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## Counselling of non-communicable diseases' patients for COVID-19 vaccine uptake in Jordan: Evaluating the intervention



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### ABSTRACT

**Background:** People with noncommunicable diseases (NCDs) are at a significantly higher risk of worst outcomes if infected with COVID-19 and thus amongst the main target population for vaccination. Despite prioritizing them for vaccination, the number of vaccinated patients with comorbidities stalled post vaccine introduction. Despite that the government along with partners ran a national awareness campaign to ramp up vaccination coverage, the coverage remained suboptimal. Thus, a one-to-one health counselling initiative was implemented to explore the acceptance of COVID-19 vaccines by the NCDs patients and address the main issues surrounding vaccine hesitancy. This study evaluates the impact of this intervention by analyzing the change in COVID-19 vaccine acceptance.

**Methods:** In this analytical observational study, a random sample of 57,794 people living with NCDs were approached. Out of them, 12,144 received one-to-one counselling by a group of trained health professionals. The counselled group's vaccine acceptance was assessed on a Likert scale from 1 to 5 pre- and post-counselling. Moreover, a random sample was followed up 2 months after initial counselling to measure their vaccine acceptance and update their vaccination status.

**Results:** 44.5% of total respondents were already registered in the vaccination platform. On a scale from 1 to 5, the overall mean confidence significantly increased by 1.63 from 2.48 pre-counselling to 4.11 post-counselling. Two-months post counselling, a random sample was contacted again and had a mean vaccine confidence of 3.71, which is significantly higher than pre-counselling confidence level despite a significant decrease to post-counselling results.

**Discussion:** Implementing an intervention that targets all key factors impacting health decisions, such as health literacy, risk appraisal and response efficacy, helps reach an adaptive response and increase vaccine confidence. Scholars should be cautious when implementing an intervention since it could lead to maladaptive defensive responses. One-to-one interventions are more effective in population when addressing new interventions and vaccines.

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### 1. Background

Noncommunicable diseases (NCDs) is significantly associated with increased risk of intensive care unit (ICU) admissions and higher mortality among COVID-19 infected patients. Among others, diabetes, hypertension, and cardiovascular diseases represent critical risk exposures [1,2]. On the basis of evidence, the WHO Strategic Advisory Group of Experts on Immunization (SAGE)

identified people with NCDs comorbidities among the main target population for COVID-19 vaccination [3].

Ministry of Health (MoH) estimates that 1.2 million people live with one or more NCDs in Jordan, and 920,000 are covered by MoH services [4]. Available figures might underestimate the real situation given the result of the 2019 Jordan National Stepwise Survey, which reported the prevalence of hypertension, diabetes, and hyperlipidemia as 22 %, 20 %, and 17.7 %, respectively [5].

In Jordan, the National Immunization Technical Advisory Group (NITAG) aligned with the WHO SAGE recommendations and prioritized people living with NCDs (PLNCDs) for COVID-19 vaccination. PLNCDs were therefore included in Jordan National Deployment

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and Vaccination Plan, as one of the first-tier target population along with elderly, healthcare providers and essential workers [6].

COVID-19 vaccinations in Jordan started on 13th January 2021 and is available free of cost for all individuals residing in Jordan irrespective of their nationality and legal status [7]. Despite the prioritization of PLNCDs as first tier target group, only 169,000 individuals registered at the electronic platform during the first three months of vaccination roll out. Out of which, only 32,298 completed their vaccination schedule and 47,868 received at least one dose of the two-doses schedule. Available literature suggests poor vaccination seeking behavior among PLNCDs in low- and middle- income countries [8]. Despite higher levels of concern and fear of getting infected with COVID-19 which have resulted in lower tendency of PLNCDs to visit their healthcare providers, the relation between existence of NCDs and willingness to take the vaccine has not been conclusive [9–11]. Factors influencing vaccine acceptance and hesitancy among PLNCDs did not differ from the previously reported factors among the general population and were related to vaccination time, level of education, risk perception, and history of vaccines acceptance [10,12].

The role of communication and community engagement in combatting misinformation and reassuring people about vaccine safety and effectiveness have been proven effective in increasing the vaccine uptake [13]. Accounting for personal, environmental, and societal circumstances is highly important in each communication strategy since people can perceive and understand health messages in different ways [14]. Mass-media and communication campaigns are likely to miss specific groups who might be particularly vulnerable. Thus, addressing certain groups require understanding of their specific concerns and fears [13].

Considering the aforementioned aspects, one-to-one health counselling initiative to address the main issues surrounding COVID-19 vaccine hesitancy among PLNCDs in Jordan was started in March 2021. The main objectives of the pilot initiative were to gain an understanding of the current situation surrounding COVID-19 vaccination among beneficiaries, to provide tailored messaging to prompt registration, and to promote COVID-19 vaccine acceptance among PLNCDs. This article aims to evaluate the impact of the health counselling intervention by analyzing potential changes in acceptance of COVID-19 vaccination.

## 2. Methods.

### 2.1. Study design

This is an analytical observational study that aims to evaluate the impact of one-to-one counseling on COVID-19 vaccination, conducted in March – July 2021. The study group consists of NCD patients with diabetes mellitus, hypertension, cardiovascular, and immune diseases who were previously registered in the NCD registry at the Jordanian Ministry of Health. In order to evaluate the impact of the provided COVID-19 vaccine counselling, vaccine acceptance was assessed on a Likert scale from 1 to 5. Likert Scale was deployed because of its ability to measure human attitudes and its tendency to be rather flexible and need based [15]. Given the lack of consensus on a unified vaccine acceptance scale, vaccine acceptance was measured subjectively using a feedback question on vaccines. While single item surveys may miss some of the aspects related to acceptance, it was previously proved to be effective to assess self-rated quality of health and was reported to be associated with increased validity when predicting health service use [16].

Study group was asked to fill a pre-post counselling vaccine willingness and confidence score. A random sample of the counselled population was followed up for 2 months after counselling

to report their willingness, confidence, and registration status. Although, the scale used was not previously validated, it was used as an indication of the subjective self-reported attitude of the same group pre-, and post- counselling to evaluate the impact of the initiative on vaccine acceptance and willingness to get vaccinated.

Before starting the intervention, a group of 46 experienced healthcare providers living with NCDs were recruited and trained on communication and counselling skills around COVID-19 immunization. Having counselors suffering themselves from different NCDs could help build rapport and increase mutual respect which could aid counselors be more understanding since they are more likely to be empathic, accepting and involved. This has been previously reported as helpful and important by clients receiving counselling services [17]. Each counsellor was provided with a list of registered PLNCDs selected from the registry for further intervention through phone calls to provide necessary counselling and documenting the interactions.

### 2.2. Study sample

Ministry of Health has a database of 540,000 PLNCDs that was extracted from different health information systems operating in public and private institutes. Relying on this registry, a random sample of 57,794 persons (11 % of total PLNCDs in the database) were contacted in the first stage of implementation. The sample included all PLNCDs over the age of 18 years with documented one or more noncommunicable disease. Among the contacted individuals, a total of 21,871 PLNCDs responded yielding a response rate of 38 %. After excluding individuals previously registered for COVID-19 vaccination, a total of 12,144 PLNCDs (21 % of total contacted) were counselled for COVID-19 vaccination. The remaining 35,923 (62 %) were not reached as their contact details were inaccurately registered in the MOH databases. All included individuals were residents of Jordan with at least one NCD at the time of the intervention.

### 2.3. Data analysis

The data was analyzed using IBM SPSS version 26. Paired *t*-test was utilized to examine the significance of score change in the pre- and post- counselling confidence in COVID-19 vaccination. A *p*-value of < 0.05 was considered statistically significant.

## 3. Results

A total of 9,727 (44.5 % of total respondents) were already registered in the vaccination platform at the time of the initial contact compared to 12,144 (55.5 %) patients who had not yet registered for vaccination. After excluding the registered population, a total of 12,144 PLNCDs were counselled for COVID-19 vaccines. The mean age of the study sample was 78 years, with age range of 21 to 99 years. Participants were from all twelve Jordanian governorates and included both Jordanians and non-Jordanians, 98 % and 2 % respectively. Among the sample, 64.5 % were diabetics, 56.5 % were hypertensive while 60.7 % reported cardiovascular diseases. The majority of the study sample were treated in MoH facilities (81.9 %) followed by Royal Medical Services and the private sector, 5.9 % and 5.7 % respectively.

### 3.1. Pre-counselling

The overall mean confidence in COVID-19 vaccines among the study sample was 3.47, on a scale from 1 to 5. This ranged from a mean of 2.45 among nonregistered population to 4.85 among those who registered and got vaccinated (Table 1).

**Table 1**  
Pre-counselling acceptance disaggregated by registration status.

Report			
Pre-counselling acceptance			
Did you register/ get the vaccine?	Mean	N	Std. Deviation
Yes, registered and vaccinated	4.85	6156 (28 %)	0.450
Registered not vaccinated	4.55	3571 (16 %)	0.794
Neither registered nor vaccinated	2.45	12,140 (56 %)	1.129
Total	3.47	21,867 (100 %)	1.474

### 3.2. Post-counselling

#### (i) Immediate post-counselling

As per the exclusion criteria, all PLNCDs registered for COVID-19 vaccination were excluded while the non-registered were counselled about COVID-19 vaccines after providing their consent. The average consultation session duration ranged between 3 and 30 mins and it was exclusively conducted through a phone call. The counselling resulted in a mean increase of 1.63 (95 % CI 1.609–1.652), pre-counselling and post-counselling confidence were 2.48 and 4.11 respectively (Table 2).

The counselled study sample reported their willingness to register in 59.5 % of the cases compared to 8.5 % who reported their unwillingness to register and 32 % hesitant population who were not sure if they are going to register.

#### (ii) Post counselling after two months

A total of 1,000 previously counselled PLNCDs were randomly selected and invited to participate in the two months follow-up. Yielding a response rate of 73.9 %, 739 participated in the two months follow-up. Among the follow-up sample of previously counselled individuals, 308 (41.7 %) were vaccinated compared to 431 (58.3 %) who were not vaccinated at the time of follow-up. Those who did not register reported different reasons, including difficulty in accessing the registration platform, being recently diagnosed with COVID-19, and physicians advise not to get the vaccine.

The sample had a mean COVID-19 vaccine confidence of 3.71 (SD = 1.45) when measured on a scale from 1 to 5. The overall confidence is still significantly higher than pre-counselling confidence of 2.49 (SD = 1.18) despite seeing a significant decrease compared to the previously reported immediately post-counselling confidence; 4.1 (SD = 1.17), (p-value < 0.001) (Fig. 1).

The sample reported an increase in their post-counselling confidence irrespective of their registration status. While the mean increase was 1.59 for those who registered between counselling and follow-up, vaccine confidence among unregistered was 1.7 immediately post-counselling. The main difference was the change in confidence two months post-counselling as registered population mean confidence further increased reaching 4.76, compared to 2.67 pre-counselling and 4.26 immediately post-counselling.

**Table 2**  
Pre- and post- counselling confidence in COVID-19 vaccines.

Paired Samples Test		Paired Differences				t	df	Sig. (2-tailed)	
Pair	Post-counselling acceptance - Pre-counselling acceptance	Mean	Std. Deviation	Std. Error Mean	95 % Confidence Interval of the Difference				
		1.630	1.208	0.011	Lower	Upper			
					1.609	1.652			
Pair 1	Post-counselling acceptance - Pre-counselling acceptance	1.630	1.208	0.011	1.609	1.652	149.848	12,318	0.000

Meanwhile, unregistered population confidence saw a dramatic decrease from 4.02 immediately post-counselling to 2.96 two months post-counselling but remained significantly above the baseline confidence of 2.32 pre-counselling (Table 3).

The willingness to register also saw a slight decrease two-months post counselling, 55.1 % compared to 59.1 % willing to register immediately post-counselling. There was also a drop in hesitant population and increase in those unwilling, 24.8 % and 20.1 % respectively.

### 4. Discussion

This intervention built on various previously reported factors that can impact interventions related to vaccination coverage, among which are health literacy, risk appraisal, and perceived response efficacy. Health literacy is one of the key factors that can impact all health decisions including vaccination [18]. Usually in pandemics, the media interest in the topic lead to a huge amount of communicated information from multiple sources. In COVID-19 pandemics, the amount of misinformation, and rumors led the World Health Organization to associate the pandemic with an infodemic [19]. In Jordan, previous scholars reported an increase in circulated rumors and misinformation leading to conspiratorial thinking and negative health consequences, among which is anti-vaccination [20].

Risk appraisal includes the perceived likelihood and severity of the infectious agent as people perceiving higher likelihood of getting infected and worse outcome if infected are more likely to get vaccinated [21]. Previous reports showed that heightening risk appraisals was associated with an increase in vaccination intentions, behaviors, and coverage [22]. Related to COVID-19, a study has reported that the perceived severity of COVID-19 was related with increased motive to get the vaccine [23].

Response efficacy is another major determinant of vaccination decision. It is known as the perceived effectiveness of the response (vaccination against COVID-19) in threat evasion [24]. When it comes to COVID-19 vaccines, it implies the confidence that the vaccines are safe, effective, and trustworthy. It was previously associated with increased vaccine uptake for multiple vaccines, such as seasonal Influenza vaccine [25].

Building on the previous messaging components, the intervention successfully managed to provide a high-risk appraisal and response efficacy that led to an adaptive response and desired outcome. This agrees with previous reported findings surrounding the extended parallel process model (EPPM) that highlights that the perception of a disease as personally relevant in addition to confidence in the proposed response can lead to an adaptive change [26]. Nonetheless, it was observed that a proportion of the population reported unwillingness to vaccination despite being previously hesitant. This might be related to the adoption of maladaptive, defensive response in relation to the coupling of strong fear appeals with low perceived efficacy of the response and fear of its side effects [27]. Thus, extreme caution is needed

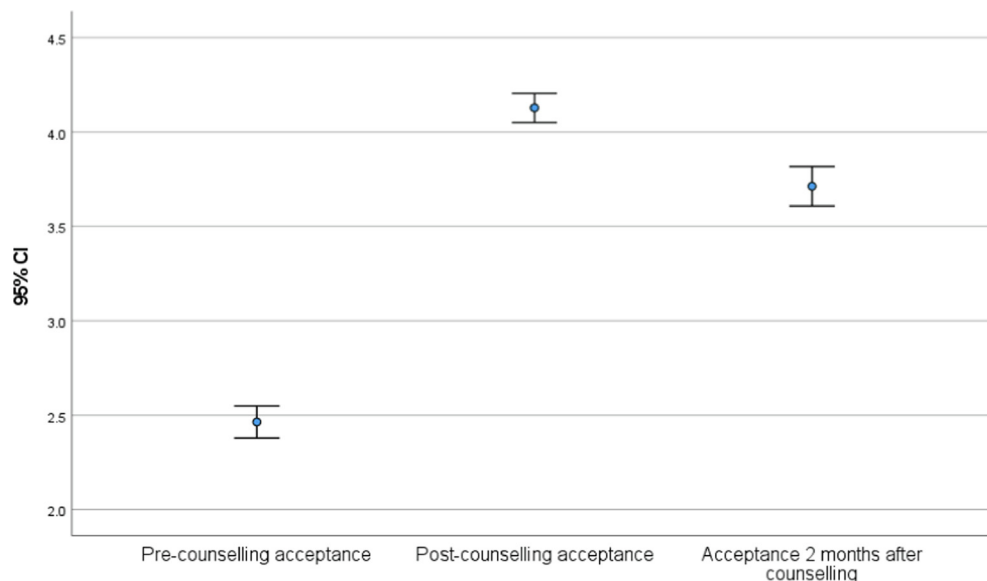


Fig. 1. Pre- and post- counselling vaccine confidence.

**Table 3**  
Pre- and post- counselling confidence disaggregated by registration status two months after counselling.

Report		Acceptance 2 months after counselling	Pre-counselling acceptance	Post-counselling acceptance
Yes	Did you register? 2 months after counselling			
	Mean	4.76	2.67	4.26
	N	308	308	308
No	Std. Deviation	0.576	1.250	0.975
	Mean	2.96	2.32	4.02
	N	431	430	431
Total	Std. Deviation	1.418	1.094	1.112
	Mean	3.71	2.46	4.12
	N	739	738	739
	Std. Deviation	1.449	1.174	1.063

when addressing this issue not to intensify anxiety leading to maladaptive behaviors.

The data surrounding the impact of similar interventions on vaccine confidence are scarce and heterogenous. Studies evaluating community education through public meetings, discussion groups and educational material have showed mild to moderate impact on childhood vaccine confidence. A Bangladesh-based randomized controlled trial showed that discussion groups improved vaccine confidence [28]. Using different educational interventions, such as brochures, posters and pamphlets, vaccine confidence was reported to increase in over half of included studies in a systematic review [29]. Similarly, another RCT reported that community-aimed interventions improve vaccine attitudes and confidence and accordingly increase vaccine coverage [30].

In another systematic review, evidence showed that face-to-face educational interventions can increase children vaccination status, knowledge, and intention to vaccinate. In this review, the author concludes that such interventions are more suited in population with lack of awareness or new vaccines [31]. Similarly, health education was effective in increasing HPV vaccine uptake among adolescents [32].

The appraisal of vaccination information and the level of trust differs based on the source of information. Getting the vaccine information from healthcare providers was previously related to better vaccine practices and increased acceptance [33]. Another aspect that might have impacted the intervention and led to the

satisfactory results is the reliance on healthcare workers to provide the information related to COVID-19. This agrees with previously reported results showing that receiving information from healthcare professionals was associated with greater self-efficacy, response-efficacy and vaccine knowledge for both childhood and COVID-19 vaccines [23,34].

In the Jordanian context, the findings of this study agree with reported benefits of virtual coaching on vaccine hesitancy, knowledge and attitudes towards vaccination [35]. Given the vulnerability of PLNCDs and the persisting low uptake of COVID-19 vaccination, it is highly recommended that interventions to educate, counsel and guide PLNCDs on the benefits of COVID-19 vaccination be widely adopted whether through primary healthcare facilities or different virtual platforms.

The counseling intervention showed similarly positive improvement in vaccine confidence among both the vaccinated and nonvaccinated groups in the two months follow-up. While the group that reporting being vaccinated maintained this high-confidence, those who didn't get vaccinated showed a drop in vaccine confidence; 4.02 post-counselling to 2.96 two-months post-counselling. This phenomenon could be related to the vaccination experience for those who got vaccinated. The absence or minimal adverse events following vaccination could have been related to the overall vaccination experience. This agrees with prior reports showing a significant association between vaccination willingness and discomfort after vaccination [36]. Thus, it might be argued that the high con-



confidence and its persistence might not be only related to the intervention. Personal experience and vaccine confidence are inter-related and positive vaccination experience could be among the factors that increase vaccine acceptance. This was previously linked through the protection motivation theory and the role of response cost in determining the performance of a health behavior [37].

## 5. Limitations

This study relied on participants self-assessed vaccine confidence level. In the absence of a consensus on the best vaccine confidence scale, this study relied on self-assessed confidence without going into the subscales of benefits, harms, and trust in healthcare provider. Another limitation could be selection and response bias. Although a random sample of all registered PLNCDs were contacted, it is not guaranteed that those who responded are representative of the general population of PLNCDs or whether they are similar to those who were not tracked. Similarly, response bias could stem from the inability to track all sample for the follow-up two months after implementation. The final limitation could be related to the inability to measure the cost-effectiveness of conducting such intervention on a larger scale. It is highly recommended to holistically address the cost-effectiveness of conducting similar interventions for high-risk and vaccine hesitant population.

## 6. Conclusion

One-to-one counselling for high-risk population proved effective in increasing vaccine confidence and uptake among PLNCDs in Jordan. Similar intervention to increase vaccine knowledge and accordingly build vaccine confidence is highly recommended.

## 7. Ethical approval

Granted by Ministry of Health IRB Committee.

## 8. Author's contributions

All author contributed significantly to drafting and reviewing the.

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## Data availability

Data will be made available on request.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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