ORIGINAL ARTICLE

Prostate cancer early detection among primary care physicians in Mexico: A cross-sectional study

Detección oportuna de cáncer de próstata en los médicos de primer contacto en México: estudio transversal

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Abstract

Aim: *This study aims to assess primary care physicians (PCPs) knowledge and skills regarding prostate cancer early detection (PCa-ED).* **Materials and methods:** *A survey about knowledge and skills of PCa-ED was delivered to PCP. Logistic regression analysis was conducted for the propensity of PCP to test prostatic specific antigen (PSA) on asymptomatic men.* **Results:** *The survey was completed by 170 PCP. Score on risk factors knowledge was 51.5 ± 15.7% a better score was not associated with conducting PCa-ED (p = 0.674). The 40.6% answered having an institutional program on PCa-ED and 86% having access to PSA testing. Testing PSA on asymptomatic men was found in 40%. Moreover, 61.2% do not performed any digital rectal examination for PCa-ED, and this was not associated with preventing factors such as lack of space, time, and assistance (p > 0.05). Fewer years in practice and being a family medicine resident were associated with a less likelihood of testing PSA in asymptomatic men. The only associated factor in the multivariable model was having access to PSA testing (odds ratio: 3.36 confidence interval 95% 1.54-7.30) p = 0.002).* **Conclusions:** *A low rate of PCP performs PCa-ED and using concepts outside evidence-based recommendations. A national program on PCa-ED and continuing medical education for PCP are a promising strategy to improve PCa-ED.*

Key words: *Prostate cancer. Early detection. Men's health; primary care. Prostatic-specific antigen. Digital rectal examination.*

Resumen

Objetivo: *Evaluar el conocimiento y las habilidades de los médicos de primer contacto en la detección oportuna del cáncer de próstata (DO-CaP).* **Método:** *Se aplicó una encuesta a médicos de primer contacto. Se realizó un análisis de regresión logística evaluando la propensión de los médicos a medir el antígeno prostático específico (APE) en sujetos asintomáticos.* **Resultados:** *Contestaron 170 médicos y la calificación del conocimiento sobre factores de riesgo fue de 51.5 ± 15.7%, pero una mejor calificación no se asoció con realizar DO-CaP (p = 0.674). El 40.6% respondió contar con un programa institucional en DO-CaP y un 86% con acceso a la prueba de APE. El 40% medían el APE en sujetos asintomáticos. El 61.2% no realizaba*

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ningún examen digital rectal para DO-CaP, y esto no se asoció con factores limitantes como falta de tiempo, espacio o asistencia (p > 0.05). Menos años en práctica y ser residente de medicina familiar disminuyeron la probabilidad de determinar el APE en asintomáticos. El único factor asociado en el análisis multivariado fue el acceso a la prueba de APE (odds ratio: 3.36; intervalo de confianza del 95%: 1.54-7.30; p = 0.002). **Conclusión:** *Una baja proporción de médicos de primer contacto realizan DO-CaP y utilizan conceptos alejados de la evidencia científica. Un programa nacional en DO-CaP y de educación continua para médicos de primer contacto es una estrategia prometedora para mejorar la DO-CaP.*

Palabras clave: *Cáncer de próstata. Detección oportuna. Salud masculina. Antígeno prostático específico. Examen digital rectal.*

Introduction

Prostate cancer (PCa) is a major public health concern worldwide, and in 2018, 1,276,106 new cases were reported. Moreover, PCa is the second most commonly diagnosed cancer and the second cause of cancer-related death in Mexican men. In addition, PCa ranks among the top 10 causes of death in Mexico's general population, and the mortality rate expected for 2020 is 11.5 in every 100,00 men diagnosed with PCa[1-4].

In developed countries, 80% of PCa cases are detected in early stages with a prostate-confined disease, whereas in Mexico, 80% are advanced-stage diseases when diagnosed, halting the chance for intent-to-cure treatments[3,5].

PCa early detection (PCa-ED) in asymptomatic men through a digital rectal examination (DRE) and prostatic-specific antigen (PSA) proved a positive impact dropping mortality rates. Nevertheless, controversy remains around the related risk of overtreatment and overdiagnosis. PCLO trial failed to demonstrate a significant effect on long-term mortality in North American men. On the other hand, the European trial ERSPC found a long-term reduction of 21% in cancer-specific mortality rate, remarking the need to submit 781 men to PCa-ED to detect 27 cases and prevent one death[6,7].

Although these trials' methodologies were different and not without biases, pooled data from both trials were reanalyzed by Tsodikov et al., concluding that in fact, PCa-ED drops cancer-specific mortality rate by 7-9%[8].

Current American Urological Association (AUA) guidelines recommend providing patients with information about risk and benefits of PCa-ED to reach a shared decision. Nonetheless, Mexico lacks strong PCa-ED programs which could have an impact on stage at diagnosis and mortality rates[9].

Primary care physicians (PCPs) have an important role in PCa-ED as they are the ones who mainly carry it and refer patients further to urology when needed. Current tendencies on PCa-ED among PCP in Mexico are to date unknown. Therefore, we consider that this could be a strategic target for improvement in PCa mortality rates in the long run. The objective of this cross-sectional study was to assess PCP knowledge and skills on PCa-ED trough a modified survey from Drummond et al.[10].

Materials and Methods

Survey development

A self-administrating survey assessing knowledge and skills on PCa-ED for PCP previously developed by Drummond et al., was modified. Data on PCPs practice, skills, and knowledge regarding PCa-ED were included in the study. The survey was evaluated and analyzed by a panel of urologists for content discussing. Afterward, it was analyzed by an expert on surveys and questionnaires development and proper modification on wording and syntaxes were made, and a first draft was obtained, which was then delivered to five subjects and last modifications were made based feedback, reaching the final version (Supplementary material 1).

Survey administration and data collection

PCPs were approached in a scheduled session during a local family medicine annual meeting and invited to participate. Only PCPs who voluntarily accepted, with current public and/or private clinical activities within Southeast Mexico, were included. PCPs were categorized by academic degree as social service medical doctors, general practitioners, family medicine physicians, and family medicine residents. After a briefing about the survey and the scope of the study,

questions and doubts were cleared and every PCP was provided with the printed self-administrating survey to fill in. Data were then emptied in a Microsoft Excel database.

Statistical analysis

A Kolmogorov–Smirnov normality test and descriptive statistics were conducted. Categorical data were compared by the χ^2 test. A logistic regression model was carried out to assess the propensity of PCP to test PSA in asymptomatic men for PCa-ED. All $p < 0.05$ values were considered statistically significant. Analysis was done using SPSS v. 21 software.

Ethical considerations

The protocol was approved by the Hospital Regional de Alta Especialidad de la Península de Yucatán's Research and Ethics Committee and all surveyed subjects participated voluntarily.

Results

A total of 170 PCP completed the survey. Median age was 33 (29-50) years and 58.2% were female. Regarding academic level, 51.8% were general practitioners, 14.7% family medicine physicians, 25.3% family medicine residents in training, and 8.2% social service medical doctors. Factors related to PCa-ED among PCP are summarized in table 1.

Table 1. Primary care physicians' characteristics and practice trends related to prostate cancer early detection

n = 170	n	%
Sex		
Male	71	41.8
Female	99	58.2
Age		
33 (29-50) years		
Academic degree		
General practitioner	88	51.8
Family medicine physician	25	14.7
Family medicine resident	43	25.3
Social service medical doctor	14	8.2
Training finish year		
2009 (1993-2012)		
1977-2008	83	48.8
2009-2017	87	51.2
PCa-ED† institutional program		
Yes	69	40.6
No	101	59.4
Do you routinely practice PCa-ED†?		
Yes	95	56
No	75	44
Self-perception of training in PCa-ED†		
Well trained	45	26.5
More or less trained	102	60
Not well trained	23	13.5
Do you have access to PSA‡ testing at your institution?		
Yes	129	75.9
No	41	24.1
DRE§ monthly performed for PCa-ED†		
None	104	61.2
1-5	60	35.3
6-10	5	3.0
> 10	1	0.6
Are you aware of national guidelines on PCa-ED†?		
Yes	122	71.8
No	48	28.2

Knowledge of the predictive value of PCa-ED tools

Mean score of risk factors knowledge was 51.5 ± 15.7%. A score above the mean was not associated with testing PSA on asymptomatic men ($p = 0.674$). Risk factors outcomes are summarized in table 2. The positive predictive value (PPV) of PSA + DRE was overestimated by 65.3% os respondents.

Institutional programs and skills on PCa-ED

Having an institutional program for PCa-ED was answered by 40.6% of PCP. Moreover, 76% of PCPs have access to PSA testing in their work facilities/institution. Only 13.5% were self-perceived as "not well-trained" for PCa-ED. Furthermore, 56% reported carrying out PCa-ED routinely. Testing PSA on asymptomatic was considered as a proxy for PCa-ED and was found on 40% of PCP. The selected age ranges for PSA in asymptomatic men are presented in figure 1.

The 61.2% of PCP answered they do not carry out any DRE for PCa-ED. Moreover, 60.6% lacks proper physical space at their facilities, 44% lacks assistance, and 39.4% lacks time for DRE in daily practice. Nevertheless, these factors were not associated with weather or not carry out a DRE ($p = 0.196$, $p = 0.122$, and $p = 0.108$, respectively).

Table 2. Knowledge about prostate cancer risk factors among primary care physicians

Risk factor	Correct n (%)	Does not affect risk n (%)	Reduces risk n (%)	Increases risk n (%)	I'm not sure n (%)
Older age (> 50 years)	158 (92.9)	4 (2.4)	6 (3.5)	158 (92.9)	2 (1.2)
First-degree relative with PCa†	157 (92.4)	4 (2.4)	6 (3.5)	157 (92.4)	3 (1.8)
Smoking	11 (6.5)	11 (6.5)	7 (4.1)	144 (84.7)	8 (4.7)
High fat diet	104 (61.2)	26 (15.3)	7 (4.1)	104 (61.2)	33 (19.5)
First-degree relative with breast cancer	79 (46.5)	49 (28.8)	2 (1.2)	79 (46.5)	40 (23.5)
HPB‡	27 (15.9)	27 (15.9)	4 (2.4)	132 (77.6)	7 (4.1)
African-American race	84 (49.4)	10 (5.9)	17 (10)	84 (49.4)	59 (34.7)

†PCa: prostate cancer early detection; ‡BPH: benign prostatic hyperplasia

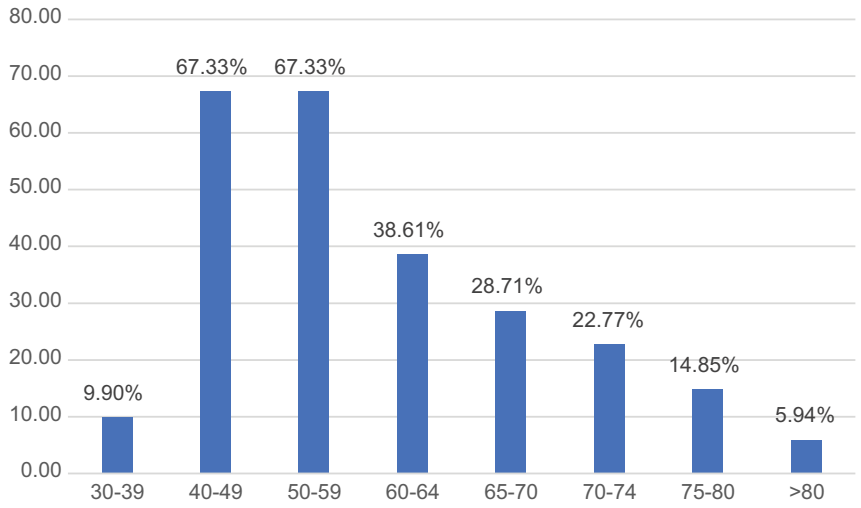

Figure 1. *Age ranges chosen by primary care physicians for testing prostatic-specific antigen in asymptomatic men.*

Factors related to testing PSA in asymptomatic men

Unadjusted logistic regression model found that fewer years in practice and being a family medicine resident were factor related with a less likelihood of testing PSA in asymptomatic men whereas having access to PSA testing and an institutional program on PCa-ED, increased the probability. However, the only factor significantly related in the multivariate model was having access to PSA testing at their work institution, as shown in table 3.

Discussion

This is the first work on PCa-ED trends among PCP in Mexico, where currently, PCa is overall the most common solid tumor in men. The role of PCa-ED is paramount on detecting significant PCa in early stages and it drops the mortality rate up to 21%[2,7,8].

Findings related to PCa-ED skills and knowledge are notable, with a low frequency of PCP practicing PCa-ED and mostly using concepts which differ from scientific evidence. Despite this, solely, a small proportion were self-perceived as "not well-trained" (13.5%) (Table 1).

According to the AUA guidelines, PCa-ED is performed through PSA and DRE[9]. In this work, 56% of PCP answered carrying out PCa-ED, nonetheless, 61.2% do not perform a single DRE and over 95% perform < 5, monthly. Furthermore, 40% do not test PSA on asymptomatic men, and those who did, mostly selected age ranges outside the evidence-based recommended (Fig. 1). Likewise, Tasian et al. reported

Table 3. Factors associated with the primary care physicians' propensity to test PSA in asymptomatic men

	Test PSA in asymptomatic men n (%)	OR‡ univariate (CI§ 95%)	p	OR ‡ multivariate (CI§ 95%)	p
Sex					
Male	41/71 (57.7)	0.88 (0.47-1.65)	0.708	1.34 (0.67-2.68)	0.404
Female	60/99 (60.6)	1	1		
Training finish year					
1977-2008	57/83 (86.7)	1	1	0.63 (0.29-1.33)	0.630
2009-2017	44/87 (50.6)	0.46 (0.25-0.87)	0.017*		
PCa-ED institutional program					
No	53/101 (52.5)	1	0.027*	1.54 (0.75-3.18)	0.237
Yes	48/69 (69.6)	2.07 (1.08-3.94)			
Academic degree					
General practitioner	56/88 (63.6)	1.43 (0.77-2.66)	0.245	1.13 (0.30-4.23)	0.850
Family medicine physician	18/25 (72)	1.9 (0.75-4.88)	0.165	1.19 (0.23-6.03)	0.825
Family medicine resident	19/43 (44.2)	0.43 (0.21-0.87)	0.019*	0.64 (0.16-2.48)	0.521
Social service medical doctor	8/14 (59.4)	0.90 (0.29-2.72)	0.857	1.55 (0.42-5.66)	0.500
Institutional access to PSA† testing					
Yes	87/129 (67.4)	3.95 (1.90-8-40)	0.001*	3.36 (1.54-7.30)	0.002*
No	14/41 (34.1)				

CI: coefficient intervals; ‡OR: odds ratio; PCa-ED: prostate cancer early detection; †PSA: prostatic-specific antigen.
*p < 0.05

on 82 PCP from San Francisco that 86% carry out PCa-ED in < 60% of men over 50 years old. However, a survey about PCa-ED practice among PCP from the United Kingdom found that solely 24% had not tested PSA on asymptomatic men within the past 3 months. Drummond et al. reported a higher rate of PCa-ED practice on 1625 Irish PCP (79%), although the age ranges also differ from the evidence-based recommendations. These data evidence that the rate of PCP in Mexico performing PCa-ED is low and outside the suggested age ranges[10-12].

On the other hand, PCP scored low in knowledge about PCa risk factors (51.5 ± 15.7%, table 2). Factors as older age and a first-degree relative with PCa were correctly identified by > 90%, nevertheless, smoking was wrongly identified as a risk factor by a higher rate (84.7%) than that reported elsewhere (29-56%). Although controversial, meta-analyses have failed to prove an association of smoking as a risk factor[10,11,13]. Likewise, prostatic hyperplasia was wrongly marked as a risk factor for PCa by 77.6%, whereas solely 28% of the Irish PCP did, even when evidence points otherwise[10,14]. African-American race was correctly identified as a risk factor by 49%, whereas Tasian et al. and Drummond et al. reported 98% and 17%, respectively. Furthermore, the rate of PCP self-perceived as "not well-trained" reported by Drummond et al., was more than twice than the herein reported (37% vs. 13.5%)[10,11].

Data suggest a lack of continuing medical education on PCa, nevertheless, our findings, as well as those reported by Tasian et al., showed no association between risk factors knowledge and testing asymptomatic men[11].

Based on these findings, it is important to improve PCPs training on PCa risk factors, as it might reverberate on better health promotion and PCa prevention, but training focused on clinical skills for PCa-ED is mandatory, since over 28% of PCP were not aware of national guidelines on PCa-ED.

Furthermore, these heterogenic data point that the PCa-ED conducted in Southeast Mexico is suboptimal and of lower rate compared to that reported elsewhere[10,11]. This can be partly explained by the high rate of PCP lacking an institutional program or a dedicated clinic to PCa-ED (59.4%) and by the fact of not having access to PSA testing by almost one quarter. Moreover, the rate of PCP who do not carry out DRE was quite high (> 60%) and nonetheless the institutional limitations may prevent them to conduct it such as lack of space, assistance, and time, these were not associated to whether or not performing a DRE (p > 0.05).

A PSA > 3.0 ng/dL holds ~ 25% risk of PCa and a PPV < 30% in the PCa-ED[15,16]. More than half of PCP overestimated the PPV of PSA and interestingly, despite the lower rate of DRE conducted, also the PPV of DRE and DRE + PSA was overestimated. Similar results were reported in Malaysia and Ireland, were

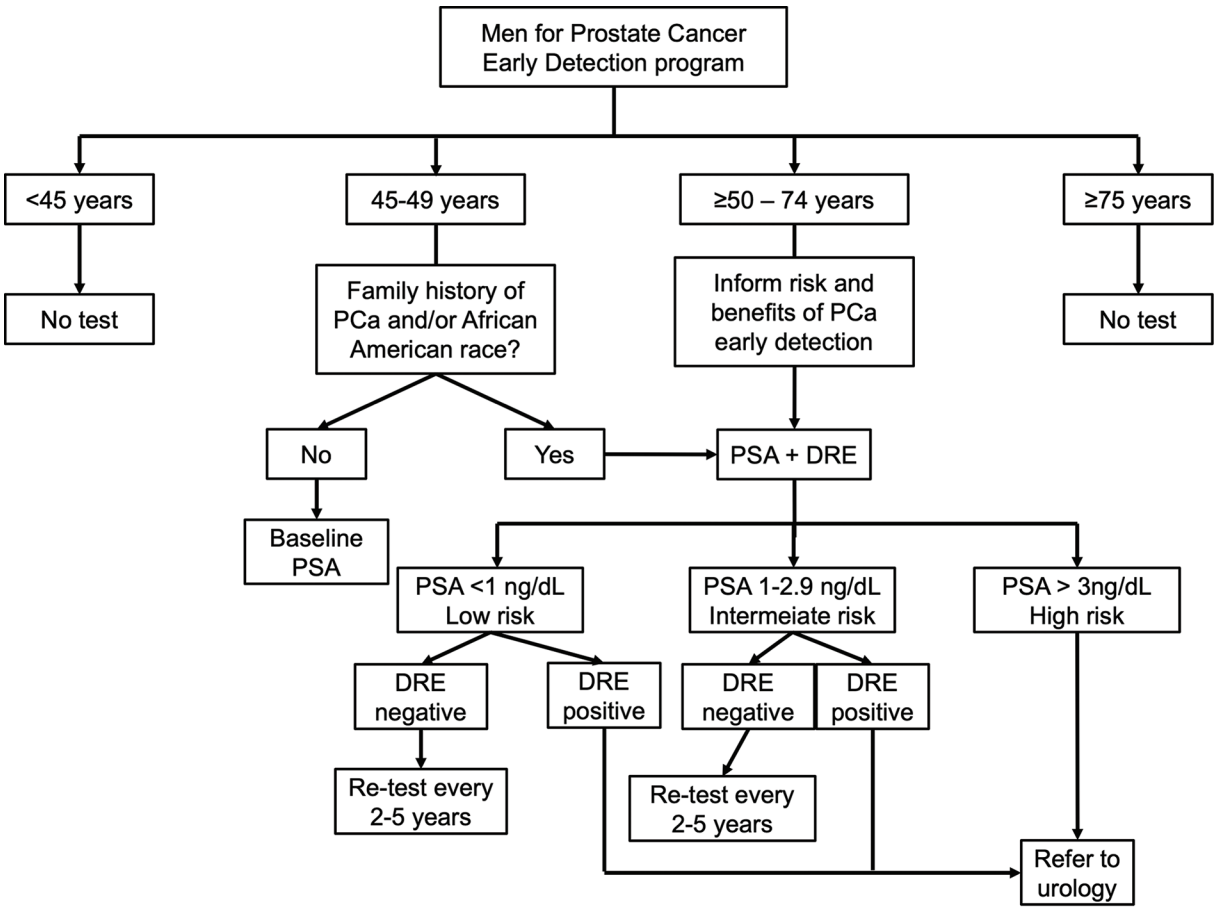

Figure 2. *Prostate cancer early detection decision-making flowchart for primary care physicians.*

> 50% overestimated PPV from tools used for PCa-ED. A deficient knowledge on this regard carries a risk of overdiagnosis[10,17].

Factors related to preventing testing PSA on asymptomatic men on unadjusted model suggest a relation with experience, as PCPs who been in practice fewer time or still in training (family medicine residents) were less likely to perform PCa-ED (Table 3). This matches with other studies where longer time in practice (> 10 years) at least doubled the likelihood of testing PSA on asymptomatic men (odds ratio [OR]: 2.15, IC95% 1.11-4-16, p = 0.03), suggesting that engaging PCP on adequate continuing medical education programs focused on PCa-ED can improve PCa diagnosis. Family medicine residents are trainees, and this hypothetically should have increased the likelihood of testing, nevertheless, other factors as the lack of time due to busy schedules and a supervised decision-making by attendings could have impacted on these results, but furthers studies are needed[10,17].

Multivariate analysis showed that having access to a PSA testing at least triples the likelihood of testing PSA in asymptomatic men (OR: 3.36, IC 95% 1.5-7.30, p = 0.002) (Table 3). This result is reasonable and advises that every PCP must have access to PSA testing in their institutions. Drummond et al. reported that PCP having institutional "men clinics" were more likely to test PSA on asymptomatic men. Hence, access to PSA testing and institutional guidance trough programs or dedicated clinics is a promising strategy for improving PCa-ED in Mexico. Therefore, for PCP currently lacking institutional guidance, a flowchart is provided for PCa-ED decision-making (Fig. 2), although further validating studies are needed, and educational intervention strategies trials are warranted[10].

Regardless this work focus on the role of PCP, conducting programs of PCa-ED in Mexico go beyond in complexity. In addition, official regulation on PCa-ED is ambitious and yet controversial. A recent insight of PCa-ED in Mexico was published by Lajous et al., and it's

suggested that following the official normativity is challenging as Mexico probably lack the wanted infrastructure and resources to bear the extra burden of around 15 million men undergoing PCa-ED[18]. Following the authors' statements, we consider that outlining a PCa-ED national effort requires not only the PCP topics addressed here but also a collective endeavor along health institutions to provide a wider overview and determine the settings needed for this challenging situation.

Some limitations are warned in this work: (I) Southeast Mexico has a high proportion of rural communities, which might not reflect the same situation of other regions; (II) related literature published arise from non-standardized surveys and questionnaires, hence, outcomes are not always uniform and exactly transposable, and (III) subjecting a patient to PCa-ED is a shared decision process which requests patients engagement on his own health, a variable which was not considered by this study.

Conclusions

PCa-ED drops the cancer-specific mortality rate and is mainly performed by PCP. The lack of access to PSA testing, institutional guidelines and programs dedicated to PCa-ED, added to a scarce knowledge of PCa and a presumably suboptimal continuing medical education programs in Southeast Mexico, turns out in a low rate of PCP performing PCa-ED and far from evidence-based recommendations. The development of a nationwide strategy for practice and training in PCa-ED tailored to PCP is mandatory for improving the CaP mortality rate and increases the likelihood of diagnosing patients with prostate-confined stages trough an informed and shared decision-making process.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

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