GEMs
GOOD EVIDENCE MATTERS

GEMs of the Week

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What's in this week's issue?

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SPOTLIGHT: Do Live Appointment Reminders Decrease Missed Appointments in High-Risk Patient Populations?

Do Live Appointment Reminders Decrease Missed Appointments in High-Risk Patient Populations?

GEMs GOOD EVIDENCE MATTERS SPOTLIGHT

Reducing Disparities in No Show Rates Using Predictive Model-Driven Live Appointment Reminders for At-Risk Patients: A Randomized Controlled Quality Improvement Initiative

Tarabichi Y, Higginbotham J, Riley N, Kaelber DC, Watts B. Reducing Disparities in No Show Rates Using Predictive Model-Driven Live Appointment Reminders for At-Risk Patients: a Randomized Controlled Quality Improvement Initiative. *J Gen Intern Med.* 2023;38(13):2921-2927. doi:10.1007/s11606-023-08209-0

KEY TAKEAWAY: There was a significant reduction in no-show rates in the interventional care group compared to the standardized care group, but there was no difference in same-day cancellations.

STUDY DESIGN: Randomized control quality improvement initiative

LEVEL OF EVIDENCE: STEP 2

BRIEF BACKGROUND INFORMATION: Missed appointments are a common occurrence throughout healthcare, particularly in systems providing care to underserved populations. The socioeconomic, racial, and ethnic disparities in missed, or "no show", appointments are common in these areas. The usefulness of technology-driven solutions in a population with limited digital access, often secondary to socioeconomic disparities, is uncertain. This study aims to determine the efficacy of a predictive model-driven outreach on missed appointments in a high-risk "safety-net" clinic.

PATIENTS: Patients at an underserved primary care at risk for missing appointments

INTERVENTION: Standardized automated appointment reminders + phone calls to patients with high no show score

CONTROL: Standard automated appointment reminders

PRIMARY OUTCOME: Any same-day missed or canceled appointment

Secondary Outcome: Missed appointments stratified by race/ethnicity, missed in-person appointment rates, same-day cancellation rates, telehealth conversion rates within seven days of a scheduled in-person appointment

METHODS (BRIEF DESCRIPTION):

- The study was conducted at an outpatient internal medicine clinic in Cleveland, Ohio, known as a "safety-net" facility.
- This clinic's patient population was analyzed and divided into categories of "White, non-Hispanic" (43%), "Hispanic"(4.9%), and "Black" (40%) for comparison of no show rates between these races/ethnicities.
- The clinic utilized in this study continued its standard procedure of sending automated texts and phone calls to each patient with a scheduled appointment and sending a push notification to each patient with patient portal access.
- The "no-show model" random forest algorithm was utilized to assess the risk of missed appointments. This model was activated in the clinic's electronic health record (EHR) over three months enabling the calculation of no-show model predictions for each clinic appointment.
- Following the validation of the model, the systems improvement process randomized in-person appointments into "standard" or "augmented" care groups.
- The augmented care group had the standard outreach activity in the EHR alongside predicted no-show risk and schedulers called patients with a predicted no-show risk of ≥15% 3–5 days before an appointment with a provided script.
- Patients in the augmented care group were asked to confirm their appointments and were offered to cancel, reschedule, or convert their visit to a telehealth visit if they declined to confirm.
- Data was reviewed bi-weekly by stakeholders who decided on continuation, change to the initiative design, or discontinuation by majority vote.

INTERVENTION (# IN THE GROUP): 2,858

COMPARISON (# IN THE GROUP): 2,982

FOLLOW-UP PERIOD: Seven months

RESULTS:

Primary Outcome –

- Augmented care reduced no-show rates compared to standardized care (33% vs 36%, respectively; $p<.01$).

Secondary Outcome –

- When classified using the defined three divisions of race and ethnicity, there was a noticeable improvement in no-show rates for in-person appointments only for Black patients.
- The augmented care group experienced a statistically significant reduction in missed appointments compared to the standard care group (27% vs 31%, respectively; $p<.01$).
- No statistically significant difference was observed in same-day cancellations between the two groups.
- There was a low frequency of telehealth conversion rates within seven days of scheduled in-person appointments and there was no statistically significant difference between the standard and augmented patient groups in total or with racial stratification.
- The number needed to treat (NNT), or call, to prevent a patient from "no-showing," was reduced from 29 to 15 with an outreach threshold of 45% but increased to 28 with an outreach threshold of 55%.

LIMITATIONS:

- One primary care internal medicine clinic was used for this study, which could mean it is not easily generalizable to clinics not targeting underserved patients.
- Socioeconomic impact was not included as a confounding variable.
- This specific study did not formally identify why a person-to-person telephone reminder was more effective.
- The study design did not investigate patients' barriers to access.

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Infertility in Obesity: Is Exercise Alone Sufficient Treatment?

Effects of Preconception Lifestyle Intervention in Infertile Women with Obesity: The FIT-PLESE Randomized Controlled Trial

Legro RS, Hansen KR, Diamond MP, et al. Effects of preconception lifestyle intervention in infertile women with obesity: The FIT-PLESE randomized controlled trial. *PLoS Med*. 2022;19(1):e1003883. Published 2022 Jan 18. doi:10.1371/journal.pmed.1003883

KEY TAKEAWAY: An intensive weight loss program does not improve the number of healthy live births compared to an exercise-only regimen.

STUDY DESIGN: Randomized controlled trial

LEVEL OF EVIDENCE: STEP 2

BRIEF BACKGROUND INFORMATION: Obesity has long been tied to infertility and maternal/fetal pregnancy complications. However, few high-powered studies have documented that weight loss in the preconception period increases the chances of conception and or decreases the incidence of pregnancy complications.

PATIENTS: Obese women with infertility

INTERVENTION: Intensive weight loss program

CONTROL: Exercise program not specifically focused on weight loss

PRIMARY OUTCOME: Healthy live births

Secondary Outcome: Live birth rate (birth after 20 weeks), time to live births, multiple pregnancy rate, duration of pregnancy, cesarean section rate, birth weight, neonatal complication rate

METHODS (BRIEF DESCRIPTION):

- Women 18–40 years old with BMI >30, with a history of >1 year of infertility, and regular ovulation with normal ovarian reserve.
- Patients were randomized to one of the following preconception lifestyle intervention groups:
  - A program designed for weight loss through increasing physical activity, caloric restriction, and anti-obesity medication orlistat
  - A program designed to keep weight constant and focused only on physical activity
- Serum pregnancy tests were administered after menses and positive tests were confirmed with an ultrasound.
- The dropout rate was noted to be 20% throughout the study.
- Pregnancy outcomes were documented by review of maternal and neonatal records.
- Analysis was done by intent-to-treat principle meaning all patients were analyzed based on the treatment groups to which they were randomly assigned.

INTERVENTION (# IN THE GROUP): 188

COMPARISON (# IN THE GROUP): 191

FOLLOW-UP PERIOD: Three years

RESULTS:

Primary Outcome –

- The rate of having a healthy live birth was not significantly different between intensive vs standard groups (12% vs 15%, respectively; rate ratio [RR] 0.81; 95% CI, 0.48–1.3).

Secondary Outcome –

- There was no significant difference in the rates of live births, multiple pregnancies, or the time to live births between the two groups.
- There was no significant difference in the duration of pregnancy, rate of cesarean section, and birth weight between the two groups.

LIMITATIONS:

- This is a relatively small study given primary outcome is the live birth rate in women who are already struggling with infertility.

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Comparison of CT and MRI Imaging Modalities to Evaluate C-Spine Injuries in Acute Trauma

Utilization of Computerized Tomography and Magnetic Resonance Imaging for Diagnosis of Traumatic C-Spine Injuries at a Level 1 Trauma Center: A Retrospective Cohort Analysis

Sutherland M, Bourne M, McKenney M, Elkbuli A. Utilization of computerized tomography and magnetic resonance imaging for diagnosis of traumatic C-Spine injuries at a level 1 trauma center: A retrospective cohort analysis. *Ann Med Surg (Lond).* 2021;68:102566. Published 2021 Jul 16. doi:10.1016/j.amsu.2021.102566

KEY TAKEAWAY: The outcome of this study provided robust recommendations for the use of both MRI and CT imaging in trauma patients who cannot be examined, have abnormal physical exam findings, or have central neck tenderness.

STUDY DESIGN: Retrospective cohort analysis

LEVEL OF EVIDENCE: STEP 3

BRIEF BACKGROUND INFORMATION: Blunt traumatic injuries in the United States can cause both vertebral and soft tissue cervical spine injuries at an incidence rate of 2–6%. The current recommended screening tool is CT imaging of the cervical spine unless there are abnormal neurologic examinations and negative CT findings. The purpose of this study is to evaluate the usage of CT and MRI in clearing traumatic C-spine injuries and create an evidence-based protocol for MRI use.

PATIENTS: Adult trauma patients

INTERVENTION: CT

CONTROL: MRI

PRIMARY OUTCOME: Concordance rates, sensitivity, specificity, negative predictive value (NPV), and positive predictive value (PPV)

METHODS (BRIEF DESCRIPTION):

- This study focused on data obtained between 1/1/2013–12/31/2016.
- The inclusion criteria were patients with traumatic injury, abnormal neurologic exam, central neck tenderness, and unexaminable, received CT and MRI C-spine imaging.
- Pediatric patients and transfer patients were excluded from the study.
- The median age of participants was 42 years old. 63% were male and 38% were female.
- The study compared CT imaging and MRI, ancillary imaging, in elucidating bony and soft tissue C-spine injuries.
- The data obtained was used to calculate concordance rates, sensitivity, specificity, NPV, and PPV of vertebral fracture, ligamentous injury, contusion, hematoma, and disc injury of C1–C7 in a trauma setting.

INTERVENTION (# IN THE GROUP): 805

COMPARISON (# IN THE GROUP): The same 805 patients received both CT and MRI imaging of C-spine

FOLLOW-UP PERIOD: Not available

RESULTS:

Primary Outcome –

- Compared to MRI evaluation of any c-spine injury, C1-C7 fractures, and cervical soft tissue injuries, CT imaging had the following likelihood ratios (LR):
  - Any C-spine injury: Sensitivity 50, specificity 27, + LR 2 & – LR of 2
  - C1–C7 fractures: Sensitivity 84, specificity 96, + LR 0.9 & – LR 0.9
  - Cervical soft tissue injury: Sensitivity 43, specificity 85, + LR 0.5 & –0.5
- MRI was more capable of detecting the following compared to CT:
  - Any C-spine injury (difference 14%; 95% CI, 10–18)
  - Edema (difference 7%; 95% CI, 5–9)
  - Ligamentous injury (difference 15%; 95% CI, 12–17)
  - Any soft tissue injury (difference 16%; 95% CI, 12–19)
  - Disc injury (difference 12%; 95% CI, 10–15)

LIMITATIONS:

- There are inherent limitations of retrospective cohort studies such as the absence of data on potential confounding factors.
- The authors highlight the data is subject to limitations associated with the databases used, such as inaccurately recording data.
- The authors are not able to evaluate long-term outcomes or treatment interventions, such as a C-collar on patients participating in this study.

- The data presented by the authors was not fully synthesized, requiring additional computation to understand the data.

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Can OMM Hasten Short-Term Concussion Recovery?

Concussion-Related Visual Memory and Reaction Time Impairment in College Athletes Improved After Osteopathic Manipulative Medicine: A Randomized Clinical Trial

Mancini JD, Angelo N, Abu-Sbaih R, Kooyman P, Yao S. Concussion-related visual memory and reaction time impairment in college athletes improved after osteopathic manipulative medicine: a randomized clinical trial. *J Osteopath Med.* 2022;123(1):31-38. Published 2022 Sep 30. doi:10.1515/jom-2022-0085

KEY TAKEAWAY: Osteopathic manipulative medicine (OMM) shows short-term improvement in some concussion-related symptoms compared to concussion education in healthy athletes.

STUDY DESIGN: Randomized, single-blinded controlled trial

LEVEL OF EVIDENCE: STEP 3 (downgraded due to small sample size)

BRIEF BACKGROUND INFORMATION: Sports-related traumatic brain injuries (TBI) can result in bone, fascial, connective tissue, and neurologic changes. OMM serves to reduce somatic dysfunction and holistically optimize physiologic performance. This study investigates whether new-onset impairments (NOI) in concussions among college athletes improve after receiving OMM.

PATIENTS: College athletes with acute concussion

INTERVENTION: OMM

CONTROL: Concussion education (CEd)

PRIMARY OUTCOME: Improvement in cognitive impairments

METHODS (BRIEF DESCRIPTION):

- College athletes (75% male) with acute head injury and concussion symptoms were included in the study.
- Those with an emergent condition, current or prior neurodegeneration or spinal cord injury, not able to complete assessments, absolute contraindications to OMM, loss of consciousness ≥2 minutes, seizures, intractable vomiting, pregnancy, paralysis, or no concussion-related NOI were excluded.
- Patients were blinded and randomized to one of the following treatments:
  - Two OMM treatments
    - Osteopathic structural exam
    - 30-minute treatment focused on cranial OMM and decompression based on the mechanism of injury (MOI)
    - 30-minute treatment using lymphatic and venous techniques to improve circulation
  - Two CEd sessions
    - 30 minutes of educational resources focusing on signs, diagnosis, recovery, and return-to-play guidelines
- Treatments were administered by a neuromusculoskeletal medicine (NMM)/OMM or family medicine OMM-certified physician.
- Medical history and baseline ImPACT were provided at the first visit.
- Injury ImPACT and KD were repeated before the 2nd visit and before the 3rd visit (6–7 days after the initial injury). Of note, three participants did not complete the second session.
- Measures:
  - Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT), a computerized tool that yields five indices, including visual memory (visual), verbal memory (verbal), visual-motor processing speed (PS), reaction time (RT), and impulse control (IC), and a total symptom score (SS). Higher indices for visual, verbal, PS, or IC reflect improvement. Lower RT or SS scores indicate recovery.
  - King-Devick test (KD), a concussion screening test measures the speed of rapid number naming. Participants were asked to read single-digit numbers on three test cards from left to right as quickly as possible without making errors. The KD time score is the sum of the three test cards' time scores with higher scores indicating worse performance.
- Change in means: Reliable change with 90% confidence intervals (RCI) of ImPACT indices between injury onset and interventions were computed.

INTERVENTION (# IN THE GROUP): 11

COMPARISON (# IN THE GROUP): 9

FOLLOW-UP PERIOD: 6–7 days

RESULTS:

Primary Outcome –

- After the first intervention, OMM significantly improved the following compared to CEd:
  - Visual symptoms in women (82 vs 60, respectively; *p*=.046)
  - IC symptoms in men (–2.4 vs 1.0, respectively; *p*=.021)
  - Verbal symptoms in women (90 vs 85, respectively; *p*=.030)
- After the second intervention, OMM significantly improved the following compared to CEd:
  - Visual symptoms in men (–14 vs –2.8, respectively; *p*=.032)
- Combining men and women, the KD scores improved as follows for OMM vs CEd:
  - After one intervention (13% vs 8.0%, respectively)
  - After two interventions (18% vs 21%, respectively)

LIMITATIONS:

- The population was young, otherwise healthy athletes which limits generalizability.
- They did not assess the OMM effect on severe TBIs or the long-term outcomes.
- A small sample size equals a low-power study.
- Treatments were patient-specific, even if following the study treatment plan.

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The opinions and assertions contained herein are those of the authors and are not to be construed as official or as reflecting the view of the US Army Medical Department, the Army at large, or the Department of Defense.

Walking Towards Wellness: Do More Steps Matter?

Lifestyle Walking Intervention for Patients with Heart Failure with Reduced Ejection Fraction: The WATCHFUL Trial

Vetrovsky T, Siranec M, Frybova T, et al. Lifestyle Walking Intervention for Patients With Heart Failure With Reduced Ejection Fraction: The WATCHFUL Trial. *Circulation*. 2024;149(3):177-188. doi:10.1161/CIRCULATIONAHA.123.067395

KEY TAKEAWAY: The lifestyle intervention of increasing daily steps does not have a meaningful impact on heart failure with reduced ejection fraction (HFrEF) when considering patient-oriented or clinical outcomes.

STUDY DESIGN: Multicenter, parallel-group, randomized controlled trial

LEVEL OF EVIDENCE: STEP 3 (downgraded due to low power and lack of blinding)

BRIEF BACKGROUND INFORMATION: Physical activity is known to have benefits in managing the substantial burden of heart failure with reduced ejection fraction. While cardiac rehab programs are beneficial, the utility of unstructured exercise is unclear.

PATIENTS: Patients with ejection fraction (EF) <40% on goal-directed medical therapy (GDMT)

INTERVENTION: Activity tracker and nurse-driven counseling to encourage increased daily step count by 3000 steps/day

CONTROL: Continued usual care

PRIMARY OUTCOME: Change in six-minute walk test (6MWT) at six months

Secondary Outcome: Daily step count, minutes of moderate to vigorous physical activity (MVPA), proBNP, C-reactive protein (CRP), EF, depression, self-efficacy, quality of life, and survival risk score.

METHODS (BRIEF DESCRIPTION):

- The study was conducted at six centers in the Czech Republic and included adults >18 years old, left ventricular ejection fraction (LVEF) <40%, and New York Heart Association (NYHA) class two or three with maximally tolerated dosages.
- Exclusion criteria: Patients on initial testing who could not complete the 6MWT or exceeded 450 m, cardiovascular events within three months, angina related to exertion, severe or symptomatic aortic stenosis, decompensated heart failure, or uncontrolled arrhythmia.
- Patients in the intervention group received an activity tracker and monthly telephone counseling from nurses who encouraged self-monitoring, goal-setting, and action planning to increase daily step count by at least 3000 steps/day.
- Assessors of the 6MWT were blinded to treatment.
- Monthly telephone counseling to address barriers and specific feedback was conducted.
- Three and six-month visits were performed in person.
- The primary outcome was the difference in walking distance during the six-minute assessment.
- Secondary Outcomes:
  - Activity was measured by an accelerometer worn by all patients
  - Adherence was determined by participation in the phone and clinic visits and wearing of the activity tracker
  - Depression was measured by the Beck Depression Inventory-II with higher scores indicating higher levels of depression.
  - Efficacy was measured by the General Self-Efficacy Scale with a higher score indicating more self-efficacy.
  - General health was measured by the 36-item short-form health survey with higher scores indicating a greater quality of life.

INTERVENTION (# IN THE GROUP): 92

COMPARISON (# IN THE GROUP): 94

FOLLOW-UP PERIOD: Six months

RESULTS:

Primary Outcome –

- Counseling patients to increase their daily step count did not result in improved performance on the 6MWT after six months (mean difference [MD] 7.4 m; 95% CI, –8.0 to 23).

Secondary Outcome –

- Counseling patients to increase their daily step count improved average daily step count compared to usual care (MD 1,420; 95% CI, 749–2,091).

- Counseling patients to increase their daily step count improved daily MVPA minutes compared to usual care (MD 8.2; 95% CI, 3.0–13).
- Counseling patients to increase their daily step count improved general health (adjusted between-group MD 4.5; 95% CI, 0.7–8.4).
- There was no statistically significant difference for all other secondary outcomes.

LIMITATIONS:

- The level for clinical significance was set at 45 m and was not a patient-centered outcome.
- The study was small and insufficiently powered to detect the secondary outcomes.
- Short follow-up period of only six months.
- The study population may not be representative due to a high proportion of NYHA II patients and those with a high baseline 6MWT.
- To decrease the assessment burden, robust and validated surveys were not used.
- No patient blinding, concern for Hawthorne effect.

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