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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 | ControlVaccination Rate(N, %) | InterventionVaccination Rate(N, %) |  Findings |
| Baxter et al (2013)98 | UKCommunity Clinic | Ecological Study | Weak | Not reported  | Influenza | MultimodalCommunity 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) | England2010/2011  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 | ItalyObstetric Clinic | Cohort2017-2018 | Moderate  | Size: 201Age: 24Ethnicity: Italian: 198 (98%) Foreign: 3 (1.5%) | InfluenzaTdap | 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 | USAObstetric Clinic | RCT5 months (2012-2013) | Moderate | Size: 325Age: 27.2 ± 5.6Ethnicity: White: 154 (47%) Black: 133 (41%) Asian: 7 (2%) Other: 31 (10%) Hispanic: 20 (6%) | InfluenzaTdap | 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 | TaiwanHospitalClinic  | RCT2 months (2020-2021) | Moderate | Size: 2092Age:  Control: 32.1 ± 5.6 Intervention: 31.9  ± 5.1Ethnicity: 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 | ItalyHospitalClinic | Cross Sectional2019-2020 | Weak | Size: 326Age: 18–24: 5, 1.5%25-34: 215, 66%35-40: 94, 28.8%40+: 12, 3.7%Ethnicity: not reported  | InfluenzaTdap | Patient EducationHealthcare 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 | USAObstetric Clinic | Pre-post QI2019-2020 | Moderate  | Size: 2967Age: 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 | MultimodalPatients 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 ZealandHospital Clinic  | Pre-Post Audit 2017 | Moderate | Size: 111Age:  < 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 | USAWomen’s Hospital | Cohort2011-2015 | Strong | Size: 2294Age:  Control: 32.8 ± 5.2 Intervention: 33.2 ±4.8Ethnicity 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% | InfluenzaTdap | 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 | USAAntenatal Clinic | RCT2 months in 2013 | Moderate | Size: 95Age: 26.1 ± 5.5Ethnicity Black/AA: 94, 99% Other: 1, 1% | Influenza | Patient EducationVideo 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 | USAObstetric Clinic | RCT2013-2014 | Moderate | Size: 100Age: 31 ± 5.4Ethnicity: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 EducationEducational 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 | USAHospitalClinic  | Pre-post QI2013-2014 | Weak | Size: 6577Age: 29.8Ethnicity 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 | USAObstetric Clinic  | Pre-post QI4 weeks in 2021 | Weak | Size: 87Age:  Control: 28.6 Intervention: 29.4Ethnicity: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 ZealandPharmacies | Pre-Post Study2015-2019 | Strong | Size: 27,576Age: 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 | USAHospitalClinic  | Pre-post QI2015-2016 | Moderate | Size: 708Age: 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 | USAVirtual | RCT1 week in 2012  | Moderate | Size:  Planning vaccination  at baseline: 1652 Not-planning  vaccination at  baseline: 2253Age: not reportedEthnicity: not reported | Influenza | Patient EducationFree 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 | USAObstetric Clinic | Pre-post QI1 month in 2008 | Moderate | Size: 1284Age: not reportedEthnicity: not reported | Influenza | PolicyA 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 | AustraliaMaternity Hospital | Cross Sectional2015-2017 | Weak | Size: 916Age: not reportedEthnicity: not reported | Tdap | Provider Different healthcare professional-led immunisation servicesHospital A: nurse-led immunisation Hospital B: standing order for midwife-led vaccinationHospital C: GP-led primary care clinic | Median % uptake:Hospital A55%Hospital B39%Hospital C65% | Median % at 3 months & 6 months:Hospital A65%, 68%Hospital B48%, 91%Hospital C74%, 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 | USAObstetric Antenatal Clinic | RCT4 months in 2013 | Moderate | Size: 106Age: 26.1Ethnicity: African American:  100% | Tdap | Patient EducationGroup 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 | USAObstetric Clinic | Cohort12 weeks | Weak | Size: 75Age: 19-44Ethnicity:  Hispanic 100% | Tdap | Patient EducationA 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 Audit2 weeks in 2010 & 2011 | Moderate | Size: 439Age: not reportedEthnicity: 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 | AustraliaWomen’s Hospital  | Pre-post Audit 2010-2014 | Moderate | Size: 1086Age: 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 | USAAntenatal Clinic | RCT2011-2012 | Moderate | Size: 133Age: not reportedEthnicity Asian: 6, 4.5% Black: 36, 27.1% White: 41, 30.8% Hispanic: 50, 37.6% | Influenza | Patient EducationGroup 1: pamphletGroup 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 | USAHospital Clinic | RCT2010-2012 | Strong  | Size: 204Age: 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 | USAHospital Clinic | Pre-post QI2013 | Moderate | Size: 20,801Age: not reportedEthnicity: 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 | USAObstetric Clinic | RCT2011-2014 | Weak | Size Control: 37085 Intervention: 39813Age:  Control: 38 ± 12.9 Intervention: 41 ±  14.9Ethnicity White: 24,477  (31.9%) Black: 1,484 (1.9%) Hispanic: 5,398  (7%) Other: 2,447 (3.2%) Unknown: 43,092  (56%) | InfluenzaTdap | MultimodalAssign 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 | USANon-profit Community Health Clinic | RCT2013-2016 | Strong  | Size: 462Age:  Flu: 31.3 ± 4.2 Tdap: 32 ± 4.5Ethnicity Flu: White 255, 88%  Tdap: White 148, 84% | InfluenzaTdap | Patient EducationGroup 1: website with vaccine information onlyGroup 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 | USAObstetric Clinic | RCT2017-2018 | Strong  | Size: 2092Age: not reportedEthnicity 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% | InfluenzaTdap | MultimodalProvider: Educational CME module, ‘VaxChat’.Practice: ‘QI program to increase vaccination ‘AFIX’Patient: individually tailored app ‘MomsTalkShots’Group 1: practice + provider + patient interventionGroup 2: practice + provider intervention, patient controlGroup 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%)Tdap1: 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 | AustraliaWomen’s Hospital  | Pre-post Audit July 2015, 2017 | Moderate  | Size: 574Age:  Control: 33.3 ± 5.1 Intervention: 31.5 ±  5 Ethnicity: not reported | Influenza | PolicyThe 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 | UKVirtual | Cohort2019-2020 | Weak | Size: 67Age: 18+Ethnicity: not reported | Influenza | Patient EducationA 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 | USAWomen’s Clinic | RCTMay-Aug 2014 | Moderate | Size: 279Age: 26.4 ± 5.7Ethnicity White: 130, 46.6% Black: 126, 45.2% Others: 23, 8.2% | Tdap | Patient EducationModified 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 | USAObstetric Clinic | Pre-post QI2010-2012 | Weak  | Size: 8019Age: not reportedEthnicity: 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 | UKVirtual | Cross Sectional2017 | Weak  | Size: 282Age: 31 ± 5.1Ethnicity British White 232,  82%  Other White 33, 12% Non-White 17, 6% | Tdap | Patient EducationMessage 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: 217Age: 31.5Ethnicity: not reported | COVID-19 | Patient EducationArm 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 | USAPrimary Care Centre  | Cohort3 months in 2003, 2005 | Moderate  | Size: 1367Age: 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: 1Intervention 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 | USAObstetric Clinic | Pre-post QI2016-2018 | Weak | Size: 889Age:  Control: 32 ± 5.5 Intervention: 31.5 ± 5Ethnicity: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% | InfluenzaTdap | ProviderThe 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 influenzavaccination 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 | USACommunity Clinic | RCT4 months in 2011 | Moderate | Size: 1187Age: not reportedEthnicity: 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 KongHospital Antenatal Clinic | RCT2013-2015 | Strong  | Size: 321Age: 33.5 ± 4.2Ethnicity: not reported | Influenza | Patient EducationLeaflet 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 | RCT2013-2014 | Strong  | Size: 317Age:  Control 32.4 Intervention: 32.2Ethnicity: 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 | USACommunity Clinic | Cohort2010-2012 | Moderate | Size: 2883Age: 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%) |