants	PHC	138 GPs taking part in QCs, 8–12 GPs in each one.	Not applicable	Evaluation of case-based QC process focussing on a topic.	GPs use their own medical records, patient data or video recordings as a basis for problem-based learning. Facilitation by a GP.	Case-based discussions may indicate a need to change everyday practice. Evidence-based material and/or local opinion leaders may contribute to the discussion and consensus finding.	79% of the GPs thought that cases from daily practice should be the starting point of QCs. The process led to locally adapted guidelines.	Papers about establishing QCs in Germany: pilot stage.
Hart-mann 1995[34]	Germany	Controlled before-and-after study	PHC	2 QCs, 10 GPs in each group compared to control group	4 months. Evalua-tion after 5 meetings	Increase guideline adherence in diabetic care. Test training modules for facilitators (GPs).	2 GPs in each group received training in facilitating small groups.	Didactic techniques as in Gerlach 1995, role play to practise patient–doctor communication.	Guideline adherence improved compared to control group.	
Murad 1998[35]	Germany	Before-and-after study	PHC	1 QC including 10 GPs	12 months	Improve guideline adherence for patients with diabetes mellitus type 2. 23 existing QCs meeting once a month.	GPs use their own medical records, patient data or video recordings as a basis for problem-based learning. Facilitation by a GP.	Use of practice data, medical records and case discussions involving a local opinion leader.	According to QC documents, improved guideline adherence.	
Tausch 1995[36]	Germany	Before-and-after study (protocol)	PHC	23 QCs, 10 GPs in each group	Evalua-tion over 18 months	Evaluate facilitators' manuals on different common diseases. 23 existing QCs met	The facilitators prompted and encouraged participants to identify common problems in their	The manual may provide a starting point for developing consensus guidelines.	Evaluation on three levels: reasons for participation in QCs, usability of the manual,	Papers about establishing QCs in Germany using manuals.

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						once a month.	practice.		assessing behaviour change.	
Tausch 1996[37]	Germany	Survey	PHC	25 QCs, 246 GPs	Evalua-tion after 12 months and 10 meetings	Capture the objectives of the participants. 25 pre-existing QCs met once a month.	As above	Case vignettes, discussion of adequate diagnostic and therapeutic procedures in relation to evidence-based material.	Reasons for participating in QCs: exchange among colleagues, improved self-confidence.	Papers about establishing QCs in Germany using manuals.
Tausch 2001[38]	Germany	Before-and-after study	PHC	23 QCs, 243 GPs	Evalua-tion after 18 months	Evaluate reasons for participation, usability of manuals and assessment of behaviour change (self-reported improvement). To expand QCs within short time.	Voluntary participation in monthly meetings, 6–12 GPs in each group, trained facilitator.	Moderator-manuals that allow self-evaluation provide information about appropriate diagnostic and therapeutic recommendations for common diseases.	Reasons for participating: exchange of experiences among colleagues, increased competence and high level of satisfaction.	
Andres 1997[39]	Germany/ Hessen	Controlled before-and-after study	PHC	32 GPs were grouped into 3 QCs promoted by the association of statutory health insurance	12 months	Evaluate the process in the groups after 10 meetings. Participating GPs exceeded average prescription costs.	Participants felt forced to join QCs to change their behaviour. They had to overcome the feeling of being controlled.	Case discussions, audit charts to analyse prescription habits, interactive learning, reflective thinking and consensus finding as to rational prescription practice.	66% reported change in behaviour. 22 of 27 wanted to continue with QCs.	Papers about establishing QCs in Germany using data on everyday practice to improve prescription patterns.

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Andres 2004[40]	Germany/ Lower Saxony	Survey among 797 QC participants	PHC	648 out of 797 participants answered the survey	Evalua-tion after 1 year	Evaluate QC participants' experiences in QCs intended to improve prescription patterns.	7–10 GPs, monthly meetings, facilitator guiding through the process, support by academic staff members if necessary.	Case discussions, peer-led academic detailing allowing comparison with colleagues, reflective thinking, consensus discussions, evidence-based material, patient information.	Main problems were initial prescribing in hospitals and communication with patients when changing drugs.	Papers about establishing QCs in Germany using data on everyday practice to improve prescription patterns.
Wen-sing 2004[41]	Germany / Saxony-Anhalt	Controlled before-and-after study	PHC	87 GPs in 10 groups of 7–12; control group: 90 GPs not participating in the intervention.	Evalua-tion after 2 years	Determine the impact of a large-scale programme of QCs on quality and costs of prescribing, 11 meetings of 2 hours, existing QCs promoted by the association of statutory health insurance.	A trained facilitator (GP) supported the group.	Structured feedback report, patient video, evidence-based material, interactive learning and reflective thinking about willingness to change.	High satisfaction with QCs. Prescriptions decreased in the intervention group while increasing in the control group. Aspects of quality of prescriptions improved.	
Andres 2004[42]	Germany /Hessen	Survey	PHC	483 out of 612 GPs (57 QCs) answered.	Evalua-tion after 2 years	Evaluate participants' experiences of existing QCs taking part in a large project.	7–10 GPs in each QC, facilitator guiding through the process, support by academic staff members.	Personal prescription data with the opportunity to compare with colleagues.	Positive effects on medical practice and increase in knowledge.	

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Fessler 2006[43]	Germany (Rhine Main)	Controlled before-and-after study	PHC	90 GPs participating in QCs were compared to non-participants in another area	Evalua-tion after 2 or 3 years	Improve prescription patterns concerning statins, antidiabetics, other drugs for cardiovascular diseases. Intervention in existing QCs.	Facilitated group work every 4–6 weeks.	QC process according to German standards; discussion of any results not in line with guidelines.	Guideline adherence increased.	Papers about establishing QCs in Germany using data on everyday practice to improve prescription patterns.
Papen-dick 2006[44]	Germany (Rhine Main)	Controlled before-and-after study	PHC	59 GPs participating in QCs compared to 52 non-participants	Evalua-tion after 12 months	Examine the development of drug costs among GPs participating in existing QCs.	Facilitated group work every 4–6 weeks.	QC process according to German standards; discussion of any results not in line with guidelines.	The cost of medical drugs and the increase in expenditure were lower compared to the control group.	
Wen-sing 2009[45]	Hesse, Lower Saxony, Saxony-Anhalt	3 controlled before-and-after studies with baseline in 2001 and follow-up in 2003	PHC	1090 GPs in the inter-vention group and 2090 in the control group.	Baseline data 3 months; evaluation using another 3 months' data after 24 months.	Determine the effectiveness of the QC process on prescribing patterns in existing and new QC groups. Data were gathered on different groups of drugs. One QC meeting a month.	8–14 physicians in a group, trained facilitator (GP)	Repeated feedback on prescribing patterns, evidence-based information, reasons for variations were discussed, case-based discussions, objectives for improvement were formulated and specific plans made.	Attendance rate 71–79%, high satisfaction >80%. Reduction of mean prescription costs per patient, increased prescription of recommended drugs compared to the control group.	

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Andres 2010[46]	Hesse, Saxony-Anhalt, Westfalen-Lippe, Schleswig-Holstein	Interrupted time series 1995–2007	PHC	1242 QCs documented 27,255 meetings. Evaluation of QCs only if they meet at regular intervals and have done so for at least one year.	12 years	Assess the quality of the structure, processes and results of existing QCs promoted by the association of statutory health insurance.	Facilitators questioned the groups and tried to detail an agreement on best practice.	A group of GPs met at regular intervals to consider their standard practice. Their work was based on personal experience, own data and was target-oriented to promote quality in their own practice.	8 and 12 meetings per year, group atmosphere was generally very good; the proposed method was actually used in the groups; consensus was often achieved.	
Beyer 1999[47]	Saxony-Anhalt, Bremen	Cross-sectional survey	PHC	2412 out of 4270 answered	Not applicable	Analysis of demands and expectations on supporting institutions	Not applicable	Not applicable	GPs reported good emotional support from colleagues, improved professional self-confidence, but also fear of control and excessive demands.	Paper about evaluation of reasons for and against participation in QCs.
Aubke 2003[48]	West-phalia-Lippe	Cross-sectional survey 1995–2001	PHC	520 QCs with 7350 participants: 3260 meetings were evaluated	5 years	Assessment of QI cycle in existing QCs using a checklist. 15 GPs in each group, meeting time 120 minutes on average	Not applicable	QCs work both continuous and topic-centred, based on documentation from own practice with the aim of promoting their quality of care.	29.6% of all QCs had implemented the PDCA cycle, 54.9% had partially implemented the characteristics.	Paper on QCs about evaluation of adherence to the PDCA cycle.

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Beyer 2003[49]	Germany and European countries	Cross-sectional survey among EQuiP delegates	Euro-pean PHC	Reports of EQuiP delegates from 26 countries	Cross-sectional	Provide an overview of QC activities across Europe.	Facilitator is usually a GP.	A consistent group of 8 to 15 health-care professionals meet at regular intervals to consider and reflect on their standard practice.	High activity of QCs (i.e. > 10% of all GPs are involved) in 9 European countries.	Paper about the spread of QCs across Europe (Update Rohrbasser 2019).
Mols 2005[50]	Germany (Black Forest region)	Controlled before-and-after study	PHC	36 GPs in QCs treated 75 patients, 25 GPs in the control group treated 51 patients	Baseline after 6 months, evaluation after 18 months.	Study the effect of existing QCs on secondary prevention of stroke.	Facilitated group work every 6 to 8 weeks.	QC process according to German standards.	QCs did not have an additional effect on secondary prevention after stroke compared to the control group.	Paper on QCs about testing guideline adherence.
Schnei-der 2007[51]	Germany	Ran-domised controlled trial	PHC	12 QCs involving 96 GPs; out of 256 partici-pants, 185 responded to the follow-up.	Evalua-tion after 1 year	Evaluate the efficacy of QCs for asthma care working with individual feedback with and without benchmarking.	Trained facilitators supported the groups in the process.	Collective discussion of evidence-based pharmacotherapy and management of patients on the basis of prescribing data.	Both groups improved their guideline adherence.	Testing the question whether benchmarking in QCs improves guideline adherence - or not.
Vollmar 2007[52]	Germany (North-Rhine West-phalia)	Protocol of a randomised controlled trial	PHC	174 GPs in approx. 20 QCs	Evalua-tion after 3 meetings (6 months)	Improve GPs knowledge and skills about people with dementia.	QCs are facilitated by a trainer rather than by a facilitator.	Study concept A: e-learning followed by case discussions in QCs. Study concept B: oral presentation of evidence-based information followed by a discussion led by a presenter.	Possible change of behaviour, use and acceptance of new learning tools.	Papers about evaluation of e-learning methods in QCs.

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Vollmar 2009[53]	Germany (North-Rhine West-phalia)	Cross-sectional survey	PHC	264 out of 449 GPs answered the questionnaire	Cross-sectional	Gain understanding of German GPs' preferences for different forms of educational methods, such as e-learning.	Not applicable	Not applicable	Approx. 70% wanted to discuss everyday practice with colleagues. Meeting experts and e-learning were not favoured.	.
Vollmar 2010[54]	Germany (North-Rhine West-phalia)	Ran-domised controlled trial	Ger-man PHC	166 GPs in 26 QCs	1 year after study start	Compare knowledge acquisition about dementia management between blended learning and QC methods alone.	QCs are facilitated by a trainer rather than by a facilitator	Study concept A: e-learning followed by case discussions in QCs. Study concept B: oral presentation of evidence-based information and its discussions in a QC.	Groups A and B improved their knowledge. A blended learning approach was not superior to the QC approach.	
Siebolds 2012[55]	Germany	Survey	PHC	83 facilitators received survey	Cross-sectional	Evaluation of training and support for facilitators by tutors.	To support facilitators, the KBV (National Association of Statutory Health Insurance) developed structured didactic handouts for the QC work.	Guidelines of the National Association of Statutory Health Insurance for Quality Assurance Procedures.	High level of satisfaction with didactic handouts (manuals) and training opportunities.	Paper about the quality of training and support for facilitators.

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Swiss QCs										
Bugnon 2004[56]	Switzer-land	Controlled before-and-after study	PHC	6–10 GPs in 1 QC.	Develop-ment over 3 years	Improve prescription patterns and reduce costs for drug prescriptions.	A pharmacist facilitated the group through the process of academic detailing. The group engaged in local networking. Group cohesion increased with time.	Evidence-based information, feedback on prescriptions including information about possible substitutions. Consensus discussions and agreement on best choices.	Improvement of prescription patterns (antibiotics, antidiabetic and antihypertensive drugs, NSAIDs); reduction of costs compared to control groups.	Papers about pharmacist-led QCs in Switzerland.
Niquille 2010[57]	Switzer-land	Controlled before-and-after study	PHC	24 GPs in 6 QCs	Develop-ment over 9 years	Improve prescription patterns and to reduce costs for drug prescriptions.	A pharmacist facilitated groups of 3–6 GPs through the process of academic detailing. Group cohesion increased with time.	As in Bugnon 2004	42% decrease in drug costs, improved adherence to prescription guidelines compared to control group.	

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Drug Education Project										
Lund-borg 1999[58]	Sweden	Ran-domised controlled trial	PHC	18 groups (104 GPs) compared with 18 groups (100 GPs), 3–10 GPs in each group	6 months	Improve the treatment of asthma and urinary tract infections. The two study groups served as controls for each other.	Pharmacists facilitated the GP groups, two meetings, each meeting 1.5 hours.	Information on their judgements of written simulated cases. Discussion of actual decisions taken on the simulated cases. Discussion of personal experience of difficult clinical cases and underlying reasons for prescriptions.	Guideline adherence increased for patients with urinary tract infections and patients with asthma.	QC study on improving drug prescriptions in Sweden, Norway, The Netherlands and Slovakia: Drug Education Project.
Lund-borg 1999[59]	Sweden	GPs' evaluation of the trial: survey	Swe-dish PHC	82 out of 104 GPs and 83 out 100 GPs responded.	6 months	Capture GPs' experiences of the trial through a questionnaire.	As above in Lundborg 1999	As above in Lundborg 1999	87% of participating GPs wanted to take part in similar CME activities for other conditions.	
Lager-lov 2000[60]	Norway	Ran-domised controlled trial	Norwe gian PHC	32 groups (199 GPs), 4–8 GPs in each group	6 months	As above in Lundborg 1999	As above in Lundborg 1999	As above in Lundborg 1999.	Guideline adherence increased.	

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Veninga 1999[61]	Sweden, Slovakia, The Nether-lands	Evaluation of a randomised controlled trial	Swe-dish, Norwe gian, Dutch and Slova-kian PHC	The Netherlands: 24 groups, 181 GPs; Sweden: 36 groups, 204 GPs; Norway: 32 groups, 199 GPs; Slovakia: 20 groups, 81 GPs.	6 months	Explore whether a specific educational approach for implementation of guidelines has a similar effect when used in different health care settings.	As above in Lundborg 1999 (Slovakia only one meeting).	As above in Lundborg 1999	Attitudes changed and prescription patterns improved.	QC study on improving drug prescriptions in Sweden, Norway, The Netherlands and Slovakia: Drug Education Project (DEP).
Veninga 2000[62]	The Nether-lands	Ran-domised controlled trial	PHC	24 groups (181 GPs)	6 months	As above in Lundborg 1999	As above in Lundborg 1999	As above in Lundborg 1999	Guideline adherence increased.	
European single studies										
Eliasson 1999[63]	Sweden	Literature review, survey and authors' reflections	PHC	5–10 GPs in each of approx. 230 groups	Meeting once to twice a month	Give an overview of CME group work in Sweden and describe its strengths and weaknesses.	Facilitated group discussions. Reflection on emotional responses was part of the group process.	Prearranged modules with short introductions and facts on a topic. Discussions based on experiences.	80% of the group members assessed the pedagogical value of the group sessions as more valuable than direct instruction.	Paper on Swedish QCs

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Watkins 2004[64]	England	Qualitative study: focus group	PHC	6 different facilitators with different backgrounds. A total of 19 GPs in four practices and one practice manager took part. 11 GPs were interviewed.	7 monthly sessions taking place at midday	Reflect on inappropriate and costly prescribing. Investigate feasibility of educational sessions for GPs: acceptability among GPs and possible barriers.	'Reflective practice' as a potential solution to high-cost prescribing. GPs felt that participation was to appease their prescribing adviser. No or little sense of ownership. Information overload was a problem.	Video-tape of a scenario, followed by brainstorming, and personal responses in the group. 'Best buy' response was selected. Identification of barriers to implementation and discussion of means to overcome barriers.	Low response for participation (4 out of 61 practices). There was friction between clinical autonomy and the experience of a top-down intervention.	Paper on English QCs (reflective groups)
Tonies 2006[65]	Austria	Survey	PHC	In 2001, 29 GPs out of 169 (17%) responded; in 2002, 46 out of 272 (27%) responded.	Evalua-tion after 4 years of offering QCs	Improve care of patients with drug replacement therapy using synthetic opioids in PHC.	A GP facilitated the group and had the support of an experienced local opinion leader.	Local opinion leaders introduced topics. Stimulation of discussions to increase self-awareness and frustration tolerance.	High level of satisfaction with the teaching. Communication skills improved. Topic-specific knowledge increased.	Topic-specific QC activities in Austria.
Riou 2007[66]	France	Controlled before-and-after study	PHC	Number of groups is not mentioned, 7–11 GPs per group, 24 participating GPs, 3–6 local pharmacists in each area.	12 months (Dec 2001 to Dec 2002)	Improve prescription patterns in three semi-rural areas of Brittany, France. Financial incentive.	4 plenary meetings with consultants lecturing on pre-specified topics. QCs every 6th week using personalised feedback.	Expert input during plenary sessions, voluntary feedback, peer review and specific recommendations for changes during QCs.	Increase in generic prescription rates and decreased prescription of drugs with no evidence-based efficacy.	French QC study on improving drug prescription patterns.

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van Driel 2007[67]	Belgium	Cluster randomised controlled trial	PHC	9 QCs (122 GPs) in the intervention and 9 QCs (134 GPs) in the control group	November 2004 to March 2005	Improve antibiotic prescribing in patients with rhinosinusitis. Existing QCs.	The group meetings were scheduled as regular QC sessions without the presence of an external expert.	Dissemination of the guidelines by e-mail; facilitators received educational material concerning antibiotics.	A single intervention in QCs did not have a significant effect on prescription patterns.	Belgian QC study on improving drug prescription.
Spiegel 2012[68]	Austria	Qualitative evaluation	PHC	445 out of 821 GPs took part in the groups, 8–10 participants in each group	2 years: 2004 and 2005	Explore GPs' perception of QCs concerning prescribing habits. Qualitative analysis was used to evaluate QC protocols.	Facilitators' duties were to schedule dates for QCs, give introductory talks on intended topics and facilitate the group process.	Use of educational material on various issues of pharmacotherapy; costs were addressed; provision of personal feedback on prescription habits.	Prescription of generic drugs increased.	Austrian QC study on improving drug prescription.
OTHER AREAS										
de Villiers 2003[69]	South Africa	Qualitative evaluation using Nominal Group Technique followed by survey	PHC	64 GPs answered (response rate 38%), 51 out of 101 responding GPs had participated in QC, 8 out of 12 facilitators responded	Evalua-tion of 9 months CME/ CPD activity	A nominal group technique was used to compose two questionnaires (for participants and facilitators)	Facilitated small-group activities	Activities built on previous experience, involved the learners, focussed on relevant problems; solutions were applicable in practice; the process followed a cycle of action-reflection and GPs acquired technical skills.	91% of the respondents indicated improved knowledge, 73% indicated improvements in their patient care and 61% improved clinical skills	South African QCs

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Rich-ards 2003[70]	New Zealand	Pilot study: retro-spective, controlled before-and-after study	PHC	52 GPs in small education groups: approx. 10 GPs in each group	After 1 and 2 years	Determine whether a QC-programme designed to promote rational GP prescribing succeeds in changing practice when added to audit and feed-back, academic detailing.	Meetings were monthly and group composition remained the same over time.	Control group: audit and feedback on prescription habits, academic detailing and educational bulletins. Intervention group: peer-led groups, monthly meetings.	Positive effect of the education strategy in groups compared to the combination of audit and feedback and academic detailing.	QCs on improving drug prescriptions in New Zealand.
Parker 2007[71]	USA (Hawaii)	Ran-domised controlled trial	PHC	4 health-care facilities of similar size participated and were randomly assigned the local or the central QI approach	Duration about 2.5 years	Compare the participatory local approach with the central expert approach to QI in depression care.	Researchers allowed teams to design their own programmes. Local QI groups had a facilitator.	The QI teams followed guidance regarding team composition and process. The central expert approach used centrally organised teams of experts.	A hybrid model (central expertise and local participation) may be the most effective approach to maintain a high level of motivation.	QCs on Hawaii compared to centrally steered options.
Som-mers 2007[72]	USA (Califor-nia)	Survey and attendance rate	PHC	Researchers invited 30 sites, 11 (103 GPs) out of 14 sites who started continued with their meetings	5 years	Introduce small-group meetings as means of managing clinical uncertainty.	A group member or an invited, external member facilitated discussions, searched for and appraised evidence and coordinated meeting logistics.	Reflection on and appraisal of one's own delivery of clinical care. Case-based discussion and reflection.	Most common themes: being with colleagues, the role of time in GP practice. Other common themes: acknowledging uncertainty, receiving validation.	Practice-Based Learning and Improvement in in California.

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Murrihy 2009[73]	Australia	Before-and-after study	PHC	6 groups of GPs (32 GPs)	6 months	Improve GPs' skills and actual use of cognitive behaviour therapy. 8 two-hour sessions.	Expert-led small-group interactive learning, and ongoing discussion of patients.	Development of mentor-type relationships, the use of interactive learning and skills-based training, discussion of ongoing patients.	GPs' knowledge, skills in and actual use of cognitive behaviour therapy increased.	QCs in Australia.
UPDATE December 2020										
Fisher 2013[74]	North East Ohio, USA	Before-and-after study and survey (qualitative data)	PHC	78 participants in 20 practices/ groups; some groups were inter-professional	1 year	The American Board of Medical Specialties' Performance and Practice initiated the project to support GPs in working in groups to improve practice.	A coach facilitated the process, led discussions, helped the team to recognise their skills, to identify the next steps and to address problems arising.	Physicians discussed their priorities for improvement, narrowed the topic, reflected on results of patient surveys and shared their view of 'best practice' using personal examples.	Introduction of QI tools into groups succeeded. Participants felt that the group activity encouraged collaboration with colleagues.	Practice-Based Learning and Improvement in the USA.
Francois 2013[75]	Isère, France	Survey	PHC	16 groups, 132 GPs	Not applicable	Review the implementation of QCs by mapping the groups, describe the perspective of participants and study how these groups work.	Facilitators helped the groups to share experiences and to discuss difficult cases and medical errors.	Case discussions, audit charts to analyse prescription habits, interactive learning, reflective thinking and consensus-finding, local opinion leaders.	6–10 GPs in each group, meetings lasted between 1 and 2.5 hrs, 6–10 meetings per year, participants had a high level of satisfaction.	Description of QC development in Isère, France.
Wilcock 2013[76]	England	Cluster randomised controlled trial	PHC	11 practices using workshops, 12 practices usual care	12 months	Test of a tailored educational intervention on the clinical management of	Facilitated small-group workshops with practice teams.	Adult learning approach to solving real-world problems, tailoring the learning need, using	The intervention did not alter the clinical management of patients with	QC-like intervention in England testing guideline adherence.

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				(NICE guidelines)		people with dementia.		workshops at the work place.	dementia.	
Andres 2015[77]	Germany	Focus group	PHC	12 health-care professionals	Not applicable	Evaluation of 20 years' QC work	Maintaining autonomy, self-determination of topics and the process in QCs ensure the practical rele-vance of topics and emotional engagement of participants.	Case-based learning among peers in a facilitated group process is key in the QC process.	Measures to support QC-work: evidence-based information and trustworthy prescription patterns.	20 years' experience of QCs in Germany
Dowling 2015[78]	Ireland	Survey	PHC	96% of GPs participating in CME groups responded (1366), 146 groups	Not applicable	Investigate whether taking part in CME groups improves GPs' clinical knowledge.	A local, small-group setting provides live peer-group interaction, peer support and reflection on practice.	Face-to-face activities, multiple exposure, the use of multi-media and multiple education techniques.	97% stated that they want to improve their clinical practice, 86.3% agreed that taking part in CME groups is key for this.	QCs in Ireland
Ver-bakel 2015[79]	The Nether-lands	A three-group cluster randomised controlled trial	PHC	10 groups in each intervention group	4 months	Assess the effect of two interventions on patient safety culture: a survey compared to adding a QC-like intervention compared to usual care.	Team-based reflection on personal practice data and team-based development of action plan.	Didactics were added to the experiential learning principles of Kolb, for example, concrete experience, reflection, conceptualisation, and experimentation.	Increased reporting of critical incidents	Dutch QC study on improving patient safety culture.

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Mahl-knecht 2016[80]	Austria (Salzburg) and Italy (Tirol)	Before-and after-study	PHC	20 GPs in regional QC groups (number of groups not mentioned)	3 years	Assess whether quality can be improved by self-auditing, benchmarking and QCs.	Facilitated, regular group meetings	Critical self-reflection, audits and feedback, benchmarking.	The mean quality score increased significantly.	Austrian–Italian study using benchmarking in QCs.
Vervloet 2016[81]	The Nether-lands	Controlled before-and-after study	PHC	4 groups (39 GPs) in the intervention and 4 groups (38 GPs) in the control group	1 year	Evaluate the effect of a multifaceted, peer-group-based intervention aiming to reduce respiratory tract related antibiotic prescriptions.	A series of regular meetings between GPs and pharmacists in the same catchment area.	Communication skills training, including communication about delayed prescribing, quarterly feedback figures for GPs.	Guideline adherence increased.	Dutch QC study on improving drug prescription involving pharmacists.
Jäger 2013[82]	Germany	Protocol of a cluster randomised controlled trial	PHC	10 QCs (40 GPs)	6 months	To implement structured medication counselling, use of medication lists and medication reviews to avoid potentially inappropriate medication.	QC meetings every three months.	Development of individual concepts of change and their presentation at QC meetings. Posters and flyers for patients. Written feedback on individual practice patterns.	The degree of implementation of the three recommendations measured at patient level.	German QC study on improving drug prescription.
Jäger 2015[83]	Germany	Description of intervention	PHC	12 GPs and 8 medical practice assistants from 8 practices participated in the workshop.	6 months	Describe the content and delivery of the tailored intervention.	No further mention of QCs in the paper.	Workshops about structured medication counselling, use of medication lists and medication reviews to avoid potentially inappropriate medication.	The workshop seemed to improve participants' knowledge of medication management.	German QC study on improving drug prescription.

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Jäger 2017[84]	Germany	A cluster randomised controlled trial	PHC	Intervention group: 10 GPs in 5 different QCs; control group: 11 GPs in 6 different QCs,	6 months	As above in Jaeger 2013	Not mentioned	Training for GPs and medical practice assistants, educational material for patients, individually developed action plans, written feedback on prescription patterns.	Little or no effect of the tailored programme on the combined primary outcome could be substantiated. Lack of statistical power to detect any effect.	
Jäger 2017[85]	Germany	Interviews	PHC	Analysis of 12 interviews, 21 question-naires, 120 documenta-tion forms.	Evalua-tion of 6 months' study	To evaluate the study Jaeger 2017 using various data sources.	Facilitation or group dynamics were not described as QCs were not used as planned.	Workshop-like atmosphere of one meeting.	Patients were not able to use the tablets provided. Participants suggested integrating the training into QCs.	
Ter Brugge 2017[86]	The Nether-lands	Mixed-methods design: question-naire about types of group meetings followed by interviews	PHC	78 out of 128 GP supervisors filled out the questionnaire; 18 GP supervisors were interviewed	Not applicable	Examine different types of group meeting and explore the use of clinical research evidence.	Little discussion on clinical applicability of evidence.	Guidelines, local opinion leaders who lecture, consensus discussion.	QCs are the type of group meeting that occur most often in PHC. They seem to be more goal-oriented than learning-oriented. The agenda was heavily influenced by health insurance companies.	Dutch QC study on improving drug prescription involving pharmacists.

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Trietsch 2017[87]	The Nether-lands	A cluster randomised controlled trial	PHC	21 QCs (197 GPs)	3 years	Test the effect of audit and feedback with peer review on GP' prescribing and test-ordering performance.	Facilitation by local opinion leaders (laboratory specialist or local pharmacist) who were trained in a three-hour meeting. The groups met twice for each topic.	Facilitators had written and digital evidence-based materials, individual feedback reports	The increase in total tests ordered was 3% in the intervention and 15% in the control group. The increase in prescriptions was 20% in the intervention and 66% in the control group.	Dutch QC study on improving test ordering and drug prescription.
Andres 2018[88]	Germany	Controlled before and after study	PHC	48 GPs	12 months	Test the effect of audit and feedback with peer review on quality indicators for coronary heart disease (CHD)	Classic German QC without further description	Individually presented 11 quality indicators for patients with CHD; feedback reports for each doctor's practice at two QC meetings	For three of these indicators the increase rates were higher than those in the Bavarian control group	German study of use of quality indicators in QCs
Binienda 2018[89]	USA (Ohio)	Survey	PHC	126 GPs	Not applicable	To explore the research efforts of Practice Based Research Networks (PBRN)	Not applicable	Not applicable	PBRNs currently thrive on conducting research predominantly in quality improvement and practice transformation	QI in US

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Kral 2018[90]	Czech Republic	Case study	PHC	GPs, not stated how many	6 months	Use of quality circles as a support tool in the taking over of practices by young general practitioners.	1st meeting, identification of problems; 2nd meeting, discussion of specific issues of starting to practice; 3rd meeting, analysis of the suggested measures and implementation; 4th meeting, evaluation.	Facilitated discussions	QC work offers a good platform for young GPs in starting their own practice.	QC pilot in the Czech Republic
Park 2018[91]	Scotland	Focus groups	PHC	GPs/Practice Nurses/Pharmacists	Not applicable	To determine how groups recruit new members and discern what are the important attributes of the new members.	Not applicable	Not applicable	4 themes: group formation and purpose; group culture; experience of group members; professional socialisation.	Recruitment to PBSG in Scotland
Pedersen 2018[92]	Norway	Case series	PHC	53 health care professionals PHC	12 months	to investigate what is discussed when QCs work to complete an action form as part of an audit and feedback cycle.	Insight into their own and their colleagues' practices.	Discussion of results of the audit; identification of gaps between recommendations and local practice; choice of areas for improvement; addressing local barriers and enablers; evaluation.	Acting on audit and feedback provided an opportunity to discuss practice.	QC I Norway

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Rogn-stad 2018[93]	Norway	Cluster-randomised controlled study	PHC	80 CME groups; 7–8 GPs in each group located in the southern part of Norway	6 months: meetings once a month; the study covered 3 meetings.	To undertake a multifaceted, educational intervention to improve GPs' prescribing practice for patients aged ⩾ 70.	See Rognstad 2013	See Rognstad 2013	Reduction of Potentially inappropriate prescriptions.	Norwegian QC studies on improving drug prescriptions
Rogn-stad 2018[94]	Norway	Cluster-randomised controlled study	PHC	80 CME groups; 7–8 GPs in each group located in the southern part of Norway	6 months: meetings once a month; the study covered 3 meetings.	To explore the characteristics of the GPs responding to QC intervention.	See Rognstad 2013	See Rognstad 2013	GPs with the lowest adherence to recommended practice at baseline improved their practice most.	Norwegian QC studies on improving drug prescriptions
Will-man 2018[95]	Scotland	Survey	PHC	Not known	Not applicable	To assess the educational impact of PBSGL.	Not applicable	Not applicable	PBSGL is an essential pillar for supporting all doctors in Defence Primary Healthcare.	Scottish PBSGL

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Cunningham 2019[96]	Scotland	Evaluation	PHC	Not applicable	Overview of 17 years	To increase clinical knowledge and to implement it.	Facilitated discussion case presentations; study of current evidence base; proposal of changes to practice.	Members are encouraged to make a commitment to change, to log these changes in a shared document, and to review changes with their colleagues.	3,400 members drawn from GPs, GP nurses, pharmacists and other professions.	Scottish PBSGL overview
Dowling 2019[97]	Ireland	Survey	PHC	1686 GPs answering the questionnaire	Not applicable	To examine whether local, accessible ongoing CME-SGL for rural GPs meets their educational needs.	Not applicable	Not applicable	87% reported that their educational needs were fully or mostly met.	Irish CME groups
Martin 2019[98]	Switzer-land	Before and after study	PHC	9 GPs	2 years	Assess status of colorectal carcinoma screening and use of shared decision when choosing screening method.	Facilitated small group work according to Swiss standards.	data-driven Plan-Do-Study-Act cycles to implement changes in practice.	Through data-driven PDSA cycles and organisational changes, GPs implemented SDM tools in their daily routine.	Swiss QC on screening of colorectal carcinoma

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Sieben-hofer 2019[99]	Germany	Cluster randomised controlled study	PHC	52 general practices	24 months	To examine whether case management reduces thromboembolic events and major bleeding events.	Training for healthcare assistants; information and quality circles for GPs; 24 months of case management.	Quality circles to discuss practical problems; case discussions.	The intervention appears to have positively influenced several process parameters under 'real-world conditions'.	German QCs on antithrombotic treatment
Armson 2020[100]	Canada	Mixed methods	PHC	139 GPs	Not apppli-cable	To assessed feasibility and effectiveness of practice-based small-group learning in academic half days; question-naire and interviews.	Participants were divided into groups of 14-16 members to discuss 12 different module topics.	Presentation of clinical cases presented in educational modules and reflection on own clinical experiences; trained peer facilitator.	Feasible approach for half day learning sessions.	Canadian PBSGL
Dowling 2020 [101]	Ireland	Before and after study using mixed methods	PHC	4 CME groups including 43 GPs	6 months	To identify whether CME-small group learning increases knowledge and changes behaviour; questionnaires, prescribing audits and qualitative focus groups.	A two-hour teaching module on deprescribing in older patients was devised and implemented.	Needs assessment; four case studies and own examples; facilitated discussion.	Learning outcomes seemed achieved; 79.9% of cases were de-prescribed; sharing experiences helped them change practice	Irish CME groups

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Mahl-knecht 2020[102]	Austria and Italy	Before and after study	PHC	56 GPs	2 years	To assess the changes in quality of life (QoL) and patient satisfaction of chronically ill patients in Tyrol and South Tyrol.	Not described	Intervention consisted of self-audit, benchmarking and QCs	The impact of the intervention was not significant within the intermediate time periods analysed in the study.	QCs in Tyrol (Austria and Italy)
Mercer 2020[103]	Scotland	Survey	PHC	4371 GPs	Not applicable	To determine GPs' views on QCs.	QC participants were asked to what extent QCs were: 1) well organised; 2) friendly; 3) well facilitated; and 4) productive	Not applicable	2456 responses were received from 4371 GPs (56.4%). QCs are in need of more support to improve quality of care	Scottish PBSGL
Plüss-Suard 2020[104]	Switzer-land	Before and after study	PHC	GPs, nurses and pharmacists	6 Years	To describe antibacterial use in long-term care facilities and to investigate the determinants of use.	Improving the enforcement of clinical guidelines within long term care facilities prescribing practices.	Benchmarking, analysis of attitudes towards guidelines, building consensus and evaluation of results.	Antibacterial use decreased from 45.6 to 35.5 DDD per 1000 beds per day.	Swiss QC on drug prescription

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Author year	Country	Study design	Set-ting	Participants, professional background	Study duration	Objective and intervention setting	Facilitation and group dynamics	Didactic and QI technique	Outcome oriented data	Common characteristics of the cluster (kinship)
Kamradt 2018[105]	Germany	Study protocol: three-armed cluster randomised trial compared to standard care	PHC	193 practices	3 years	To examine the change of the antibiotic prescription rate within three intervention arms and the comparison between the three intervention arms	Various social mechanisms influence the spread of new attitudes and behaviours	A: e-learning, QCs, data feedback B: A plus in addition, feedback tailored for practice staff C: A plus computerized support and multiprofessional QC.	Established indicators of the European Surveillance of Antimicrobial Consumption Network. Process evaluation: interviews.	German QC for rational antibiotic prescribing patterns. Effectiveness study is still pending.
Poss-Doering 2020[106]	Germany	Evaluation: interviews and surveys	PHC	76 GPs and 80 medical assistants	Not applicable	To describe the individual and organizational factors affecting the uptake of this multi-faceted program using surveys and interviews	Not applicable	Not applicable	Highest uptake gave feedback reports, background information, e-learning modules and disease-specific QCs.	
Poss-Doering 2020[107]	Germany	Evaluation: interviews	PHC	GPs, medical assistants and stakeholder representa-tives	Not applicable	To explore factors and processes attributed to the network's contribution to improving antibiotic prescribing.	Not applicable	Not applicable	Professional peer exchange, social support and reassurance contributed to behaviour change.	

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Author year	Country	Study design	Set-ting	Participants, professional background	Study duration	Objective and intervention setting	Facilitation and group dynamics	Didactic and QI technique	Outcome oriented data	Common characteristics of the cluster (kinship)
Stewart 2020[108]	Scotland	Evaluation: interviews	PHC	GPs, secondary care doctors	Not applicable	To identify the perceptions and experiences of participants in mixed groups of general practitioners and secondary care doctors	Not applicable	Not applicable	There was desire to improve working relationships; logistics of arranging further meetings seemed challenging.	Scottish PBSGL in mixed groups (GPs and secondary care doctors)

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