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| **Table 1. Details of 39 included studies including quality assessment. \***Intent to vaccinate. RCT = Randomised Controlled Trial. Tdap = Tetanus, Diphtheria and Pertussis vaccination.  QI = Quality Improvement. At risk: eligible for influenza vaccine due to pre-existing medical condition, regardless of pregnancy. | Country  & Setting | Study Design  & Period | Quality Rating | Patient Characteristics  - Sample Size (N)  - Age (mean ± SD)  - Ethnicity (N, %) | Vaccine | | Intervention | Control  Vaccination Rate  (N, %) | Intervention  Vaccination Rate  (N, %) | Findings |
| Baxter et al (2013)98 | UK  Community Clinic | Ecological Study | Weak | Not reported | Influenza | Multimodal  Community awareness campaign (e.g., media, radio, newspaper, leaflets, posters, direct contact)  Community pharmacy programme (advice & immunisation)  GP financial incentive (if 75% of pregnant women vaccinated) | | England  2010/2011  At risk: 56.6%  Not at risk:  36.6%)  2011/2012  At risk:  50.8%  Not at risk:  25.5% | Stockport  2010/2011  At risk: 65%  Not at risk:  53%  2011/2012  At risk:  79.7%  Not at risk:  63.4% | **•** Following the intervention, Stockport (an affluent part of Manchester) had the highest influenza vaccine coverage in England.  **•** Real-life case stories used during community campaigns to address myths and misconceptions about vaccination were effective.  **•** The enthusiasm, support and confidence of staff (midwives, GPs and practice nurses) were crucial.  **•** GP incentive scheme encouraged GPs to meet specific targets and increase uptake. |
| Bechini et al (2019)84 | Italy  Obstetric Clinic | Cohort  2017-2018 | Moderate | Size: 201  Age: 24  Ethnicity:  Italian: 198 (98%)  Foreign: 3 (1.5%) | Influenza  Tdap | Patient Education  A 30-minute presentation on vaccination by experts with handouts of slides for patient participants | | \* 72/210, 34%  [Vaccination intention] | \*130/201, 65%  [Vaccination intention] | **•** After the intervention, hesitancy in the intention to vaccinate during pregnancy decreased and the number of pregnant women with poor knowledge of vaccination decreased by 30% (no P-value provided). |
| Chamberlain et al (2015)97 | USA  Obstetric Clinic | RCT  5 months (2012-2013) | Moderate | Size: 325  Age: 27.2 ± 5.6  Ethnicity:  White: 154 (47%)  Black: 133 (41%)  Asian: 7 (2%)  Other: 31 (10%)  Hispanic: 20 (6%) | Influenza Tdap | Multimodal  Practice- provider- and patient-focused package (e.g., talking points on coloured papers, vaccine champions, lapel buttons for staff, provider education, posters, brochures and iPad tutorials for patients, and maps to vaccination sites) | | Influenza: 11/151 (7%)  Tdap: 13/151 (9%) | Influenza: 16/149 (11%)  Tdap: 19/140 (14%) | **•** A non-significant increase in vaccination in the intervention group (influenza RD:3.6%, 95% CI: −4.0, 11.2; Tdap RD: 1.3%,95% CI: −10.7, 13.2).  (raw data for influenza vaccination; intervention: control; 16/149: 11/151)  **•** A non-significant increase in likelihood (50%) to receive any Tdap vaccine in the intervention than the control group (RR = 1.47, 95%CI: 0.70, 3.12), with 13.1% design-adjusted absolute difference.  (raw data for pertussis vaccination: intervention: control; 19/140: 13/151)  **•** Most intervention components positively associated with vaccine receipt  **•** Provider recommendation was most strongly associated with actual receipt regardless of study group or vaccine |
| Chang et al (2022)73 | Taiwan  Hospital  Clinic | RCT  2 months (2020-2021) | Moderate | Size: 2092  Age:  Control: 32.1 ± 5.6  Intervention: 31.9  ± 5.1  Ethnicity: not reported | Influenza | Patient Education & Prompting  The app uploads announcements, news, epidemic prevention policies, and health information. It reminds pregnant women about influenza vaccines and requests vaccination status feedback every two weeks. | | \*9/117 (8%)  [Vaccination intention] | \*22/126 (17%)  [Vaccination intention] | **•** Women in the intervention group had 2.41 times higher odds of experiencing a positive change in vaccination intention compared to the control group (OR = 2.41, 95% CI: 1.04–5.55, p = 0.03).  **•** The intervention group showed a 11.64% increase in knowledge scores regarding influenza vaccine vs 7.39% in control group. Intervention was significantly more effective than standard maternal education |
| Costantino et al (2021)116 | Italy  Hospital  Clinic | Cross Sectional  2019-2020 | Weak | Size: 326  Age:  18–24: 5, 1.5%  25-34: 215, 66%  35-40: 94, 28.8%  40+: 12, 3.7%  Ethnicity: not reported | Influenza  Tdap | Patient Education  Healthcare professionals provided one-hour education on immunisation & vaccination during childbirth classes in-person or online and offered counselling to those with questions and concerns | | Influenza:  10/326, 3.1%  Tdap:  24/326, 7.4% | Influenza:  96/201, 47.8%  Tdap:  116/201, 57.7% | **•** After intervention, influenza vaccine recipients increased by 44.8%, Tdap recipients increased by 50.7%. and 64.2% received both vaccines (a 54.8% increase).  **•** Increased vaccination was associated with higher education, employment, prior accurate knowledge about vaccination, and previous vaccine uptake.  **•** After intervention, reasons for refusal were fear of adverse events (47.6%), vaccines not recommended by obstetrician (43.4%), and intervention conducted outside of seasonal vaccination campaign (9%). Additionally, 43% of pregnant women who refused vaccination were discouraged by their obstetrician |
| Dehlinger et al (2021)99 | USA  Obstetric Clinic | Pre-post QI  2019-2020 | Moderate | Size: 2967  Age: not reported  Ethnicity:  Controls  Asian: 89, 6.0%  AA: 561, 37.9%  Hispanic: 86, 5.8%  Multiracial: 28, 1.8%  Other: 24, 1.6%  White: 688, 46.4%  Intervention  Asian: 87, 5.8%  AA: 522, 35.2%  Hispanic: 78, 5.2%  Multiracial: 28,1.8%  Other: 32, 2.1%  White: 741, 49.8% | Influenza | Multimodal  Patients received written information dispelling myths and highlighting the benefits of influenza vaccination for infants and mothers. Posters from the CDC promoting vaccination were displayed in patient restrooms. Clinicians were educated on patient barriers, vaccine recommendations, positive messaging, best practices, and received periodic reminders. The electronic health record included a prompt via a best practice advisory. | | 870/1480, 58.7% | 940/1487, 63.2% | **•** After the intervention, 940 (63.2%) influenza vaccines were identified (2019-2020 season) in patients’ records compared to 870 (58.7%) in 2018-2019.  **•** The number of records without a vaccination code was significantly less after the intervention in 2019- 2020 season compared to the 2018-2019 season (13.9% vs 22.9%; P < .001). |
| Deverall et al (2018)31 | New Zealand  Hospital  Clinic | Pre-Post Audit  2017 | Moderate | Size: 111  Age:   < 25: 50 (45%)  >25: 58 (52%)  Ethnicity:  Māori: 54 (48%)  European: 32 (29%)  Other: 25 (23%) | Pertussis | Multimodal  Maternity units notify GPs about their patient's pregnancy for vaccination discussions. A nurse attends antenatal classes for opportunistic immunisation. After-hours vaccination is available at the pharmacy and the Community Child Health Nurse vaccinates pregnant women at a monthly clinic. | | 31/69 (45%) | 16/21 (76%) | **•** The multimodal approach in the intervention areas resulted in improved vaccine uptake.  **•** A woman not being recalled to the GP for vaccination was the biggest reason for not being vaccinated |
| DiTosti et al (2021)100 | USA  Women’s Hospital | Cohort  2011-2015 | Strong | Size: 2294  Age:  Control: 32.8 ± 5.2  Intervention: 33.2 ±4.8  Ethnicity  Controls  White: 369, 53.6%  Black: 92, 13.9%  Asian:100, 15.2%  Hispanic:70, 9.1%  Other:58, 8.3%  Intervention:  White: 924, 57.6%  Black:199, 12.1%  Asian:186, 10.9%  Hispanic:119, 7.7%  Other:182 11.7% | Influenza  Tdap | Multimodal  Updated vaccination guidelines (2012) recommending universal Tdap in pregnancy:  Electronic Medical Record reminders, increased stocking of vaccines, routine sharing of information with providers to increase knowledge | | Tdap:  324/684, 47.4%  Influenza:  419/684, 61.2% | Tdap: 1385/1610, 86.1%  Influenza:  1159/1610, 72% | **•** After guidelines, Tdap uptake increased (47.4% vs 86.1%, p<0.001). Post-guideline cohort had 4.50-times greater adjusted odds of receiving the vaccine compared to pre-guideline cohort (95% CI 3.54–5.72). Receiving the Tdap vaccine within the recommended time improved from 52.5% to 91.8%.  **•** Post-guidelines, influenza vaccine frequency improved (61.2% vs 72%, p<0.001). Post-guideline cohort had an adjusted 70% increased odds of receiving the vaccine compared to pre guidelines cohort (aOR 1.71, 95% CI 1.40–2.07).  **•** Non-Hispanic Whites were more likely to receive both vaccines (p = 0.017) compared to Non-Hispanic Blacks.  **•** An increased number of prenatal visits was associated with receiving both vaccines (respective, aOR 1.09 95% CI 1.05–1.13; aOR 1.50 95% CI 1.17–1.94). |
| Frew et al (2016)80 | USA  Antenatal Clinic | RCT  2 months in 2013 | Moderate | Size: 95  Age: 26.1 ± 5.5  Ethnicity  Black/AA: 94, 99% Other: 1, 1% | Influenza | Patient Education  Video case studies and interactive educational tutorials.  Group 1: “Pregnant Pause” video, affective messaging  Group 2: “Vaccine for Healthy Pregnancy” video, cognitive messaging | | 4/34 (12%) | 1: 4/31 (13%)  2: 2/30 (7%) | **•** No significant difference in vaccination rate between groups. Log binomial regression models showed no association in intention to receive vaccine during future pregnancies based on any group.  (Influenza vaccine administered during pregnancy; risk ratio compared to control for (a) pregnant pause movie: 1.10 (0.30, 4.01; (b) iBook 0.57 (0.11, 2.88)  **•** Main reasons for not receiving the influenza vaccine:  -Vaccine safety concerns (47%, n=40)  - Low perceived risk of influenza  infection (31%, n=26). |
| Goodman et al (2015)81 | USA  Obstetric Clinic | RCT  2013-2014 | Moderate | Size: 100  Age: 31 ± 5.4  Ethnicity:  Control  Black 23.1%  Asian 1.9%  White 71.2%  Hispanic 1.9%  Multi-race 1.9%  Refused 0%  Other 0%  Intervention:  Black: 20.8%  Asian 0%  White 73.6%  Hispanic 1.9%  Multi-race 0%  Refused 1.9%  Other 1.9% | Influenza | Patient Education  Educational video developed by the CDC: “Protect Yourself, Protect Your Baby” (3 ½ minutes) based on the Health Belief Model | | 13/52 (25%) | 15/53 (28%) | **•** No significant difference in vaccination rate between groups.  (raw data for influenza vaccination; intervention: control; 15/53: 13/52)  **•** Multivariate analysis showed two beliefs independently associated with vaccination:  -“Flu shot protects me” (OR=2.19, 1.08-  4.44, p=.003) and  - “Flu shot protects my baby” (OR=2.04,  1.14-3.66, p=0.02).  **•** 45 (46%) received recommendation from healthcare professional. Those with recommendation were more likely to be vaccinated (21/45, 47% vs (6/52,12%, p<0.001)  **•** Intervention positively influenced four health beliefs with significant differences in mean pre- vs. post-video scores (intervention vs control respectively):  -Flu shot may harm me (-0.36 vs. 0.14, p=0.009),  -Flu shot may harm my baby (-0.36 vs. 0.09, p=0.015),  -Flu shot protects me against flu (0.43 vs. -.06, p=0.003),  -Flu shot protects baby against flu (0.82 vs 0.23, p=0.001). |
| Healy et al (2015)101 | USA  Hospital  Clinic | Pre-post QI  2013-2014 | Weak | Size: 6577  Age: 29.8  Ethnicity  White: 43.6%  Hispanic: 27%  Black/AA: 21%  Asian: 7.1%  Native: 0.5%  Other: 0.8% | Tdap | Multimodal  Implementation of American College of Obstetricians & Gynaecologists (ACOG) Guidelines recommending universal Tdap vaccination in pregnancy (2013).  Educating healthcare staff about recommendations and providing ACOG toolkit | | Not Reported, 36% | 3678/6577, 56% | **•** Tdap vaccination rate increased from 36% in women who delivered in April 2013 to a sustained rate of more than 61% since November 2013.  **•** Vaccination rate based on gestational age   * 95% received Tdap during weeks 27-36 of pregnancy * 71.6% during weeks 28- 32. * 3621 (98.5%) received Tdap at least 7 days before delivery * Of 19 women who had two deliveries within the 15-month study period, four (21%) received Tdap in both pregnancies   **•** Demographic associations   * Black women were less likely than other ethnicities to receive Tdap (41%versus 59%; P < 0.001) * Older maternal age was a positive predictor of receiving Tdap (OR 1.05 for each additional year older, 95% CI 1.04–1.06) * Being Black (OR 0.44, 95% CI 0.38–0.51) or having a preterm infant (OR 0.14, 95% C.I. 0.09–0.22) were negative predictors |
| Hirschberg et al (2021)96 | USA  Obstetric Clinic | Pre-post QI  4 weeks in 2021 | Weak | Size: 87  Age:  Control: 28.6  Intervention: 29.4  Ethnicity:  Controls  Hispanic: 2, 6.1%  Black: 21, 63.6%  White: 12, 36.4%  Intervention  Hispanic: 3, 5%  Black: 44, 73.3%  White: 16, 26.7% | COVID-19 | Policy  Onsite vaccination  availability once a week at two high-risk obstetric clinics | | 1/32, 3% | 6/55, 10% | **•** Onsite vaccination availability did not significantly increase the vaccination rates (3% vs 11%; P=.22). |
| Howe et al (2021)92 | New Zealand  Pharmacies | Pre-Post  Study  2015-2019 | Strong | Size: 27,576  Age: not reported  Ethnicity  Māori: 11302, 41%  Pacific: 1137, 4.1%  Asian: 2889, 10.5%  Other: 457, 1.7%  European: 11791. 42.8% | Tdap | Policy  Community pharmacy funding. One region received funding for maternal pertussis vaccination | | Pre-intervention period: 767/2904 (26%)  Post-intervention period: 3545/9342 (38%) | Pre-intervention period: 749/3581 (21%)  Post-intervention period: 4112/11748 (35%) | **•** Intervention group: 67% increase in Tdap uptake in the post- vs pre-intervention period and control group: 44% increase in post- vs pre-intervention period.  **•** Odds of Tdap vaccination increased in the post- vs pre-intervention period with this increase being larger (p = 0.0014) in intervention (35% versus 21%, OR = 2.07, 95% CI 1.89–2.27) compared to control regions (38% versus 26%, OR = 1.67, 95% CI 1.52–1.84). (Raw data for Intervention: Control: 4112/11748: 3545/9342)  **•** Coverage was lower for Māori versus non-Māori but increased more for Māori in the intervention versus control regions (117% versus 38% increase).  **•** No significant difference in pertussis vaccine uptake by area-level socioeconomic deprivation |
| Jina et al (2019)102 | USA  Hospital  Clinic | Pre-post QI  2015-2016 | Moderate | Size: 708  Age: not reported  Ethnicity: not reported | Tdap | Multimodal   Components:  Educating healthcare professionals and patients, increasing Tdap availability, reminding staff to facilitate vaccination, encouraging obstetricians to offer vaccine and transferring Tdap documents from office to hospital | | 362/636, 56.9% | 457/708, 64.5% | **•** The intervention resulted in a significant increase in Tdap vaccination among clinically eligible pregnant women. The absolute difference was 7.6% (64.5% vs. 56.9%, p<0.01), representing a relative increase of 13.4% (64%/56.9%).  **•** If this vaccination rate of 64% were applied to over 6500 deliveries annually, it would mean an additional 495 women receiving Tdap during pregnancy in this site |
| Jordan et al (2015)74 | USA  Virtual | RCT  1 week in 2012 | Moderate | Size:  Planning vaccination  at baseline: 1652  Not-planning  vaccination at  baseline: 2253  Age: not reported  Ethnicity: not reported | Influenza | Patient Education  Free national ‘Text4baby’ education to improve health knowledge and behaviour by sending three weekly interactive text messages and reminders timed to a woman’s due date or her infant’s birthday based on cognitive theory, health belief model and transtheoretical model. | | Planning vaccination at baseline:  821/1360 (60%)  Not planning vaccination at baseline:  267/1228 (22%) | Planning vaccination at baseline:  171/292 (59%)  Not planning vaccination at baseline:  219/1025 (21%) | **•** A reminder increased the odds of vaccination at follow-up among mothers (AOR.2.0, 95% CI.1.4, 2.9) and of continued intent to be vaccinated later in the season (pregnant, AOR.2.1, 95% CI.1.4, 3.1; mother, AOR.1.7, 95% CI.1.1, 2.5).  **•** Among mothers not planning to be vaccinated because of cost, those who received a tailored message about low-cost vaccination had higher odds of vaccination at follow-up (AOR.1.9, 95% CI.1.1, 3.5). (raw data intervention: control for (a) women planning at baseline to get vaccinated: 171/212: 821/1099; (b) women not planning at baseline to get vaccinated 219/877: 267/1025)    **•** Other tailored messages were not effective. |
| Klatt et al (2012)93 | USA  Obstetric Clinic | Pre-post QI  1 month in 2008 | Moderate | Size: 1284  Age: not reported  Ethnicity: not reported | Influenza | Policy  A best-practice alert implemented in an electronic prenatal record to inform healthcare providers if a patient had not received vaccination or expressed a well-informed refusal during prenatal visits. | | 267/639, 41.8% | 393/645, 60.9% | **•** Post-intervention (2008-2009), there was increased vaccination among women, increased documented discussions about influenza vaccination (compared to 2007-2008) and 68.1% of women accepted vaccination after discussion.  **•** In 2007-2008, most unvaccinated women had no documented discussion, whereas in 2008-2009, the main reason for not getting vaccinated was an informed refusal. |
| Krishnaswamy et al (2018)90 | Australia  Maternity Hospital | Cross Sectional  2015-2017 | Weak | Size: 916  Age: not reported  Ethnicity: not reported | Tdap | Provider  Different healthcare professional-led immunisation services  Hospital A: nurse-led immunisation  Hospital B: standing order for midwife-led vaccination  Hospital C: GP-led primary care clinic | | Median % uptake:  Hospital A  55%  Hospital B  39%  Hospital C  65% | Median % at 3 months & 6 months:  Hospital A  65%, 68%  Hospital B  48%, 91%  Hospital C  74%, 88% | **•** Uptake improved significantly at all three hospitals over the study period with the most significant change (39% to 91%, p < .001) noted at the hospital where standing orders were introduced (midwife-led).  **•** The nurse-led intervention showed improvement in late 2015, with significant progress between periods 1 and 2, improvement was less pronounced between periods 2 and 3.  **•** The GP-led intervention showed steady improvement throughout the study period, increasing from a median of 65% in period 1 to 88% in period 3. |
| Kriss et al (2017)71 | USA  Obstetric Antenatal Clinic | RCT  4 months in 2013 | Moderate | Size: 106  Age: 26.1  Ethnicity:  African American:  100% | Tdap | Patient Education  Group 1: Video ‘Pregnant Pause,’ affective messaging. Detailed information on Tdap and influenza vaccines, safety, and current advice (20 minutes in the waiting room.  Group 2: iBook ‘Vaccine for Healthy Pregnancy,’ cognitive message. Information on antenatal Tdap and influenza vaccination, vaccine safety, the impact of pertussis and influenza on pregnant women and infants, and the current advice (20 minutes in the waiting room) | | 2/34 (6%) | 1: 2/30 (6%)  2: 2/33 (7%) | **•** Tdap vaccination rates were 18% in the control group, 50% in the iBook group (RR: 2.83; 95% CI: 1.26-6.37), and 29% in the video group (RR: 1.65; 95% CI: 0.66-4.09)  **•** At baseline, average likelihood of getting Tdap during current pregnancy was 3.0 (SD 3.4) on a 0–10 scale; at follow up, it was 6.3 (SD 3.6).  **•** Main reasons for not receiving Tdap were not receiving a recommendation from healthcare professional (48%) and not knowing about Tdap (44%) |
| McAlister et al (2018)119 | USA  Obstetric Clinic | Cohort  12 weeks | Weak | Size: 75  Age: 19-44  Ethnicity:  Hispanic 100% | Tdap | Patient Education  A handout, a 5-minute video, and a patient education session, (10 mins all together) all available in English and Spanish. Intervention at Clinic A (privately insured or Medicaid) and Clinic B (women with no insurance or vaccine reimbursements). | | 186/468, 40% | 66/75, 81% | **•** Vaccination rate increased compared with the previous year. Higher vaccinations in private and Medicaid insured women (clinic A) than women with no insurance (clinic B).  **•** Participants in Clinic A were more willing to receive Tdap vaccine after discussion before viewing the video.  **•** Language barrier at Clinic B was an obstacle for staff in explaining the importance of Tdap vaccination during pregnancy, but an educational video in Spanish overcame this obstacle.  **•** Factors influencing vaccination rates were video education in native language about Tdap importance and involving family input. |
| McCarthy et al (2012)103 | Australia  Tertiary Hospital | Pre-post Audit  2 weeks in 2010 & 2011 | Moderate | Size: 439  Age: not reported  Ethnicity:  Controls  Aboriginal or Torres  Strait Islander1.25%  Intervention:  Not reported | Influenza | Multimodal  Grand round lecture, daily antenatal clinical meetings, an English language patient information brochure, stamped reminder messages, and a safety checklist. Increased vaccine supplies and referral to GPs for vaccination. | | 60/199, 30.2% | 96/240, 40% | **•** Vaccine coverage increased from 30% in 2010 to 40% in 2011 (p=0.03). The reason cited for choosing vaccination was to protect both their babies and themselves.  **•** Following the 2011 educational campaign, fewer women expressed safety concerns for themselves or their babies.  **•** Reasons for not getting vaccinated included concerns about risk to the unborn baby, lack of discussion about vaccination from healthcare professionals and doubts about vaccine efficacy. |
| McCarthy et al (2015)104 | Australia  Women’s Hospital | Pre-post Audit  2010-2014 | Moderate | Size: 1086  Age:  Teenage mothers: 1.2%  Over 35: 27.3%  Ethnicity  Australian-born and  Indigenous | Influenza | Multimodal  Providing national public health policies promoting influenza vaccination, statement from Royal College of Obstetricians and Gynaecologists, patient information brochures, staff education and  increased vaccine supply | | 59/199, 30% | 2011:  95/240, 39.6%  2012:  72/203, 35.5%  2013:  137/253, 54.2%  2014:  98/191, 51.3% | **•** Influenza vaccination significantly increased by 6% per year (95% CI 4-8%): from 29.6% in 2010 to 51.3% in 2014 (p < 0.001).  **•** Lack of discussion from maternity caregivers was a persistent reason for non-vaccination, recalled by 1 in 2 non-vaccinated women.  **•** Women preferred face to face consultations with doctors and midwives, and internet and text messaging as information sources about influenza vaccination.  **•** Messages about vaccine safety in pregnancy and infant benefits are increasingly being heeded. Lower awareness of maternal benefits of influenza vaccination, especially for women with risk factors for severe disease. |
| Meharry et al (2013)122 | USA  Antenatal Clinic | RCT  2011-2012 | Moderate | Size: 133  Age: not reported  Ethnicity  Asian: 6, 4.5%  Black: 36, 27.1%  White: 41, 30.8%  Hispanic: 50, 37.6% | Influenza | Patient Education  Group 1: pamphlet  Group 2: pamphlet & verbalised benefit statement | | 23/49 (47%) | Group 1: 35/48 (73%)  Group 2: 31/36 (86%) | **•** Vaccine uptake significantly improved in both Group 1 (v2 = 6.81, df = 1, p = .009) and Group 2 (v2 = 13.74, df = 1, p < .001) compared to control. There was no significant difference between Groups 1 & 2.  (raw data for vaccination (a) Group 1: 35/48 (b) Group 2: 31/36 (c) Control: 23/49  **•** Among intervention groups, perception of vaccine safety (F = 4.973, df = 2, p < .01) and perception of benefit to mother & infant (F = 6.690, df = 2, p < .01) significantly improved compared to control. |
| Moniz et al (2013)83 | USA  Hospital Clinic | RCT  2010-2012 | Strong | Size: 204  Age: not reported  Ethnicity  White 56, 28%  Black 134, 66%  Native American  5, 2%  Multiracial 9, 4% | Influenza | Patient Educational & Prompting  12 weekly text messages about general preventive health in pregnancy plus the importance of influenza vaccination | | 31/100 (31%) | 34/104 (33%) | **•** No significant difference in vaccination rate between groups. (raw data for vaccination Intervention: Control: 34/104: 31/100)  **•** Most participants in both groups reported finding texts helpful and wanted to continue receiving texts.  **•** More than 70% of participants felt that receiving text messages about how to stay healthy during pregnancy increased their satisfaction with their prenatal care. |
| Morgan et al (2015)94 | USA  Hospital Clinic | Pre-post QI  2013 | Moderate | Size: 20,801  Age: not reported  Ethnicity: not reported | Tdap | Policy  Electronic Medical Record alert. The best-practice alert was designed to appear starting at 32 weeks of gestation and to reappear at every subsequent encounter until vaccine acceptance was recorded or delivery occurred. | | 5064/10600, 48% | 9879/10201, 96.8% | **•** Implementation of a Tdap vaccine best-practice alert and antepartum administration achieved a 97% vaccination rate, doubling the previous year's rate.  **•** Non-significant decline in pertussis incidence among neonates born to mothers receiving prenatal care. |
| O’Leary et al (2019)b105 | USA  Obstetric Clinic | RCT  2011-2014 | Weak | Size  Control: 37085  Intervention: 39813  Age:  Control: 38 ± 12.9  Intervention: 41 ±  14.9  Ethnicity  White: 24,477  (31.9%)  Black: 1,484 (1.9%)  Hispanic: 5,398  (7%)  Other: 2,447 (3.2%)  Unknown: 43,092  (56%) | Influenza Tdap | Multimodal  Assign immunisation champions, train staff/providers, assist with vaccine purchasing, identify eligible patients, standing order implementation, chart review/feedback, patient education materials. | | Influenza:  775/1900 (41%)  Tdap:  1364/2637 (51%) | Influenza:  660/2249 (29%)  Tdap:  1161/2280 (51%) | **•** No significant difference in vaccination rate between groups.  **•** Both intervention and control practices showed improved vaccination of pregnant women; Risk Ratio = 0.79; 95% CI 0.55, 1.14 |
| O’Leary et al (2019)a78 | USA  Non-profit Community Health Clinic | RCT  2013-2016 | Strong | Size: 462  Age:  Flu: 31.3 ± 4.2  Tdap: 32 ± 4.5  Ethnicity  Flu: White 255, 88%  Tdap: White 148, 84% | Influenza Tdap | Patient Education  Group 1: website with vaccine information only  Group 2: website with vaccine information, interactive social media including a blog, discussion forum and ‘Ask a Question’ portal. | | Flu: 16/44 (36%)  Tdap: 21/31 (68%) | Influenza:  1: 80/140 (57%)  2: 59/105 (56%)  Tdap:  1: 57/86 (71%)  2: 43/62 (69%) | **•** For influenza, women in both the group 2 (OR=2.19, 95% CI=1.06, 4.53) and group 1 (OR=2.20, 95% CI=1.03, 4.69) had significantly higher vaccine uptake than controls. (Raw data for (a) Group 1: (59/105) (b) Group 2: 80/140; (c) Control: 16/44)  **•** For Tdap, there were no significant differences in vaccination rate between groups. (Raw data for (a) Group 1: (43/60) (b) Group 2: 57/80; (c) Control: 21/31) |
| Omer et al (2022)106 | USA  Obstetric Clinic | RCT  2017-2018 | Strong | Size: 2092  Age: not reported  Ethnicity  White: 1133, 57.1%  Black: 284, 14.3%  Hispanic: 196, 9.9%  American Indian  Alaska Native:  24,1.2%  Native Hawaii/Pacific  Islander: 11, 0.6%  Other: 9, 0.5%  Missing: 409, 16.4% | Influenza Tdap | Multimodal  Provider: Educational CME module, ‘VaxChat’.  Practice: ‘QI program to increase vaccination ‘AFIX’  Patient: individually tailored app ‘MomsTalkShots’  Group 1: practice + provider + patient intervention  Group 2: practice + provider intervention, patient control  Group 3: practice + provider control, patient intervention | | Influenza: 320/525, 61%  Tdap: 425/525, 81% | Influenza:  1: 347/523 (66%)  2: 327/524 (62%)  3: 323/520 (62%)  Tdap  1: 424/523 (88%)  2: 399/524 (76%)  3: 414/520 (80%) | **•** No significant difference in vaccination rate between groups overall (Raw data for Influenza vaccination for (a) Group 1: (347/523) (b) Group 2: 327/524; (c) Group 3: 323/520; Control: 320/525 For dTap (a) Group 1: 424/523; (b) Group 2: 399/524; (c) Group 3: 414/520; Control: 320/525).  **•** Among women who had no intention or were unsure about receiving the influenza and Tdap vaccine, those who received patient intervention only were 61% more likely to receive the influenza vaccine than those in control group (RR: 1.61; 95% CI: 1.18–2.21).  **•** Among women who intended to receive influenza or Tdap at baseline, vaccination rates during pregnancy were similar. |
| Orefice et al (2019)95 | Australia  Women’s  Hospital | Pre-post Audit  July 2015, 2017 | Moderate | Size: 574  Age:  Control: 33.3 ± 5.1  Intervention: 31.5 ±  5  Ethnicity: not reported | Influenza | Policy  The electronic health record with a mandatory field that clinicians must complete before closing patient files, requiring them to indicate whether vaccination was performed or not. | | 96/275, 35% | 238/299, 79.8% | **•** Vaccination rates doubled between audit periods (35.0% vs. 79.8%, P < 0.0001). |
| Parsons et al (2022)72 | UK  Virtual | Cohort  2019-2020 | Weak | Size: 67  Age: 18+  Ethnicity: not reported | Influenza | Patient Education  A 4-minute online animation on beliefs about flu risk and vaccination efficacy. Emphasising severity, increased complications, and vaccine protection, tackling knowledge gaps and demystifying vaccination with reassurance | | 43.7%  (National statistic, no baseline cohort) | 38/67, 56.7% | **•** Watching the animation led to increased intentions to accept flu vaccination during pregnancy and increased appraisals of likelihood of getting flu and severity of flu during pregnancy.  **•** Of the 67 participants 38 reported influenza vaccination receipt while pregnant |
| Payakachat et al (2016)82 | USA  Women’s Clinic | RCT  May-Aug 2014 | Moderate | Size: 279  Age: 26.4 ± 5.7  Ethnicity  White: 130, 46.6%  Black: 126, 45.2%  Others: 23, 8.2% | Tdap | Patient Education  Modified version of CDC Tdap information leaflet to 6th grade literacy levels compared to 10th-grade literacy of standard CDC information leaflet. | | 68/152 (45%) | 68/139 (49%) | **•** No significant difference in vaccination rate between groups. (Raw data for Intervention: Control: 66/135:65/144) **•** Overall perception scores significantly increased (3.1–3.4, p < 0.001) after intervention, indicating increased knowledge of vaccine. |
| Pierson et al (2015)88 | USA  Obstetric Clinic | Pre-post QI  2010-2012 | Weak | Size: 8019  Age: not reported  Ethnicity: not reported | Influenza | Provider  Usual care was supplemented with brightly coloured forms attached to clinic notes to prompt healthcare professionals to discuss vaccination status. | | 101/4590, 2.2% | 2/30, 6.67% | **•** There was a significant difference in vaccination rate between groups from 2.2% to 14.2%. (95% CI: 0.11-0.13; p<0.001). |
| Ryan et al (2020)86 | UK  Virtual | Cross Sectional  2017 | Weak | Size: 282  Age: 31 ± 5.1  Ethnicity  British White 232,  82%  Other White 33, 12%  Non-White 17, 6% | Tdap | Patient Education  Message Framing. Patient assigned to read disease risk, myth busting, or control information before answering questions based on the Theory of Planned Behaviour | | Intentions: n= 87 mean 20.2 (SD 10.7, p-0.56)    [Vaccination intention] | Intentions: n=97  \*Disease Risk:  mean 20.4 (SD  10.7, p-0.56)  \*Myth Busting:  n=98, mean 22  (SD 9.7, p-  0.56)  [Vaccination intention] | **•** No significant effects of message framing were found.  **•** Attitudes (Beta = 0.699; p < 0.001) and subjective norms (Beta = 0.262, p < 0.001) significantly predicted intention to vaccinate but perceived behavioural control did not.  **•** The Theory of Planned Behaviour constructs accounted for 86% and 36% of the variance in vaccine intention and vaccine history, respectively.  **•** Disease risk information did not influence vaccine acceptability. |
| Schirwani et al (2022)85 | Austria  Maternity Hospital | Cohort  2021 | Moderate | Size: 217  Age: 31.5  Ethnicity: not reported | COVID-19 | Patient Education  Arm 1: written briefing recommending vaccine after childbirth.  Arm 2: written briefing with 5-minute oral counselling by attending physician in the postpartum ward | | 45/69 (65%)  [Vaccination intention] | \*Arm 1 (group A): 18/68 (26.5%)  \*Arm 2 (group B): 35/80 (43.8%) | **•** A personal 5-minute counselling by a physician increased the willingness to receive the vaccination against COVID-19 |
| Sherman et al (2012)87 | USA  Primary Care Centre | Cohort  3 months in 2003, 2005 | Moderate | Size: 1367  Age:  Control:  median 24 (range  14-44)  Intervention  median 24 (range  13-45)  Ethnicity:  Control  Hispanic: 168, 33%  White: 162, 32%  Black: 127, 25%  Asian: 35, 7%  Other: 11, 2%  Unknown: 1  Intervention  Hispanic: 314, 36%  White: 288, 33%  Black: 192, 22%  Asian: 39, 5%  Other: 25, 3%  Unknown: 5 | Influenza | Provider  Reminders for staff and providers about vaccination | | 74/504, 14.7% | 445/863, 51.6% | **•** Vaccination rate improved significantly, p<0.0001 [RD: 37%, 95% CI: 32.5-41.6]. RR= 3.5.  **•** All provider groups demonstrated significant increases in the rates of vaccination with a reminder, however, there were no differences in age, race, education, primary language, or insurance. |
| Spina et al (2020)89 | USA  Obstetric Clinic | Pre-post QI  2016-2018 | Weak | Size: 889  Age:  Control: 32 ± 5.5  Intervention: 31.5 ± 5  Ethnicity:  Controls  White 36.6%,  Black 7%  Hispanic 11%  Asian 2.2%  Native American  0.2%  Other 1.8%  Unknown 41.3%  Intervention:  White 39.3%  Black 16.5%  Hispanic 9.3%  Asian 2.5%  Native American  0.2%  Other 1.6%  Unknown 30.7% | Influenza Tdap | Provider  The CDC model: a menu of clearly defined QI strategies, bi-weekly technical assistance meetings with designated immunisation champions, incentives for champions/staff, and adapted CDC QI tool (AFIX) to aid each practice. | | Flu: 250/446, 56%  Tdap: 343/447, 77% | Flu: 287/443, 65%  Tdap: 372/443, 84% | **•** Post-intervention, documented influenza  vaccination rates increased from 56% at baseline to 65% (p < 0.01); and Tdap vaccination rates increased from 77% at baseline to 84% (p < 0.02) across all practices.  **•** The intervention improved provider motivation to vaccinate through assessment of current vaccination coverage with feedback, goal setting and incentives. |
| Stockwell et al (2014)77 | USA  Community Clinic | RCT  4 months in 2011 | Moderate | Size: 1187  Age: not reported  Ethnicity: not reported | Influenza | Patient Educational & Prompting  Five weekly text messages regarding influenza vaccination and 2 text message appointment reminders. All women included sent introductory text message saying they may receive pregnant health related messages. | | 269/577 (47%) | 284/576 (49%) | **•** After adjusting for gestational age and number of clinic visits, women who received intervention were 30% more likely to be vaccinated (AOR = 1.30; 95% CI = 1.003, 1.69). The majority of vaccinations were given prepartum (84.1% intervention; 82.4% control. (Raw data for vaccination during pregnancy; Intervention: Control: 243/576: 222/577)  **•** Greatest effect was seen among women who in early third trimester (28–33wks) – where there was up to a 15% absolute difference in vaccination between groups.  **•** Influenza vaccination for entire cohort remained low, 48%; small family medicine site had higher coverage 76.9%, obstetric sites ranged 41.5-52.2%. |
| Wong et al (2016)76 | Hong Kong  Hospital Antenatal Clinic | RCT  2013-2015 | Strong | Size: 321  Age: 33.5 ± 4.2  Ethnicity: not reported | Influenza | Patient Education  Leaflet about influenza vaccine in pregnancy with a 10-minute one-to-one education session | | 16/160 (10%) | 34/161(21%) | **•** Brief education was effective in improving vaccination uptake (p=0.006). (Raw data for Intervention: Control: 34/151: 16/154)  **•** More participants in intervention group initiated discussion about influenza vaccination with healthcare professional (19.9% vs. 13.1%; p=0.10), but the difference was not statistically significant. |
| Yudin et al (2017)79 | Canada  Hospital Antenatal Clinic | RCT  2013-2014 | Strong | Size: 317  Age:  Control 32.4  Intervention: 32.2  Ethnicity:  Caucasian: 50%  Other: 50% | Influenza | Patient Educational & Prompting  Two text messages weekly for four weeks reinforcing that influenza vaccine is recommended and safe | | 41/152 (27%) | 40/129 (31%) | **•** No significant difference in vaccination rate between groups. (Raw data for Intervention: Control: 40/129: 41/152)  **•** Overall vaccination rates low (29%) in the entire cohort. Vaccination more likely if household income (>100,000) or had previously received the vaccine. |
| Zakrzewski et al (2014)91 | USA  Community Clinic | Cohort  2010-2012 | Moderate | Size: 2883  Age: not reported  Ethnicity: not reported | Influenza | Provider  Nurse-provided and recommended vaccination compared to physician (control) | | 804/2112, 38.1% | 297/771, 38.5% | **•** A nurse-driven protocol did not improve vaccination rates across varying practice sites  **•** Nurse offering rate 99.7% with 38.2% receiving (vaccination rate 38.1%) and physician offering vaccine 54.5% with 79.7% receiving (vaccination rate 38.5%) |