# Supplement_E_PICO_4_Practical things

# PICO 4: What are the practical things we can do in order to prevent non-adherence?

Knowledge of practical things that can be done to prevent non-adherence should help the physician/health-professional implementing recommendations/points to consider into clinical practice. Only things proven to be effective should be implemented.

All interventions included in the selected systematic reviews were reviewed. Only interventions that showed a non-contradictory positive effect were finally selected. The individual components of the effective interventions were collected and summarised.

## Summary

In total, 4 reviews, including fifteen studies with a positive impact on adherence where screened for practical things that can be done, in order to prevent non-adherence (9 studies[1-9] for medication adherence; 6[10-15] for non-pharmacological/exercise adherence). The details and descriptions interventions are displayed in table 1.

### Medication adherence

In the included studies, patients were diagnosed with, rheumatoid arthritis (RA)[2-6], psoriasis[1], systemic lupus erythematosus (SLE)[7, 9], juvenile rheumatoid arthritis (JRA)[8]. The practical thing mentioned in the included studies are listed below:

1) Education/information should include information about drugs[2, 7], disease process[2, 7], physical exercise[2], joint protection[2, 4], pain control[2, 4], coping strategies[2], and lifestyle changes[4, 7]. The mode of delivering education/information was diverse; deliverd verbally (face to face[2] or using a telephone[6]), written (as leaflets[2] or using test messages[1, 9]), and visualized in charts[3].
2) Cueing (e.g., pairing medication taking with an established behavior such as brushing teeth), monitoring (e.g., using a calendar to track medication taking), positive reinforcement (e.g., praising and rewarding with tokens that are exchanged for special privileges), and discipline (e.g.,using time-out for defiant refusals to take medications)[8] supported adherent behaviour.
3) Giving patients the ability to express questions and doubts[7].
4) Physicians and HPRs should review the plans/strategies in order to give feedback/answers[8].
5) Individualised treatment/tailored treatment according the preferences and goals of the patient[5] support adherent behaviour.

### Exercise adherence

Patients were diagnosed with rheumatoid arthritis (RA)[15], osteoarthritis[10-12, 14], and low back pain[13]. The following practical things can be extracted out of the interventions in the studies:

1) To improve physicians' adherence, it was proposed to overcome the constraint of consultation time, the main obstacle to effective patient-provider communication. For this purpose, it was proposed to do three goal oriented visits, with one component of the complex intervention being implemented at each visit[10].
2) Psychosocial factor relevant to the motivational approach is proxy efficacy. It refers to patients' confidence in their therapists' ability to function effectively on their behalf[13].
3) Education/information should include information about physical exercises, endurance activities (walking, swimming, bicycling), advice on energy conservation, and joint protection[15].
4) Problems regarding exercise adherence should be discussed and solutions should be developed/presented[15].
5) Patients should be encouraged to plan their treatment regimens, intentions should be discussed and help should be given in recasting unrealistic plans[15].
6) Individualised physical activity advice[11] and tailored graded exercise program[12] according to the preferences and goals of the patient is supporting adherent behaviour.
7) Patients should be training in proper execution of physical exercises[15]. Photos displaying these exercises and explanatory written information[14] support adherent behaviour.

**Table 1.** List of practical things proven to be effective in improving adherence to medications and/or physical exercise.

| Study | Review | Diagnoses | Practical things we can do | Description |
|---|---|---|---|---|
| **Studies with significant effects on medication adherence** | | | | |
| Balato, Megna [1] | Depont, Berenbaum [16] | Psoriasis | Daily text messages (TM) providing reminders | The patients received 7 TM per week (1 TM per day) for a period of 12 weeks in the same randomly selected order (reminders three times weekly, educational tools four times weekly). TM were created using simple language, considering frequently asked questions about psoriatic drugs (e.g. administration, adverse effects) and general recommendations to take care of overall health. |
| Balato, Megna [1] | Depont, Berenbaum [16] | Psoriasis | Daily text messages (TM) providing educational tools | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | information about the types of drugs | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | information on the disease process | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | information on physical exercise | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | information on joint protection | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | information on pain control | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | information on coping strategies | |
| Hill, Bird [2] | Depont, Berenbaum [16] | RA | Written information: drug information leaflet | |
| El Miedany, El Gaafary [3] | Depont, Berenbaum [16] | Early RA | Visualization of computer charts showing the disease progression | During their visit, the patients were given the chance to view the progression of their disease on the computer, discuss the changes in their disease activity parameters, comorbidity risks, functional disability, and quality of life. |
| El Miedany, El Gaafary [4] | Depont, Berenbaum [16] | RA | The programme includes 4 main components: educational – joint-learn | Joint-learn: educate the patient about the different types of pain relief (medication, acupuncture, complementary medicine and diet), informed on things they can do to ease their joint pain |
| El Miedany, El Gaafary [4] | Depont, Berenbaum [16] | RA | The programme includes 4 main components: behavioural – joint-change | Joint-change: behavioural therapy, lifestyle changes using visual diary charts, and journaling and other coping skills; visual diary charts/tables for activities carried out by the patient throughout the day and its impact on the patient's energy levels |
| El Miedany, | Depont, Berenbaum [16] | RA | The programme includes 4 main components: information – joint act | Joint-act: Patients are taught things to do and others to avoid, to help to ease their joint pain. |

| Study | Review | Diagnoses | Practical things we can do | Description |
|---|---|---|---|---|
| El Gaafary [4] | | | | |
| El Miedany, El Gaafary [4] | Depont, Berenbaum [16] | RA | The programme includes 4 main components: joint-cise | Joint-cise (Joint-exercise): This includes changes in everyday routines as well as exercises. Active physical exercises vary according to the patient's condition, namely range-of-motion exercises, strengthening exercises and endurance exercises. |
| Clifford, Barber [6] | Galo, Mehat [17] | RA | Telephone-based, patient-tailored pharmacy advisory service | The pharmacist started by asking patients 'How are you getting on with your medicines?', then went on to enquire about their medicine-related problems, adherence to the new medicine and whether they required any further information. The pharmacist followed the flow of the patient's conversation. The pharmacist gave information, advice or reassurance in response to the patients' expressed needs. |
| Ganachari and Almas [7] | Galo, Mehat [17] | SLE | Education regarding the disease | regarding the disease, medication and lifestyle modifications<br>written educational material was then given<br>The patient was then asked to clarify his/her doubts if any. |
| Ganachari and Almas [7] | Galo, Mehat [17] | SLE | Education regarding medication | |
| Ganachari and Almas [7] | Galo, Mehat [17] | SLE | Education regarding lifestyle modifications | |
| Ganachari and Almas [7] | Galo, Mehat [17] | SLE | The patient was then asked to clarify his/her doubts if any. | |
| Rapoff, Belmont [8] | Galo, Mehat [17] | Juvenile Rheumatoid Arthritis | cueing (e.g., pairing medication taking with an established behaviour such as brushing teeth) | 10-min audiovisual program and a booklet which described adherence-enhancement strategies |
| Rapoff, Belmont [8] | Galo, Mehat [17] | Juvenile Rheumatoid Arthritis | monitoring (e.g., using a calendar to track medication taking) | |
| Rapoff, Belmont [8] | Galo, Mehat [17] | Juvenile Rheumatoid Arthritis | positive reinforcement (e.g., praising and rewarding with tokens that are exchanged for special privileges) | |
| Rapoff, Belmont [8] | Galo, Mehat [17] | Juvenile Rheumatoid Arthritis | discipline (e.g., using time-out for defiant refusals to take medications) | |

| Study | Review | Diagnoses | Practical things we can do | Description |
|---|---|---|---|---|
| Rapoff, Belmont [8] | Galo, Mehat [17] | Juvenile Rheumatoid Arthritis | The nurse reviewed and rehearsed strategies, gave answers. | |
| Evers, Kraaimaat [5] | Depont, Berenbaum [16] | Early RA | cognitive-behavioural therapy (CBT): consisted of individual treatment with two out of the four treatment modules: pain and functional disability, fatigue, negative mood and social relationships. | |
| Ting, Kudalkar [9] | Galo, Mehat [17] | childhood-onset SLE | cellular text messaging reminders (CTMR) to remind taking medication and to remind for | CTMR was sent to all patients at a set time of day (e.g., morning or evening), according to self-report of HCQ intake |
| Ting, Kudalkar [9] | Galo, Mehat [17] | childhood-onset SLE | cellular text messaging reminders: 7 days, 3 days, and 1 day prior to each scheduled follow-up clinic appointment | |
| **Studies with significant effects on exercise adherence** | | | | |
| Ravaud, Flipo [10] | Ezzat, MacPherson [18] | OA/knee, | To improve physicians' adherence, we proposed to overcome the constraint of consultation time, the main obstacle to effective patient-provider communication. For this purpose, we proposed three goal-oriented visits, with one component of the complex intervention being implemented at each visit. | First visit (day 0), education and advice related to osteoarthritis and its treatment.<br><br>Second visit (day 15), how to protect joints (movements to avoid) and the need for physical exercise. They proposed a progressive exercise regimen.<br><br>Third visit (day 30), education about body weight and its influence on osteoarthritis of the knee and proposed a strategy for losing or maintaining weight. |
| Vong, Cheing [13] | Nicolson, Bennell [19] | Low Back Pain | Psychosocial factor relevant to the motivational approach is proxy efficacy. It refers to patients' confidence in their therapists' ability to function effectively on their behalf. | |
| Halbert, Crotty [11] | Ezzat, MacPherson [18] | OA | Individualized physical activity advice | individualized physical activity advice from an exercise physiologist at the baseline appointment and 2 follow up visits at 3 and 6 months to discuss their progress |
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | Education on physical exercises | |

| Study | Review | Diagnoses | Practical things we can do | Description |
|---|---|---|---|---|
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | endurance activities (walking, swimming, bicycling), | |
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | advice on energy conservation | |
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | joint protection | |
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | If patients anticipated problems with the application of any of the treatments, these were discussed, including possible solutions. | |
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | A training was given in proper execution of physical exercises. | |
| Brus, Van De Laar [15] | Depont, Berenbaum [16] | RA | Patients were encouraged to plan their treatment regimens, intentions were discussed and help was given in recasting unrealistic ones | |
| Pisters, Veenhof [12] | Ezzat, MacPherson [18] | OA/hip, knee | individually tailored graded exercise program to teach the patient that it is safe to move while increasing the level of activity. | Behavioural Graded Activity (BGA) https://ars.els-cdn.com/content/image/1-s2.0-S1836955310700539-mmc1.pdf |
| Tüzün, Cifcili [14] | Nicolson, Bennell [19] | Knee OA | photos displaying these exercises were taken, and explanatory information was written next to the relevant photo using large fonts. | |

## REFERENCES


1. Balato N, Megna M, Di Costanzo L, et al. Educational and motivational support service: a pilot study for mobile-phone-based interventions in patients with psoriasis. *British journal of dermatology* 2013;168(1):201-205.
2. Hill J, Bird H, Johnson S. Effect of patient education on adherence to drug treatment for rheumatoid arthritis: a randomised controlled trial. *Annals of the rheumatic diseases* 2001;60(9):869-875.
3. El Miedany Y, El Gaafary M, Palmer D. Assessment of the utility of visual feedback in the treatment of early rheumatoid arthritis patients: a pilot study. *Rheumatology international* 2012;32(10):3061-3068.
4. El Miedany Y, El Gaafary M, El Arousy N, et al. Arthritis education: the integration of patient-reported outcome measures and patient self-management. *Clin Exp Rheumatol* 2012;30(6):899-904.
5. Evers AW, Kraaimaat FW, van Riel PL, et al. Tailored cognitive-behavioral therapy in early rheumatoid arthritis for patients at risk: a randomized controlled trial. *Pain* 2002;100(1-2):141-153.
6. Clifford S, Barber N, Elliott R, et al. Patient-centred advice is effective in improving adherence to medicines. *Pharmacy World and Science* 2006;28(3):165.
7. Ganachari M, Almas SA. Evaluation of clinical pharmacist mediated education and counselling of systemic lupus erythematosus patients in tertiary care hospital. *Indian Journal of Rheumatology* 2012;7(1):7-12.
8. Rapoff MA, Belmont J, Lindsley C, et al. Prevention of nonadherence to nonsteroidal anti-inflammatory medications for newly diagnosed patients with juvenile rheumatoid arthritis. *Health Psychology* 2002;21(6):620.
9. Ting TV, Kudalkar D, Nelson S, et al. Usefulness of cellular text messaging for improving adherence among adolescents and young adults with systemic lupus erythematosus. *The Journal of rheumatology* 2012;39(1):174-179.
10. Ravaud P, Flipo R, Boutron I, et al. ARTIST (osteoarthritis intervention standardized) study of standardised consultation versus usual care for patients with osteoarthritis of the knee in primary care in France: pragmatic randomised controlled trial. *Bmj* 2009;338:b421.
11. Halbert J, Crotty M, Weller D, et al. Primary care–based physical activity programs: effectiveness in sedentary older patients with osteoarthritis symptoms. *Arthritis Care & Research: Official Journal of the American College of Rheumatology* 2001;45(3):228-234.
12. Pisters MF, Veenhof C, de Bakker DH, et al. Behavioural graded activity results in better exercise adherence and more physical activity than usual care in people with osteoarthritis: a cluster-randomised trial. *Journal of physiotherapy* 2010;56(1):41-47.
13. Vong SK, Cheing GL, Chan F, et al. Motivational enhancement therapy in addition to physical therapy improves motivational factors and treatment outcomes in people with low back pain: a randomized controlled trial. *Archives of physical medicine and rehabilitation* 2011;92(2):176-183.
14. Tüzün S, Cifcili S, Akman M, et al. How can we improve adherence to exercise programs in patients with osteoarthritis?: A randomized controlled trial. *Turkish Journal of Geriatrics* 2012;15(3).
15. Brus HL, Van De Laar MA, Taal E, et al. Effects of patient education on compliance with basic treatment regimens and health in recent onset active rheumatoid arthritis. *Annals of the rheumatic diseases* 1998;57(3):146-151.
16. Depont F, Berenbaum F, Filippi J, et al. Interventions to improve adherence in patients with immune-mediated inflammatory disorders: a systematic review. *PLoS One* 2015;10(12):e0145076.
17. Galo JS, Mehat P, Rai SK, et al. What are the effects of medication adherence interventions in rheumatic diseases: a systematic review. *Annals of the rheumatic diseases* 2016;75(4):667-673.
18. Ezzat AM, MacPherson K, Leese J, et al. The effects of interventions to increase exercise adherence in people with arthritis: a systematic review. *Musculoskeletal Care* 2015;13(1):1.
19. Nicolson PJ, Bennell KL, Dobson FL, et al. Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: a systematic review and meta-analysis. *Br J Sports Med* 2017;51(10):791-799.