

Online supplementary

Online supplementary A: Literature databank search string

("medication plan*" [MeSH]) OR ("medication list*" [MeSH]) OR ("medication schedule*" [MeSH]) OR ("medication chart*" [MeSH]) OR ("Medikationsplan" [MeSH]) OR ("Medikamentenplan" [MeSH]) OR ("Medikationsliste*" [MeSH]) OR ("Medikamentenliste*" [MeSH]) OR ("Medikamentenpläne" [MeSH]) OR ("Medikationspläne" [MeSH]) OR ("medication plan*" [Title/Abstract]) OR ("medication list*" [Title/Abstract]) OR ("medication schedule*" [Title/Abstract]) OR ("medication chart*" [Title/Abstract]) OR ("Medikationsplan" [Title/Abstract]) OR ("Medikamentenplan" [Title/Abstract]) OR ("Medikationsliste*" [Title/Abstract]) OR ("Medikamentenliste*" [Title/Abstract]) OR ("Medikamentenpläne" [Title/Abstract]) OR ("Medikationspläne" [Title/Abstract])

Online supplementary B: PRISMA Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2, 3, 5
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4, 5
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	5
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5, 6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Online supplement A
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6

Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6, 7
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	NA
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	6, 7
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	NA
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7, 8, Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7, 8, Online supplement C
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	7, 8, Online supplement C
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	8-11
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	NA
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	NA
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	NA
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	11, 12

Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	14, 15
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	15, 16
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	16

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: www.prisma-statement.org.

Online supplementary C: Characteristics of 30 included studies (all contents were expressed in the original language)

No	First author, year of publication	Design	Population	Country	Aim	Method	Benefit	Quality
1	Botermann, 2016 [1]	CSS	N = 90 patients, Ø age: 69 y, ♀: 47%, drugs per patient: 8±3	GER	Comprehension of MC, transfer information into practice	Structured interviews and practical part: fictional MC (6 drugs) had to fill a pillbox for 48h, interview about attitude towards MC; quantify comprehension with an evaluation tool (ET-MP) ranging from 0 - 100%, <90%: patient didn't comprehend MC, >90%: patient comprehended MC;	86% rated MC as clearly arranged, 82% rated MC as helpful, 78% would take their MC to every doctor's appointment or pharmacy visit; 43% were able to transfer the written information into practice; medication list has been identified as a patient safety indicator, MC can only improve medication safety if it is complete and up to date, MC only is not enough to improve safety;	WEAK
2	Manning, 2007 [2]	RCT	N = 138 patients, Ø age: 68 y, ♀: 54.7%, drugs per patient: 9.4	USA	comparison of two MCs regarding: satisfaction, knowledge and medication errors	Discharge: each patient randomly received either a MDW or 3D-MC, patients with 3D-MC could affix a tablet/capsule onto the plan, structured telephone interview after 7-14 d (research assistant blinded) about satisfaction with MC, knowledge of medication (indication, dosing frequency, special comments or cautions) and self-reported safety ("Did the MC assist you in preventing medication errors?");	no difference in patient satisfaction or self-reported medication errors; 3D-MC was associated with greater understanding of prescribed medications (p<0.0282); Over 80% of all patients indicated that MC helped them "avoid making mistakes with medications"; 3D-MC offers an advantage in patient medication knowledge;	STRONG
3	Eickhoff, 2019 [3]	Q/WS	N = 11 Arzt-Apotheker-teams	GER	Umsetzung/Machbarkeit der Software zur Produktion von BMP, Akzeptanz von Ärzten und Apothekern	Erstellung, Austausch und Aktualisierung von MCs im Alltag, pharmazeutische und ärztliche Medikationsanalyse: AMTS Prüfung der Medikation; Fragebögen: Motivation der Teilnahme, Zufriedenheit mit technischer Umsetzung, den Prozessen im MM, dem Projektnutzen und der Verwendung des MC durch Patienten (N=196); Workshop mit Ärzten und Apothekern;	6/10 Ärzte, 5/8 Apotheker waren insgesamt mit den Prozessen zufrieden; Einbettung von Bewertungstool (z.B. PRISCUS-Liste) in Software gewünscht; MC ist verständlich für Patienten (8/10 Ärzte, 7/8 Apotheker), 80% bewerten die Kommunikation zwischen Arzt-Apotheker als positiv, Ärzte erfahren mehr über Medikation anderer (Fach-)Ärzte (7/10), Apotheker erfahren mehr über Gesundheitszustand der Patienten (7/8); Verbesserung des fachlichen Austauschs und beruflichen Zusammenarbeit, BMP wird als Instrument für Erhöhung der AMTS eingestuft, für die Mehrheit der Teilnehmer lohnt sich der höhere Zeitaufwand im Hinblick auf AMTS Verbesserung;	WEAK

4	Strauss, 2018 [4]	CSS	N = 375 Passanten, Ø Alter 57 J, ♀ 63.2%, ≥1 AM pro Teilnehmer: 61.9%	GER	Welchen Nutzen sehen Bürger in einem MC; aus welchen Gründen würden sie einen MC nutzen bzw. nicht nutzen;	qualitative Feldbefragung mittels teil-standardisierten Interviewleitfaden mit offenen Fragen, MC („MeinPlan“) als Anschauung;	Orientierungshilfe (Dosierung/ Einnahmezeit; 25.7%), Gedächtnisstütze (Verwechslung vermeiden; 9.6%), Dokumentationsmittel (3.9%), Informationsquelle (Überblick über WW, UAW 3.9%), Reflexion über Gesundheitszustand (2.9%); 37.3% Kommunikation mit GDL, Schaffung von Transparenz; Hilfe für Angehörige/Dritte bei komplexer Therapie; Möglichkeit zur Verbesserung der AMTS; Mehrheit sehen hohen Nutzen im Führen eines MC: ärztliche Vorgaben können vom Patienten selbst verfolgt werden, Förderung der AMTS/Adhärenz (richtige Einnahme trotz mehrerer Medikamente, WW vermeiden, Doppelverordnung vermeiden), nur Aushändigen eines MCs genügt nicht zur Förderung der AMTS, Wirtschaftlichkeit (Zeitersparnis bei Anamnese, überflüssige AM identifizieren);	WEAK
5	Leonhard, 2008 [5]	CSS	N = 596 patients, Ø age 71.3 y, ♀ 62.75%	USA	improve the accuracy of MCs;	patients got a personal MC and medication bag for transporting medicines at hospital discharge, outcome measure: number of accurate MCs before and after intervention, patients received training on medication safety and importance of communication with their providers, post-intervention survey with patients; "accurate MC" was defined as the conformity between the clinics' medication chart and the patients' MC or bag of medicines;	69% felt the personal MC made it easier to talk with their provider about their medications; comments from provider: MC helps having a more accurate MC on file, MC support communication, partnership tool for patient-provider communication, preferred self-management tool by patients and providers, measured awareness of patients of the importance of sharing medicines with all healthcare providers, 55% of the MCs in the interventions clinics were accurate (63% in control clinics) at baseline, after intervention: 72% (+17%) vs. 56% (p=0.034);	WEAK
6	Rose, 2017 [6]	CSS	N = 142 patients, Ø age 76.7 y, ♀ 53.5%, drugs per patient: 10.5	GER	estimate and rank discrepancies between prescription and actually taken medicine, impact on medication safety;	standardized assessment questionnaire at patients home about drug regimen (name, strength, prescriber, dosage, timing, indication, handling), adverse drug events, falls, pain, vertigo, social support; comparison of medication with physicians documentation, relevance classification of discrepancies: risk for hospitalization, falls and potential DDI: "low risk" or "high risk";	discrepancies affected 94.4% of patients, 2.8 drugs per patients were not documented, 13.7% patients used an undocumented drug with risk for falls, 76.1% patients used an undocumented drug with risk for DDI, 65.8% of the undocumented drugs caused at least 1 DRP;	WEAK

7	Waltering, 2015 [7]	CSS	N = 500 patients, Ø age 72.9 y, ♀ 54.7%, drugs per patient: 8.6	GER	define factors that influence accuracy of MCs, detect discrepancies from planned and actually taken medication;	Medication review (type 2a): patient interview, data from pharmacy records and brown bag analysis were compared to current MC;	6.5% of MCs showed no discrepancies; mean of 5.4 discrepancies per plan, one Rx drug is missing on every second MC;	WEAK
8	Bruehwiler, 2016 [8]	CSS	N = 45 patients, Ø age 67.6 y, ♀ 40.0%	GER	do patients understand MCs, ask for patients' needs	patients were given 4 fictive MCs with 7 drug regimen, proof of comprehension with open questions, asking for need of additional content of the MC, design an individual MC in an empty table;	73% correctly interpreted the abbreviation «Mo» as «Morgen», 24% incorrectly as Monday, «Na» (Nacht) was recognized as bedtime by 56%; 11% understood: afternoon (Nachmittag); 42% correctly interpreted the maximum daily dose regarding the instruction «max. 2 tablets max. 4x/24 h», «ML» was understood by 24%; 91% preferred brand names in the first column, eMediplan is favorite for experts and patients for overview;	WEAK
9	Vasileff, 2009 [9]	CSS	N = 74 patients, Ø age 76.5 y, ♀ 52.2%, drugs per patient: 7.9	AUS	determine frequency and clinical significance of medication errors	compilation of medication history before (intervention group) and after (control group) the patients being seen by a doctor using MedMAP (tool for communication of medications-related issues) comparison of patients' history with prescribed medicines;	accuracy increased when the pharmacy researcher prepared MC; increased accuracy significantly reduces the frequency of unintentional discrepancy from 78.6% to 3.3%, average number of discrepancies from 2.51 to 0.03 (p<0.05) per patient; most frequent unintentional medication error was medication omission: 75.6% control group vs. 3.4% intervention group, 2.35 doses per patient missing in control group vs. 0.24 (p<0.05); 52% of discrepancies with potential significant impact on patients' health outcome;	WEAK

10	Raynor, 1993 [10]	RCT	N = 197 patients, Ø age 69 y, ♀ 44.2%, drugs per patient: 3.65	UK	investigate whether a MC improves compliance or knowledge of drug regimen	At discharge: one half got routine nurse counselling, the other half pharmacist counselling, 50% of each group got an individualized MC, interviews after 10 days at home, compliance was measured by pill count, compliance score: number of tablets taken divided by the correct number of tablets x 100%;	knowledge of drug regimen (how many times, how many doses each time, actual time): 83% (with MC) vs. 47% (w/o MC); compliance score: 93% with MC vs. 86% w/o MC (p<0.001); MC had a significant effect on compliance; significantly increased number of patients who correctly answered questions about their drug regimen (p<0.001);	MODERATE
11	ABDA, 2014 [11]	Report	-	GER	Überblick über Konzepte zur MA und MM als Tätigkeit in Apotheken	Verdeutlichung Unterschied MA und MM, verschiedene Typen der MA, Abgrenzung der MA/MM als Dienstleistung von Beratung/Information bei AM-Abgabe, Darstellung des aktuellen Stands in GER, Voraussetzungen für Implementierung, Bedeutung für Patienten und interprofessionelle Zusammenarbeit;	aktueller, vollständiger MC von zentraler Bedeutung für Medikationsprozess und AMTS, MCs können Missverständnisse bzgl. der Anwendung vermeiden, Adhärenz verbessern, für Behandlungserfolg und zur Reduktion von ABP sollte Patient gut über Therapie informiert sein und aktuellen MC besitzen; am Übergang ambulant zu stationär kann aktueller MC entscheidenden Beitrag zur AMTS leisten, erleichtert Anamnese;	n.a.
12	Freyer, 2016 [12]	Kohortenstudie	N = 179 Patienten, Ø Alter 77 J, ♀ 60.34%, Arzneimittel pro Patient: 8.5	GER	Untersuchung des Wissensstands über AM von Patienten bei KH-Entlassung, Einflussfaktoren identifizieren	strukturiertes Interview am Tag vor KH-Entlassung, Fragen zu Entlassmedikation (WS/AM-Name, Indikation, Darreichungsform, Wirkstärke, Dosierschema), Vergleich mit stationärer Patientenakte/Akte beim Hausarzt; Definitionen: Wissenstand = Anteil zutreffend benannter Medikamente pro Patient;	48% benannten AM-/WS-Name richtig; Einflussfaktoren für Wissensdefizite: kein MC, Patienten mit MC konnten mehr Entlassungsmedikamente zutreffend benennen; Verwendung eines MCs führt zur Erhöhung des Wissensstands um 45.42% (p<0.001), MC ist geeignete Unterstützung zur strukturierten Beratung über Entlassmedikation, Aushändigung eines (vollständigen) MC ist wichtige qualitätssichernde Massnahme zur Sicherstellung der Patientensicherheit an Behandlungsübergängen; signifikanter Zusammenhang zwischen Wissensstand der Patienten und Einflussfaktor „Nutzung eines MCs“, >75% bekamen bei Entlassung mind. ein neues AM verschrieben;	WEAK

13	Kannampalli, 2013 [13]	Cohort study	N = 144 patients, Ø age 71 y, ♀ 64%	USA	comparison between standard used MedCard and new developed Medtable,	patients were paired randomly as the role of a patient or provider, each pair got one out of three MCs: MedTable, eMedTable or MedCard, solving of a simple and a complex problem: 4 drugs (name, purpose, size of dose, frequency, special instructions) and the patients' daily routine (bedtime, work schedule), compare with optimal solution; measures: medication problem-solving performance, collaborative process, tool usability, subjective workload;	structured tools are easier to use, structured tools create more accurate and optimal schedules (p<0.05), supports active role of patient;	WEAK
14	Elliott, 2012 [14]	Cohort study	N = 428 patients, Ø age 84 y, ♀ 60.85%, drugs per patient: 10.5	AUS	Test the impact of MC on medication errors and use of locum medical services after discharge	Discharge from hospital to RCF, got a MC and medication for 7 d, interview with RCF member 24 h after discharge, questionnaire: time of arrival, updating of MC, missed/delayed doses, questionnaire for GPs: satisfaction with MC; primary endpoints: proportion of missed doses and updated MCs <24 h after discharge;	significant reduction of missed/delayed doses: 18.3% pre vs. 2.7% post (p<0.001); MC update by GPs reduced from 32.7% pre vs. 11.9% post (p<0.001), RCF staff reported IRCMAC improved continuity of medication admission, 88.6% of primary care doctors reported reduced urgency to attend the RCF after patients arrival;	MODERATE
15	Coombes, 2009 [15]	Cohort study	N = 1481 patients	AUS	implement MC in hospitals, investigate impact on prescribing errors, ADR and safety	MC includes previous ADR and warfarin management (INR values), investigation of prescribing errors and ADR before and after implementing a MC, checking prescriptions for discrepancies;	proportion of prescribing errors per order per patient decreased from 20% to 15.8% (p=0.03); rate of prescribing of medication to which the patient had a previous ADR decreased by 59%, from 11.3% to 4.6% (p=0.021); INR >5 (increased risk of bleeding) decreased from 1.9% to 1.45% (p=0.004), MC reduced significantly the frequency of prescribing errors and reduced exposure to drugs causing previous ADR, decreased the potential risk of warfarin management;	MODERATE

16	McManus, 2018 [16]	RCT	N = 76 patients, Ø age 49 y, ♀ 36.8%	IRE	impact of a MC on the knowledge and consolidation of drug regimen	patient received a fictional MC and 5 medication regimen with labelling, were asked to prepare a 24 h pillbox, control group w/o MC, measurement of knowledge by asking three standard questions (how many tablets at any one time? How many tablets in a day? Are there any precautions you would take while taking this medicine?)	mean knowledge score 9.28 compared to 8.81 (control group), not statistical significant (p=0.135); knowledge on medication regimen is slightly higher with MC, larger impact and improvement on prescription understanding in patients with low understanding of medicines;	STRONG
17	Send, 2014 [17]	Cohort study	N = 90 patients, Ø age 59.3 y, ♀ 54%	GER	effect of an EMP on patients' knowledge, transfer of information at conversation with physician at discharge	observing patient-physician conversations at hospital discharge before and after integration of an EMP, standardized check list (duration, details about drugs, method of drug information transfer), afterwards 3 questions about medication (e.g. at what time of the day are you supposed to take your tablet? how to take medication regarding food intake?)	time spent on individual drug therapies increased significantly by 61.7% (from 2.13 min to 3.18 min, p=0.02) by using an EMP, time spending on providing information about indication increased (+28%); Three times more patients answered all questions correctly with EMP (w/o 17.9%, with 60%, p<0.01); More drug information were given about previously prescribed drugs (w/o 64.5%, with 80.4%), and newly prescribed drugs (92.2% vs. 98%); the amount of information on drugs/drug application (indication, treatment duration) increased significantly (w/o 75.1%, with 84.6%, p=0.02), more answers were correct with EMP, especially questions on indication and food intake;	WEAK
18	Jäger, 2015 [18]	Cohort study	N = 344 patients, Ø age 72.1 y, ♀ 57.6%	GER	explore if beliefs about medicine are associated with use of MC and memory of medication counselling	questionnaire during practice visit, German version of BMQ, additional items on presence and use of MC (showing it to GP or pharmacist), comprehension of MC, process of updating MC, memory of having received a medication counselling or brown bag review;	50.6% consider their MC an important reminder; 42.4% used it for administering their medication; patients who found MC comprehensible had less concerns about medication (p<0.01); 30.2% are showing their MC during doctors' appointments; 4.1% when buying a drug in the pharmacy; regular receipt of an updated MC was associated with higher perceived necessity of the medication (p<0.01);	WEAK

19	Wilke, 2018 [19]	Kohortenstudie	N = 279 AOK Plus Versicherte, Ø Alter 72 J, ♀ 50%	GER	Vergleich der AM-Kontinuität mit und ohne MC bei KH-Aufnahme und Entlassung	Erfasste Daten bei stationäre Aufnahme: Diagnosen, Medikation, vorhandener MC und Autor des MCs; vorhandene GKV Daten: Alter, Geschlecht, AM 6 Monate vor und nach Hospitalisierung; Abgleich Medikation bei Aufnahme mit Entlassmedikation, Übereinstimmung wenn ATC-Code gleich blieb (gleicher WS oder WS-Kombination);	62% der Patienten hatten MC bei KH-Aufnahme; Weiterverordnung von AM bei KH-Aufnahme: 53% mit MC vs. 40% ohne MC (p<0.001); kein Unterschied bei Entlassung, das Verwenden eines MC kann die Anzahl der AM-Umstellungen reduzieren, AM-Kontinuität steigt (ambulant-stationär);	WEAK
20	Chae, 2009 [20]	Longitudinal study	N = 104 patients, Ø age 60.4 y, ♀ 66.6%	USA	determine the acceptance of MC and its influence on patients' knowledge of their medical care	MC (foldable, wallet-sized) was distributed to patients, PMS to assess patients responsibility and patients knowledge of their medical care (drug name, dosage, indication); phone call 4-11 M later to readminister the PMS, comparison of the responses;	patients using MC showed increased scores in perceived patient knowledge about their medication (p=0.049) and patient responsibility (p=0.031), with no change in their perceptions of physician responsibility; majority of patients using the card indicated that the card was easy to use and carry; MC is an information source across healthcare setting;	WEAK
21	Kuske, 2012 [21]	SR	N = 4 Delphi-Experten	GER	Identifizierung von AMTS-PS-Indikatoren	systematischer Review zur Identifizierung von AMTS-Indikatoren; Bestimmung PSI als Untergruppe und Priorisierung; Prüfung auf Übertragbarkeit auf AM-Versorgung; Entwicklung von Empfehlungen;	Ergebnis: 14 AMTS-PSI; Nummer 3 = Medikationsliste; Nummer 12 = Übergabe der Versorgung – Patienten, welche die Zielsetzung ihrer Medikamente verstehen;	WEAK
22	Kiel, 2018 [22]	CSS	N = 637 Patienten, Ø Alter: 67 J, ♀ 57% (Einschlusskriterium 1 - 10 AM)	GER	Ermittlung der Auskunftsfähigkeit von Patienten über Medikation	Interview (persönlich, telefonisch und postalisch) in Arztpraxen mit Patienten über ihre Medikation (Name, Dosis, Einnahmefrequenz, Indikation), Vergleich mit Praxisdokumentation;	Übereinstimmung von 54% bezüglich Anzahl AM, Besitz eines MCs zeigte keinen Einfluss auf AF; die Benutzung eines MCs verbessert die AF, ausgeprägter Effekt bei Patienten >5 AM; mit zunehmender Anzahl von AM nimmt die AF ab; 75% kannten den Namen ihrer Medikamente, MCs verbessern die Fähigkeit, korrekte Angaben zu Namen, Einnahmefrequenzen und Dosierungen zu machen;	WEAK

23	Kenning, 2015 [23]	QE	N = 15 patients, Ø age 74.5 y, ♀ 53%, drugs per patients 8.7, N = 10 pharmacists; N = 10 GPs	UK	explore the need for and acceptance of UMS	semi-structured interviews with patients at home: explore knowledge of medication (indication, dosage), adherence (how they took medication), managing multiple medications, how they get medication information; showing them UMS (useful content?), interview with pharmacists and GPs (patients understanding, adherence, barriers, views on UMS);	It (MC) would help them (patients) to prevent errors; most GPs/pharmacists thought a UMS could be feasible, acceptable and beneficial to patients; acting as reminder chart; UMS is a useful tool for communication between healthcare settings;	WEAK
24	Blake, 2010 [24]	QE	N = 23 focus group, Ø age: 52 y, ♀ 60.8%, N = 7 pharmacists Ø age: 43 y, ♀ 75%	USA	evaluate a health literacy intervention to improve medication adherence with an illustrated MC "PictureRx" card	focus group with pharmacy patients: using, understanding and satisfaction with MC, reminder calls to refill, quality of pharmacists' counselling; 1 and 6 month after intervention interviews with pharmacists: interaction with patients (especially those with limited literacy) reminder calls, understanding of and satisfaction with MC, communication training;	most pharmacists felt the MC was easy to use and provided an important counselling tool for their patients; clear health communication tool;	WEAK
25	Send, 2017 [25]	RCT	N = 115 patients, Ø age 70.3 y, ♀ 50.4%, ≥5 drugs per patient	GER	effect of MC on patients' knowledge after 2 month	control group: simple MC, intervention group: MC with additional information: indication, explicit drug administration recommendations, pictograms for food intake information), knowledge proof before handing out MC (baseline assessment) and after 2 month (follow-up assessment) by using 3 questions which were personalized regarding their current medication (Do you know the reason why you have to take ibuprofen?);	patients' drug knowledge (especially on indication and food intake) showed an absolute increase of 23.2% in the intervention group (baseline: 40.6% correct answers, follow-up: 63.8%, p<0.01), knowledge of control group was unchanged;	MODER AT

26	Dormann, 2017 [26]	Kohortenstudie	N = 863 Patienten ambulant	GER	Wirksamkeitsanalyse, Evaluation der AMTS	Drei Phasen: Einstellungsakzeptanz, Handlungsakzeptanz, Evaluationsakzeptanz; Bewertung MC bezüglich AMTS-Eignung, Vergleich Medikation Praxisdaten mit aktuellem MC und Brown Bag Analyse, Fragebogen Patient: Einstellung zu Medikation, selbstberichtete Adhärenz Morisky-Scale (6-item, 0 = adhärenz);	35.6% (Visit2) bzw. 27.1% (Visit3) der Patienten waren durch den Einsatz des BMP besser über die Einnahme (Zeitpunkt, Grund) ihrer AM informiert; kein relevanter Unterschied in selbstberichteter Adhärenz; 58.3% der Ärzte führten ein zusätzliches Beratungsgespräch bei Erstellung des MCs, 32.4% der Ärzte/Apotheker konnte bei jedem 5. Patienten mittels BMP Kontraindikationen, UAWs oder Medikationsfehler identifizieren;	WEAK
27	Thürmann, 2017 [27]	Kohortenstudie	N = 161 ambulante Patienten, Ø Alter 69 J, ♀ 59,0%	GER	Erprobung des BMP hinsichtlich Akzeptanz & Praktikabilität sowie Untersuchung des Einflusses auf die Adhärenz	Implementierung webbasierte Software in Arztpraxen, KH und Apotheken; inkl. Mitarbeiter-schulung, Patienten erhielten bei AM-Anamnese BMP (vom Arzt), Beobachtung über 12 M, Befragung der Patienten und GDL nach 0, 6, 12 M; Akzeptanz, Praktikabilität, Zufriedenheit (SIMS) mit BMP, selbst-berichtete Adhärenz (MARS), Klassifikation von Medikationsproblemen, AM-Änderungen, Wissen über Dosierung, Einnahmehinweise, Einnahmegrund;	84.1% fühlten sich nach 12 M sicherer im Umgang mit ihren AM; Zunahme des Wissens über AM: Einnahmegrund (78.5%, Steigerung um 10%) Einnahmehinweise (76.6%, Steigerung um 9.7%); selbstberichtete Adhärenz blieb unverändert; Medikationsprobleme: Doppelverordnungen: keine Änderung, Einnahmefehler (v.a. Einnahmezeitpunkt): Abnahme (N = 160 vs. 125), AM-Interaktionen: Zunahme (N = 2.5 vs. 3.3); Patienten konnten mithilfe des MC ihre Medikamente im Alltag schneller stellen (64.5%, Steigerung um 10.5%);	MODERAT
28	Botermann, 2017 [28]	Q/W	N = 196 ambulante Patienten Ø Alter 74.4J ♀ 61.3%	GER	Umsetzung des BMPs in die Praxis, technische Umsetzung nach ARMIN	1. Technische Umsetzung: Bildung von Arzt-Apotheker-Teams, Test der Software (Probepatienten) 2. Praktische Umsetzung: Schulung der Mitarbeiter, Routinebetrieb mit Patienten 3. Akzeptanz des BMP: strukturierte Interviews mit Ärzten, Apothekern und Patienten (Wissenstand: Dosierung, Indikation);	klinischer Nutzen: Angemessenheit der Therapie und Umsetzung durch Patienten, humanistischer Nutzen: Lebensqualität der Patienten, ökonomischer Nutzen: positive Auswirkung auf Kosten; 2/3 der Patienten gaben an, dass sich ihr Wissen (Dosierung 64.1%, Indikation 71.8%) verbessert hat, 68.9% fühlten sich sicherer im Umgang mit ihren AM, für 83.5% war grösster Nutzen besserer Informationsaustausch mit GDL über AM;	WEAK

29	Dormann, 2018 [29]	Report	siehe Nr. 26-28	GER	Vorstellung 3er Modellprojekte, Ableitung von Empfehlungen	Vorstellung der drei Modellprojekte aus Massnahmenkatalog 2013-2015 zur AMTS-Verbesserung mittels BMP: Metropol-Mediplan 2016, Erfurt und PRIMA; Ableitung von Empfehlungen basierend auf den gesammelten Resultaten;	Anstieg der Patientenzufriedenheit und der Medikationskompetenz, interprofessionelle Zusammenarbeit, bedeutender Effekt auf AMTS;	n.a.
30	Müller, 2018 [30]	Interviews	N = 546 Ärzte, N = 969 Apotheken, N = 3200 Patienten	GER	Implementierung des BMP	Zukunftskonzept AM-Versorgung: Wirkstoffverordnung (statt Verordnung von Präparaten), Medikationskatalog (Unterstützung von Ärzten bei AM-Auswahl) und MM: Brown Bag Analyse, Beratungsgespräch (Kenntnisse, Adhärenz, Zufriedenheit) und AMTS-Prüfung (durch Apotheker und Arzt) gemeinschaftliche Erstellung und Pflege eines MCh, wiederholte Prüfung der Gesamtmedikation, elektronischer Datenaustausch	Umsetzung der Therapie durch die Patienten, die Angemessenheit der AM-Therapie, das Wissen der Patienten zur korrekten Dosierung und Anwendung ihrer AM und Gründen der Einnahme;	WEAK

Abbreviations: **3D:** Durable Display at Discharge; **ABDA:** Federal Union of German Associations of Pharmacists (Bundesvereinigung Deutscher Apothekerverbände); **ABP:** adverse drug event (Arzneimittelbezogene Probleme); **ADR:** adverse drug reaction; **AF:** provide information (Auskunfts-fähigkeit); **AM:** drug (Arzneimittel); **AMTS:** medication safety (Arzneimitteltherapiesicherheit); **AMTS-PSI:** factors for patient and medication safety (Patientensicherheitsindikatoren zur Arzneimitteltherapiesicherheit); **AOK:** health insurance company (Allgemeine Ortskrankenkasse); **ARMIN:** drug initiative Saxony-Thuringia (Arzneimittelinitiative Sachsen-Thüringen); **ATC Code:** Anatomical Therapeutic Chemical Classification; **AUS:** Australia; **BMP:** standardized medication chart in Germany (bundeseinheitlicher Medikationsplan); **BMQ:** Beliefs about Medicines Questionnaire; **CSS:** cross-sectional study; **d:** days; **DDI:** drug-drug-interaction; **DRP:** drug related problems; **EMP:** enhanced medication plan; **GDL:** health care provider (Gesundheitsdienstleister); **GER:** Germany; **GKV:** statutory health insurance (gesetzliche Krankenversicherung); **GP:** general practitioner; **h:** hour; **INR:** International normalised ratio; **IRCMAC:** interim residential care medication administration chart; **IRE:** Ireland; **J:** years (Jahre); **KH:** hospital (Krankenhaus); **M:** months; **MA:** medication review (Medikationsanalyse); **MARS:** Medication Adherence Report Scale; **MC:** medication chart; **MDW:** Medication Discharge Worksheet; **ML:** measuring spoon (Messlöffel); **MM:** medication management; **N:** number (Anzahl); **n.a.:** not applicable (nicht zutreffend); **PMS:** Patient Medication Scale; **Q/W:** questionnaire/workshop; **QE:** qualitative evaluation; **RCF:** residential care facility; **Rx:** prescription drug; **SIMS:** Satisfaction with Information about Medicines Scale; **SR:** systematic review; **UAW:** adverse drug reaction (unerwünschte Arzneimittelwirkungen); **UK:** United Kingdom; **UMS:** Universal Medication Schedule; **w/o:** without; **WS:** active ingredient (Wirkstoff); **WW:** interaction (Wechselwirkung); **y:** years

Online supplementary D: Matrix with codes of the theme «Patient» (51 codes in original English or translated from German)

Category Population	Knowledge	Safety	Purpose	Communication	Empowerment
Physicians/ pharmacists	<ul style="list-style-type: none"> ▪ indication [30] ▪ dosage [30] ▪ drug application [30] 	<ul style="list-style-type: none"> ▪ patient safety indicator used for medication safety [21] ▪ allow identification of contraindications, adverse drug reactions and medication errors [26] 	<ul style="list-style-type: none"> ▪ reminder chart [23] ▪ transfer written information into practice [30] 	<ul style="list-style-type: none"> ▪ communication and counselling tool [5, 24, 26] 	
Patients ambulant/ nursing home	<ul style="list-style-type: none"> ▪ indication [20, 22, 25-28] ▪ dosage [16, 20, 22, 28] ▪ food intake [25] ▪ dosing frequency [16, 22] ▪ dosing time [26] ▪ drug name [20, 22] ▪ precautions [16] ▪ special taking advice [27] 	<ul style="list-style-type: none"> ▪ avoiding errors [30] ▪ safer handling of medication [28] ▪ less delayed or missed doses [14, 27] 	<ul style="list-style-type: none"> ▪ information source [20] ▪ documentation aid [6, 7] ▪ reminder [18] ▪ transfer written information into practice [1, 28] ▪ regarding speed [27] ▪ creating more accurate and optimal schedules [13] 	<ul style="list-style-type: none"> ▪ exchange of information with health care provider [28] 	<ul style="list-style-type: none"> ▪ supports active role of the patient [13] ▪ patient responsibility [20] ▪ less concerns about medication [18] ▪ higher perceived necessity of medication [18] ▪ awareness of sharing all information with healthcare providers [5]
Patients hospitalized /discharged	<ul style="list-style-type: none"> ▪ indication [2, 17] ▪ dosage [10] ▪ food intake [17] ▪ dosing frequency [2, 10] ▪ dosing time [10] ▪ drug name [12] ▪ special instructions, cautions or comments [2] 	<ul style="list-style-type: none"> ▪ avoiding mistakes [2] ▪ compliance [10] 	<ul style="list-style-type: none"> ▪ documentation aid [9] 	<ul style="list-style-type: none"> ▪ easier to talk with provider about medication [5] ▪ counselling tool [12, 17] 	
Citizens		<ul style="list-style-type: none"> ▪ avoiding interactions [4] ▪ increased adherence under polypharmacy [4] 	<ul style="list-style-type: none"> ▪ reminder aid [4] ▪ source of information [4] ▪ documentation aid [4] ▪ orientation guide [4] ▪ reflection tool [4] 	<ul style="list-style-type: none"> ▪ communication tool [4] 	

Online supplementary E: Matrix with codes of the theme «Process» (13 codes in original English or translated from German)

Category Population	Interdisciplinary cooperation	Resources	Patient files	Prescription
Physicians/ pharmacists/ hospital	<ul style="list-style-type: none"> ▪ physicians learn about prescriptions of other physicians [3] ▪ pharmacists learn about patients' diagnoses [3] ▪ communication aid between different services [23, 29] 	<ul style="list-style-type: none"> ▪ time saving [3] ▪ appropriate medical therapy [28, 30] ▪ continuity of medication at discharge decreases urgency for GP to attend the nursing home [14] 	<ul style="list-style-type: none"> ▪ medication chart on file is more accurate [5] 	<ul style="list-style-type: none"> ▪ consider previous adverse drug reactions [15] ▪ avoiding medication omission and incorrect doses [9] ▪ continuity of medication [19]
Citizens		<ul style="list-style-type: none"> ▪ identify unnecessary medication [4] ▪ time saving [4] 		<ul style="list-style-type: none"> ▪ avoiding drug duplication [4]

GP: general practitioner

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