Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes

Review questions and review protocols

September 2014

Contents

1. Medicines-related patient safety incidents

	Details
Review question a)	What systems for identifying, reporting and learning from medicines-related patient safety incidents are effective and cost-effective in reducing medicines-related patient safety incidents, compared to usual care?
Objectives	To determine the effectiveness and cost-effectiveness of systems for identifying, reporting and learning from medicines-related patient safety incidents to reduce medicines-related patient safety incidents, compared to usual care. Medicines-related patient safety incidents are **unintended or unexpected incidents** that were specifically related to medicines use, which could have, or did, lead to patient harm. These include: • potentially avoidable medicines-related hospital admissions and re-admissions • prescribing errors • dispensing errors • administration errors • monitoring errors • potentially avoidable adverse events • missed doses of medicines • near misses (a prevented medicines-related patient safety incident which could have led to patient harm)
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text) If insufficient evidence is available progress to: Conference abstracts
Population	All children, young people and adults using medicines.
Intervention	Systems for identifying, reporting and learning from medicines-related patient safety incidents including, but not limited to: • Pharmacist-led information technology intervention (PINCER) • National Reporting and Learning System (NRLS) • Significant event audits • Medication safety thermometer • Serious incident reporting • Computerised alert systems

	• Root cause analysis • STOPP/START screening tool • Beers criteria
Comparator	Standard care, usual care or no intervention
Outcomes	Critical outcomes: • Mortality • Patient reported outcomes, such as medicines adherence, patient experience and patient satisfaction • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste Important outcomes: • Clinical outcomes as reported in the study • Health and social care utilisation • Planned and unplanned contacts • Health and social care related quality of life, for example long-term harm, disability
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies investigating the causes or prevalence of medicines-related patient safety incidents • Studies investigating patient safety incidents (including hospital admissions and re-admissions, errors and near misses) that are not directly related to medicines use, for example due to inadequate staffing levels • Studies investigating expected or predicted medicines-related patient safety incidents • Studies investigating adverse effects that are not potentially avoidable
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Polypharmacy and medicines optimisation: making it safe and sound **Observational studies** GMC. An in depth investigation into causes of prescribing errors by foundation trainees in relation to their medical education – EQUIP study (2009) The King's Fund. Polypharmacy and medicines optimisation: making it safe and sound (2013)
Identified papers from scoping search that addresses the review question	**Systematic reviews** Interventions to reduce medication errors in adult intensive care: a systematic review (Provisional abstract) (2012)

	Lainer M, Mann E, Sönnichsen A. Information technology interventions to improve medication safety in primary care: a systematic review. Int J Qual Health Care (2013) 25 (5): 590-598 Interventions to optimise prescribing for older people in care homes (2013) **RCTs** NHS EED. A pharmacist led information technology intervention for medication errors (PINCER): a multicentre, cluster randomised, controlled trial and cost effectiveness analysis (Structured abstract) (2012) **Observational studies** GMC. Investigating the prevalence and causes of prescribing errors in general practice: The PRACtICe study. A report for the GMC (2012) Cousins DH, Gerrett D, Warner B. A review of medication incidents reported to the National Reporting and Learning System in England and Wales over 6 years (2005-2010). Br J Clin Pharmacol. 2012 Oct;74(4):597-604 A tiered approach is more cost-effective than traditional pharmacist-based review for classifying computer-detected signals as adverse events. (2013) **Others** NHS EED. Modelling the expected net benefits of interventions to reduce the burden of medication errors (Structured abstract) (2008) Mitigation of medication mishaps via medication therapy management (Provisional abstract) (2009) On ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study (Provisional abstract) (2010) Reported medication errors in the community residences for Individuals with mental retardation: a quality review (1999)

2. Medicines-related communication systems

	Details
Review question i)	What communication systems are effective and cost-effective in reducing sub-optimal use of medicines and improving patient outcomes from medicines when patients move from one care setting to another, compared to usual care, or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of communication systems in reducing sub-optimal use of medicines and improving patient outcomes from medicines when patients move from one care setting to another, compared to usual care, or other intervention. Patient's moving from one care setting to another includes, but is not limited to: • Transfer to or from hospital • Transfer from one hospital ward to another, or to theatre • Transfer to or from respite care Communication systems relating to medicines may be electronic, written or verbal and includes, but is not limited to: • Discharge summaries • Discharge counselling • Immediate discharge letters • Summary care records

	• Standard templates/core datasets • Patient handheld records • Patient 'passports' • Telemedicine • Case meetings Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Communication systems
Comparator	Standard care, usual care, no intervention or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Practitioner reported outcomes, such as reduced workload, professional satisfaction • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability

	• Sub-optimal medicines use
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Communication systems that are not medicines-related or reproducible.
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Royal Pharmaceutical Society(2013) Medicines Optimisation: Helping patients to make the most of medicines Royal Pharmaceutical Society (2012) Keeping patients safe when they transfer between care providers – getting the medicines right. Good practice guidance for health professionals.
Identified papers from scoping search that addresses the review question	**Systematic review** Improving patient handovers from hospital to primary care (2012) **Economic evaluation** A cost effectiveness evaluation of hospital discharge counseling by pharmacists (Provisional abstract) (2012) **Other** Enabling medication management through health information technology (2011) Agency for Healthcare Research and Quality

3. Medicines reconciliation

	Details
Review question c)	What is the effectiveness and cost-effectiveness of medicines reconciliation to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care?
Objectives	To determine the effectiveness and cost-effectiveness of medicines reconciliation to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care. Medicines reconciliation is defined as: 'the process of identifying the most accurate list of a patient's current medicines – including the name, dosage, frequency and route – and comparing them to the current list in use, recognising any discrepancies, and documenting any changes, thus resulting in a complete list of medications, accurately communicated' (Institute for Healthcare Improvement). Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing

	• over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems Medicines-related patient safety incidents are unintended or unexpected incidents that were specifically related to medicines use, which could have, or did, lead to patient harm. These include: • potentially avoidable medicines-related hospital admissions and re admissions • prescribing errors • dispensing errors • administration errors • monitoring errors • potentially avoidable adverse events • missed doses of medicines • near misses (a prevented medicines related patient safety incident which could have led to patient harm)
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text) If insufficient evidence is available progress to: Conference abstracts
Population	All children, young people and adults using medicines
Intervention	Medicines reconciliation, as defined above
Comparator	No intervention
Outcomes	Critical outcomes: • Mortality • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Patient reported outcomes, such as medicines adherence, patient experience and patient satisfaction Important outcomes: • Clinical outcomes as reported in the study • Health and social care utilisation

	• Planned and unplanned contacts • Health and social care related quality of life
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies investigating patient safety incidents (including hospital admissions and re admissions, errors and near misses) that are not related to medicines use, for example inadequate staffing levels • Studies investigating specific named medicines • Studies investigating shared care arrangements for medicines used across primary and secondary care. • Studies primarily investigating patient education in relation to medicines reconciliation • Studies primarily investigating education and training of health and social care practitioners in relation to medicines reconciliation
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Technical patient safety solutions for medicines reconciliation on admission of adults to hospital. NICE patient safety guidance 1 (2007) National Prescribing Centre. Medicines reconciliation: a guide to implementation (2008) The King's Fund. Polypharmacy and medicines optimisation: making it safe and sound
Identified papers from scoping search that addresses the review question	**Systematic reviews** CRD. Pharmacy led medicine reconciliation (MR) services in hospital care: a systematic review (2012) Hospital-based medication reconciliation practices (2012) Nurse pharmacist collaboration on medication reconciliation prevents potential harm (Provisional abstract) (2012) **RCTs** A randomized controlled trial of a pharmacist consultation program for family physicians and their elderly patients (Structured abstract) (2003) **Observational study** Brownlee K, et al. Medication reconciliation by a pharmacy technician in a mental health assessment unit. Int J Clin Pharm (November 2013)

4. Medication review

	Details
Review question b)	What is the effectiveness and cost-effectiveness of medication reviews to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care?

Objectives	To determine the effectiveness and cost effectiveness of medication reviews to reduce sub-optimal use of medicines and medicines-related patient safety incidents, compared to usual care. Medication review is defined as: 'a structured, critical examination of a patient's medicines with the objective of reaching an agreement with the patient about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste' (NPC 2008). This includes, but is not limited to: • multidisciplinary medication reviews • medicines use reviews • clinical medication reviews • opportunistic (ad-hoc) medication reviews Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems Medicines-related patient safety incidents are **unintended or unexpected incidents** that were specifically related to medicines use, which could have, or did, lead to patient harm. These include: • potentially avoidable medicines-related hospital admissions and re admissions • prescribing errors • dispensing errors • administration errors • monitoring errors • potentially avoidable adverse events • missed doses of medicines • near misses (a prevented medicines related patient safety incident which could have led to patient harm)
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand If insufficient evidence is available progress to:

	• Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text) If insufficient evidence is available progress to: Conference abstracts
Population	• All children, young people and adults using medicines • All children, young people and adults who are receiving sub-optimal benefit from medicines, for example, not receiving a medicine when they should or could benefit from medicines, or receiving a sub-optimal dose of a medicine.
Intervention	Medication reviews (as defined above) including, but not limited to: • multidisciplinary medication reviews • medicines use reviews • clinical medication reviews • opportunistic (ad-hoc) medication reviews
Comparator	No intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Health and social care utilisation • Planned and unplanned contacts • Health and social care related quality of life for example long-term harm, disability
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies investigating patient safety incidents (including hospital admissions and re admissions, errors and near misses) that are not specifically related to medicines use, for example due to inadequate staffing levels • Studies investigating specific named medicines • Studies that primarily investigate patient education in relation to medication reviews • Studies that primarily investigate education and training of health and social care practitioners in relation to medication reviews
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables.

	Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** NICE. Medicines Adherence CG76 (2009) Department of Health Action plan for improving the use of medicines and reducing waste (2012) National Prescribing Centre. A guide to medication review (2008) Royal Pharmaceutical Society. Medicines Optimisation: Helping patients to make the most of medicines (2013) The King's Fund. Polypharmacy and medicines optimisation: making it safe and sound (2013)
Identified papers from scoping search that addresses the review question	**Systematic reviews** Interventions to optimise prescribing for older people in care homes (2013) Medication review in hospitalised patients to reduce morbidity and mortality (2013) Consumer-oriented interventions for evidence-based prescribing and medicines use: an overview of systematic reviews (2012) Interventions to improve the appropriate use of polypharmacy for older people (2012) Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people: a systematic review and meta-analysis (Structured abstract) (2008) Clinical pharmacists and inpatient medical care: a systematic review Is pharmacist-led medication review effective for chronic pain management among adult patients? A systematic review Reduction of polypharmacy in the elderly: a systematic review of the role of the pharmacist (Structured abstract) (2003) **RCTs** Clinical medication review by a pharmacist of elderly people living in care homes: randomised controlled trial (Structured abstract) Targeting suboptimal prescribing in the elderly: a review of the impact of pharmacy services (Structured abstract) **Economic evaluations** Community pharmacy based provision of pharmaceutical care to older patients (Structured abstract) Health economic evaluation of the Lund Integrated Medicines Management Model (LIMM) in elderly patients admitted to hospital (2013) The MEDMAN study: a randomized controlled trial of community pharmacy led medicines management for patients with coronary heart disease (Structured abstract) **Observational study** Multidisciplinary medication review: evaluation of a pharmaceutical care model for nursing homes (2011) Pharmacy management intervention for optimising drug therapy for nursing home patients (2004) **Other** Multidisciplinary case conference reviews: improving outcomes for nursing home residents, carers and health professionals (2001)

5. Self-management plans

	Details
Review question f)	What is the effectiveness and cost-effectiveness of using self-management plans to improve patient outcomes from medicines, compared to usual care?
Objectives	To determine the effectiveness and cost-effectiveness of using self-management plans to improve patient outcomes from medicines, compared to usual care. For the purpose of this review question, self-management plans are structured, documented plans that are developed to support an individual patient's self-management of their condition. Self-management plans are often used for patients with specific long-term conditions, such as asthma or chronic obstructive pulmonary disease. It includes patient or profession-led self-management plans.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Self-management plan
Comparator	Standard care, usual care or no intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example improved management of long-term condition
Other criteria for inclusion / exclusion of studies	Inclusion: • Self-management plans • Self-monitoring plans • Action plans/individualised action plans Exclusion: • Papers published before 2000

	• Self-management plans that are not medicines-related • Multi-faceted interventions in which a self-management plan is combined with other elements such as an education programme, exercise programme or outreach visits • Self-management plans that are not documented or not reproducible, such as verbal self-management information • Other self-management support interventions that do not include use of a self-management plan, such as monitored dosage systems, compliance aids or self-management education programmes.
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Medicines Adherence CG76 Towards personalising medicines management
Identified papers from scoping search that addresses the review question	**Systematic reviews** Consumer-oriented interventions for evidence-based prescribing and medicines use: an overview of systematic reviews (2012) What are the most clinically effective and cost-effective methods of addressing patient and carer concerns about strong opioids, including anticipating and managing adverse effects and engaging patients in prescribing decisions? A systematic review of quantitative and qualitative research on the role and effectiveness of written information available to patients about individual medicines (2007) The impact of informing psychiatric patients about their medication: a systematic review (Structured abstract) (2006) Inpatient pharmacist interventions: impact on ED visits, readmissions, length of stay, mortality, patient knowledge, medication adherence, and patient satisfaction (Structured abstract) (2012) The effect of medicine self-management programmes on hospital patient self-administration: a systematic review of the literature

6. Patient decision aids

	Details
Review question e)	What is the effectiveness and cost-effectiveness of using patient decision aids in consultations involving medicines use to improve patient outcomes, compared to usual care or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of using patient decision aids in consultations involving medicines use to improve patient outcomes, compared to usual care.

	A patient decision aid is an intervention designed to support patients' decision-making by providing information about treatment or screening options and their associated outcomes, compared to usual care and/or alternative interventions. They describe the options available and help people to understand these options as well as the possible benefits and harms. This allows patients to consider the options from a personal view, prepares them to participate with their health professional in making a decision. Patient decision aids may be electronic or paper-based tools.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Patient decision aid, as described above.
Comparator	Standard care, usual care, no intervention or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability.
Other criteria for inclusion / exclusion of studies	Inclusion: • Patient decision aid • Shared decision aid • Decision grid/option grid Exclusion: • Papers published before 2000 • Patient decision aids in which participants are not making an active treatment decision about a medicine, such as patient decision aids for screening or diagnostic tests • Compliance aids • Patient information leaflets • Health education materials
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II

	criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Medicines Adherence CG76 Polypharmacy and medicines optimisation: making it safe and sound
Identified papers from scoping search that addresses the review question	**Systematic reviews** Consumer-oriented interventions for evidence-based prescribing and medicines use: an overview of systematic reviews (2012) What are the most clinically effective and cost-effective methods of addressing patient and carer concerns about strong opioids, including anticipating and managing adverse effects and engaging patients in prescribing decisions? A systematic review of quantitative and qualitative research on the role and effectiveness of written information available to patients about individual medicines (2007) The impact of informing psychiatric patients about their medication: a systematic review (Structured abstract) (2006)

7. Clinical decision support

	Details
Review question d)	What is the effectiveness and cost-effectiveness of using clinical decision support to reduce sub-optimal use of medicines and improve patient outcomes from medicines, compared to usual care or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of clinical decision support to reduce sub-optimal use of medicines and improve patient outcomes from medicines, compared to usual care or other interventions. For the purpose of this review question, clinical decision support is an active, computerised intervention that occurs at the time and location of prescribing, to support prescribers with decision-making. Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence

	• inability of patient to use medicines as intended, for example due to dexterity problems.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Clinical decision support, as described above.
Comparator	Standard care, usual care, no intervention or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability • Sub-optimal medicines use
Other criteria for inclusion / exclusion of studies	Inclusion: • Clinical decision support • Computerised decision support Exclusion: • Papers published before 2000 • Patient-decision aids / shared-decision aids • Clinical decision support that does not occur at the time and location of prescribing. • Passive interventions at the point of prescribing e.g. use of evidence resources on medicines • Electronic prescribing, unless it specifically considers clinical decision support integrated within electronic prescribing systems • Computerised physician order entry systems, unless it specifically considers clinical decision support • Near patient testing • Remote patient monitoring
Review strategies	**Appraisal of evidence quality:**

	For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Polypharmacy and medicines optimisation: making it safe and sound **Systematic reviews** A tiered approach is more cost effective than traditional pharmacist based review for classifying computer detected signals as adverse drug events (Structured abstract)
Identified papers from scoping search that addresses the review question	**Systematic reviews** Computerized clinical decision support systems for drug prescribing and management: a decision maker researcher partnership systematic review (Structured abstract) (2011) The impact of pharmacy computerised clinical decision support on prescribing, clinical and patient outcomes: a systematic review of the literature (Structured abstract) (2010) Interventions to improve the appropriate use of polypharmacy for older people (2012) Computerized advice on drug dosage to improve prescribing practice (2008) A systematic review of the social and cognitive influences on prescribing decision-making among non-medical prescribers **Observational studies** Measuring prevalence, reliability and variation in high risk prescribing in general practice using multilevel modelling in a population database (2011) **Other** Enabling medication management through health information technology (2011) Agency for Healthcare Research and Quality

8. Medicines-related models of organisational and cross-sector working

	Details
Review question g)	What models of organisational and cross-sector working are effective and cost-effective in reducing sub-optimal use of medicines and improving patient outcomes from medicines, compared to usual care, or other intervention?
Objectives	To determine the effectiveness and cost-effectiveness of models of organisational and cross-sector working in reducing sub-optimal use of medicines and improving patient outcomes from medicines, compared to usual care. For the purpose of this review question, this includes, but is not limited to: • Health profession-led working • Social care practitioner-led working, e.g. a key worker or care co-ordinator • Multidisciplinary team-led working • Cross-sector working between health and social care providers • Cross-sector working between healthcare and pharmaceutical or

	homecare industries. Sub-optimal use of medicines includes, but is not limited to: • sub-optimal prescribing • inappropriate prescribing • poor prescribing • over-prescribing • under-prescribing • unnecessary prescribing • inadequate prescribing • under-dosing • over-dosing • patient choice/intentional non-adherence • inability of patient to use medicines as intended, for example due to dexterity problems.
Type of review	Intervention
Language	English only
Study design	• Systematic review of randomised controlled trials (RCTs) • RCTs • National guidance from the UK, Europe and other countries with similar developed health systems, for example Australia, Canada and New Zealand. If insufficient evidence is available progress to: • Systematic reviews of non-randomised controlled trials • Non-randomised controlled trials • Observational studies
Status	Published papers only (full text)
Population	All children, young people and adults using medicines.
Intervention	Profession-led or multidisciplinary team-led working, including but not limited to those as described above.
Comparator	Standard care, usual care or no intervention, or other intervention
Outcomes	Critical outcomes: • Mortality • Clinical outcomes as reported in the study • Health and social care utilisation • Patient reported outcomes, such as medicines adherence, concordance, compliance, patient experience and patient satisfaction Important outcomes: • Practitioner reported outcomes, such as reduced workload, professional satisfaction • Medicines-related problems, such as potentially avoidable hospital admissions and re admissions, errors, potentially avoidable adverse effects and medicines waste • Health and social care related quality of life for example long-term harm, disability • Sub-optimal medicines use
Other criteria for inclusion / exclusion of studies	Exclusion: • Papers published before 2000 • Studies not designed to consider the review question, such as studies

	that were primarily set up to measure the effect of an intervention, not how the intervention was delivered
Review strategies	**Appraisal of evidence quality:** For guidelines, these will be assessed for quality using the AGREE II criteria. For studies, NICE methodology checklists will be used to appraise the quality of individual studies, where appropriate. All key outcomes from evidence will be presented in GRADE profiles, where possible. **Synthesis of data:** Data on all included studies will be extracted into evidence tables. Where possible, data may be pooled to give an overall summary effect. Where data cannot be pooled, narrative summaries of the data will be presented.
Identified papers from scoping search for background, including relevant legislation (UK) or national policy	**National guidance** Royal Pharmaceutical Society(2013) Medicines Optimisation: Helping patients to make the most of medicines
Identified papers from scoping search that addresses the review question	**Systematic reviews** Interventions to optimise prescribing for older people in care homes (2013) Interventions to improve the appropriate use of polypharmacy for older people (2012) Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns (2010) US pharmacists' effect as team members on patient care: systematic review and meta analyses (Structured abstract) (2010) Targeting suboptimal prescribing in the elderly: a review of the impact of pharmacy services (Structured abstract) (2009) Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people: a systematic review and meta-analysis (Structured abstract) (2008) Clinical pharmacists and inpatient medical care: a systematic review (Structured abstract) (2006) Reduction of polypharmacy in the elderly: a systematic review of the role of the pharmacist (Structured abstract) (2003) Inpatient pharmacist interventions: impact on ED visits, readmissions, length of stay, mortality, patient knowledge, medication adherence, and patient satisfaction (Structured abstract) (2012) Is pharmacist-led medication review effective for chronic pain management among adult patients? A systematic review Pharmacy led medicine reconciliation (MR) services in hospital care: a systematic review Nurse pharmacist collaboration on medication reconciliation prevents potential harm (Provisional abstract) (2012) How effective and cost-effective are pharmacy-based minor ailments schemes? A systematic review Evaluating the impact of pharmacists in mental health: a systematic review (Provisional abstract) (2003) Interventions of hospital pharmacists in improving drug therapy in children a systematic literature review (Provisional abstract) (2006) **RCTs** Clinical pharmacists on medical care of pediatric inpatients: A single center randomized controlled trial (Provisional abstract) (2012) The MEDMAN study: a randomized controlled trial of community pharmacy

	led medicines management for patients with coronary heart disease (Structured abstract) (2007) Clinical medication review by a pharmacist of elderly people living in care homes: randomised controlled trial (Structured abstract) (2006) **Economic evaluations** A cost effectiveness analysis of an in hospital clinical pharmacist service (Provisional abstract) (2012) On ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study (Provisional abstract) (2010) Clinical and economic outcomes of medication therapy management services: the Minnesota experience (Provisional abstract) (2008) Community pharmacy based provision of pharmaceutical care to older patients (Structured abstract) (2003) Health economic evaluation of the Lund Integrated Medicines Management Model (LIMM) in elderly patients admitted to hospital (2013) A cost effectiveness evaluation of hospital discharge counseling by pharmacists (Provisional abstract) (2012) Evaluating the impact of pharmacists in mental health: a systematic review (Provisional abstract) (2003)

9. Economic review protocol

Review question	**All questions – health economic evidence**
Objectives	To identify economic evaluations relevant to the review questions
Criteria	• Populations, interventions and comparators must be as specified in the individual review protocols above. • Studies must be of a relevant economic study design (cost–utility analysis, cost–benefit analysis, cost-effectiveness analysis, cost–consequence analysis, comparative cost analysis). • Studies must not be an abstract only, a letter, editorial or commentary, or a review of economic evaluations.[(a)] Unpublished reports will not be considered unless submitted as part of a call for evidence. • Studies must be in English.
Search strategy	An economic study search will be undertaken using an economic study filter – see Appendix C.1.
Review strategy	Each study fulfilling the criteria above will be assessed for applicability and methodological limitations using the NICE economic evaluation checklist which can be found in Appendix G of the NICE guidelines manual (2012). **Inclusion and exclusion criteria** • If a study is rated as both 'Directly applicable' and with 'Minor limitations' then it will be included in the guideline. An economic evidence table will be completed and it will be included in the economic evidence profile. • If a study is rated as either 'Not applicable' or with 'Very serious limitations' then it will usually be excluded from the guideline. If it is excluded then an economic evidence table will not be completed and it will not be included in the economic evidence profile. • If a study is rated as 'Partially applicable', with 'Potentially serious limitations' or both then there is discretion over whether it should be included. **Where there is discretion** The health economist will make a decision based on the relative applicability and quality of the available evidence for that question, in discussion with the GDG if required. The ultimate aim is to include studies that are helpful for decision-making in the context of the guideline and the current NHS setting. If several studies are considered of sufficiently high applicability and methodological quality that they could all be included, then the health economist, in discussion with the

	GDG if required, may decide to include only the most applicable studies and to selectively exclude the remaining studies. All studies excluded on the basis of applicability or methodological limitations will be listed with explanation as excluded economic studies in Appendix C.6. The health economist will be guided by the following hierarchies. *Setting:* • UK NHS • OECD countries with predominantly public health insurance systems (for example, France, Germany, Sweden) • OECD countries with predominantly private health insurance systems (for example, USA, Switzerland) • non-OECD settings (always 'Not applicable'). *Economic study type:* • cost–utility analysis • other type of full economic evaluation (cost–benefit analysis, cost-effectiveness analysis, cost–consequence analysis) • comparative cost analysis • non-comparative cost analyses including cost-of-illness studies (always 'Not applicable'). *Year of analysis:* • The more recent the study, the more applicable it is. *Quality and relevance of effectiveness data used in the economic analysis:* • The more closely the effectiveness data used in the economic analysis matches with the outcomes of the studies included in the clinical review the more useful the analysis will be for decision-making in the guideline.