



TESE DE DOUTORAMENTO

**KNOWLEDGE AND AWARENESS
ABOUT ORAL CANCER IN THE
COMMUNITY**

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Título da tese: Knowledge and awareness about oral cancer in the community

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Knowledge and awareness about oral cancer in the community

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En Lugo, 11 de Decembro de 2021



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RESUMO

O concepto de cancro oral preséntase moi heteroxeneo e con múltiples variacións na literatura, e por ese motivo difícilase moito a interpretación e comparación de datos, o que implica unha limitación adicional para a investigación neste área, posto que non sempre é posible a extracción e aislamento de datos da bibliografía que conteñan os mesmos factores de risco, comportamento biolóxico, e protocolos de tratamento. A característica máis común na presentación do cancro oral en estadios tempranos, pode considerarse a aparición dunha ulceración de limitacións irregulares, cos bordes elevados e firmes, debido a infiltración dos tecidos do entorno. Nestas lesións tempranas, que usualmente son de tipo eritroleucoplásico, obsérvanse unha combinación de cores branca e vermella por áreas, podendo ser variantes brancas (leucoplásicas), ou vermellas (eritroplásicas).

Considerando as características patolóxicas, os cancros orais móstranse como tumores infiltrativos con diferentes subtipos histolóxicos clasificados como menos agresivos (verrucoso, papilar, cuniculado e acantolítico) e máis agresivos (basaloide, de celas fusiformes e adenoescamoso). A súa característica histolóxica principal é a súa aparición como carcinoma de celas escamosas nunha estreita relación cun componente basaloide. A patoloxía característica do carcinoma de cela escamosas é unha invasión de celas epiteliais malignas que forman nidos ou cordas cun citoplasma eosinofílico ademais dun núcleo desproporcionalmente grande.

A ubicación intraoral deste tipo de cancro pode darse en moitas superficies, Mais nesta tese, consideramos soamente os cancros formados na cavidade oral (mucosa oral, superficie interna dos beizos, encía, chan da boca, trígono, paladar duro e suave, así como a lingua movíl).

Para determinar o estadio tumoral do cancro oral emprégase o sistema de clasificación TNM, baseado nos tres seguintes parámetros: tamaño tumoral (T), implicación do nodo (N) e metastase (M).

Xa hai máis de trinta anos dende que a Axencia para a Investigación de Cancro indentificou o tabaco e o alcohol como os principais factores de risco para cancro oral. Posteriormente engadíronse tamén, aunque en

menor medida, outros factores de risco como a dieta, a hixiene oral, o estado de saude oral, agresión traumática repetitiva ou agresións térmicas na cavidade oral.

O cancro oral estímase que abarca o 2% de tódolos cancros a nivel mundial. A importancia crucial do cancro oral radica en maior medida nas suas taxas de mortalidade e a sua importante morbilidade en non tanto na propia incidencia. En medidas xerais, a taxa de supervivencia tralos primeiros cinco anos se estima en torno a o 50%, e reduce-se ata un 30.8% aos dez anos. É a sétima causa de morte en homes a décima en mulleres na Europa, cunha taxa de sobrevida do 53% en España. A pesar de ser a boca unha cavidade facilmente accesible á exploración, case a metade destes cancros diagnósticanse en estadios avanzados. Se todos eles foran diagnosticados en estadios iniciais, a sobrevida aos 5 anos aumentaría ata o 80%. Sendo o propio paciente o maior contribuínte ao atraso na diagnose namentres decide se consultar ou non un síntoma, a probabilidade de que acuda a consulta depende de se conclúe que es síntoma é relevante.

A cavidade oral permite unha exploración rutinaria sinxela, mais a pesar de ello, case o 50% dos cancros orais son diagnosticados nas fases III ou IV. Os importantes progresos producidos nos últimos 20 anos na oncoloxía traducíronse nunha pequena melloría do 5% na sobrevida, o que semella indicar que incrementos significativos no futuro só virán da mellora na diagnose temperá. Considerando a relación entre a mortalidade e os estadios tumorais, planteouse que a implicación de diagnosticar os cancros nas fases tempranas sería un aumento na supervivencia aos 5 anos de ata mais do 80%. Determinar os coñecementos e a alerta da poboación ante esta patoloxía parece fundamental para afrontar este problema. Na situación actual, a sospeita de cancro oral depende en gran medida da identificación clínica dos profesionais da saude, que normalmente non están demasiado familiarizados coa enfermidade. Normalmente un dentista xeral poder toparse con ata dez casos de cancro oral, e aínda menos en caso dun médico de familia. Ademais, a situación aínda é mais complicada se consideramos que habitualmente estas lesions clínicas poden trocarse facilmente con outras lesions menores ou de condiciones mais benignas.

Habéndose probado que os programas de diagnóstico de cancro oral non resultan rentables (coste-beneficio) mais que en áreas de elevada prevalencia, resulta moito mais interesante o uso de diagnóstico oportunista, o que debería considerarse unha necesidade absoluta na práctica do dentista. Ademais disto, tamen os propios sistemas de saúde contribuen ao retraso do diagnóstico do cancro oral, tanto debido a o sistema organizativo das rutas de tratamento como ao método de recepción dos doentes que requiren servizos de saúde.

Os coñecementos do público xeral deste neoplasma son en xeral baixos en todo o mundo. A información referente a España ven dun único estudo nunha cidade, e amosa que o 22% dos participantes non teñen ouvido falar do cancro oral e que os seus coñecementos dos seus signos, síntomas e factores de risco eran pobres.

A maiores dos profesionais sanitarios, a poboación busca información noutras fontes, que inclúen amizades, familiares, media xeral, motores de búsqueda online e ata redes sociais. Os recursos audiovisuais en liña son doados de empregar e fornecen información dun xeito cómodo e rápido. Estas vantaxes son cruciais no ámbito Dixital, dado que o éxito de páxinas basadas en elementos audiovisuais na World Wide Web depende en grande medida de ser sinxelos de acceder, sin necesitar credenciais específicos, así como a existencia dun inxente número de vídeos de carácter gratuito. Lamentablemente, cando consideramos temas relacionaos coa saúde, estas vantaxes poden ser perigosos inconvenientes, posto que a data pode ser inadecuada, desfasada ou ata contraria. Aínda máis, a popularidades dos vídeos de carácter máis profesionais decae en comparación cos vídeos que describen experiencias persoais ou presentan un enfoque menos educativo, habitualmente dende o punto de vista do doente, no do clínico (e con os coñecementos ou ausencia de eles que isto imprica). Investigacións recentes amosaron que os vídeos máis útiles sobre cancro oral en inglés e portugués tiñan menos probabilidades de seren vistos polas persoas potencialmente interesadas.

Obxectivos

-Investigar a alerta ante o cancro oral na Galiza e o grao de coñecemento dos seus factores de risco, signos e síntomas.

-Investigar o comportamento da poboación cando nota unha lesión compatíbel con cancro oral.

-Estudar a información audiovisual sobre cancro oral dispoñible en liña e se podería ser útil para diminuír o intervalo de toma de conciencia dos pacientes.

Métodos e materiais

1. Estudo transversal na comunidade sobre suxeitos seleccionados aleatoriamente nas catro capitais galegas en diferentes localizacións nun xeito de método “pathfinder”.

Fíxose un cuestionario deseñado por 14 profesionais entrenados, onde modificouse o cuestionario de Rogers de 2011 para adaptarse a poboación galega, en factores de idioma e entorno, así como a inclusión dunha pregunta adicional sobre a inxesta de fruta.

Para determinar o tamaño da mostra considerouse un 5% de accesibilidade da poboación e unha expectativa de resposta do 28%. Cunha mostra de 10,804 persoas puidose obter un 0.8% de poder para a estimación da proporción de persoas con conciencia de cancro oral, e unha estimación de valor do 25%. Tan só persoas de máis de 18 anos participaron no estudo, sen problemas de limitacións mentais nin de comprensión ou expresión nas linguas galego ou Castelan.

Os interventores participaron nun seminario de unha hora de duración que incluía discusións, xogos de roles así como entrevistas.

Para o análise de datos, considerouse “de risco” os participantes de máis de 45 anos, bebedores de alcohol e fumadores de tabaco, que ademais afirmasen manter unha dieta cunha inxesta inferior a 5 pezas de fruta ao día.

A partir dos resultados deste cuestionario fixéronse dous análises de datos coa idea de cumprir os obxetivos de investigar a alerta ante o cancro oral na Galiza e o grao de coñecemento dos seus factores de risco, signos e síntomas, así como investigar o comportamento da poboación cando nota unha lesión compatíbel con cancro oral.

2. Estudo transversal realizado en tres repositorios de intercambio de vídeos empregando as palabras clave “cáncer de boca” e “cáncer oral”. Analizáronse os 100 primeiros achados de cada busca (unha busca por palabra clave e repertorio) en tres eidos (etiología, factores de risco, prevención, detección precoz, tratamento, e prognose). Calculáronse os índices de visualización, interacción, e utilidade, e tamén a presenza de información sen base científica.

A estratexia de búsqueda dos 100 vídeos empregouse coas palabras clave “cáncer de boca” e “cáncer oral” o 13 de outubro de 2019 mediante as bases de datos YouTube®, Dailymotion® e Vimeo®, xa que son consideradas entre as plataformas multimedia de transmisión de vídeo máis populares. Coas palabras clave descritas, anotáronse os primeiros 100 resultados de cada búsqueda, en cada base de datos, e rexistráronse os links nunha base de datos.

Retirando os vídeos duplicados así como todos aqueles que tivesen algún dos criterios de exclusión acordados (suxeitos animais, idiomas diferentes ao castelán, sin sonido, irrelevantes, e demais ...), os vídeos restantes foron analizados tanto polo contido (con variables como etiología ou factor de risco) como polos datos do link (con variables como data de publicación, número de vistas ou lonxitude).

Resultados

5.727 persoas participaron no estudo (taxa de resposta 53%), maioritariamente entre os 45 e 65 anos (30,2%; n=1.728), e o 47,7% delas foron homes (n=2.729). O cancro oral menciónao o 3% dos participantes como primeira resposta non evocada. 1.024 persoas amosaron coñecemento activo sobre o cancro oral (non evocado), que subiu ao 73,1% (n=4.189) cando foron preguntados especificamente (coñecemento pasivo). A alerta ante o cancro acadou un OR=1,30 (1,14 – 1,48) en mulleres fronte a homes e increméntase co nivel educativo. As úlceras que non curan foron o signo considerado máis suxestivo de cancro (tanto evocado coma non), seguido de inchazón na boca (non evocado) e dor na lingua ou na boca (evocado).

O tabaco foi o factor de risco máis frecuentemente identificado (55,3%; n=3.169), seguido do alcol (12,5%; n=708), mala hixiene oral (10,8%; n=618), dieta (6,5%; n=337), e xenética (4,5%; n=248). Os fumadores

foron máis conscientes do papel do tabaco como factor de risco. Os participantes de risco amosaron un menor grado de alerta.

Cando se preguntou aos entrevistados que farían de ter unha ferida/úlceras que non tivera curado en tres semanas, o 62,8% iría ao seu médico de Atención Primaria (n=3.597) e o 23,8% (n=1.371) verían ao seu dentista. A automedicación (1,8%) sería a actitude predominante entre os que escollerían un circuíto alternativo (11,5%) para chegaren á diagnose. Os que non sabían da existencia do cancro oral irían ao seu médico de familia (68,7% fronte a 31,3%) e serían máis proclives a comportamentos estoicos ou de risco.

A meirande parte dos recursos audiovisuais obtivéronse de YouTube® (92,2%; n=117) e foron producidos por medios de comunicación (46,5%; n=59), seguidos de individuos que se identificaran como profesionais sanitarios (21,2%; n=27). En xeral, estes vídeos forneceron información incompleta sobre cancro oral, cunha mediana de dous eidos considerados (RIQ: 1,00 – 4,00), e unha mediana de utilidade de 5,00 (RIQ: 3,00 – 7,00). Os vídeos producidos por persoas a título individual resultaron seren os menos úteis y os menos completos. Os máis úteis foron producidos por institucións educativas e ofreceron a perspectiva máis ampla e o maio índice de interacción. As súas fortalezas foron a inclusión de imaxes representativas (p=0,005), a mención do tabaco mastigado (p=0,257), a inclusión da úlcera como signo de sospeita, e o faceren recomendación explícita de revisións (p=0,263) e de evitar factores de risco (p=0,160).

Atopouse unha correlación positiva (0,643; p<0,001) entre a utilidade do vídeo e a súa amplitude, así como negativamente entre a amplitude e taxa de visualización.

Discusión

A metodoloxía empregada para a obtención do grupo representativo poboacional, permite un equilibrio mais adecuado de idades e sexos que se empregasemos un método mais telemático clásico como e o uso de cartas físicas de correo ou chamadas telefónicas, onde tamén hai que considerar que cada vez son mais os usuarios de teléfonos intelixentes, que inexorablemente van substituindo os teléfonos fixos dos hogares.

Hai que ter en conta o suposto que a resposta positiva de cooperación dos encuestados véase influenciada polo coñecemento de aspectos da saúde dos mesmos, de tal maneira que a xente cun menor grao de coñecemento na area, tamén presente unha menor probabilidade de aceptar participar no proxecto, incurrindo así nun hipotético sesgo de auto-selección.

Coincidindo con varias publicacións previas, o tabaco parece mostrarse como o principal factor de risco de cancro oral coñecido pola poboación xeral, aínda que as taxas que móstranse nos nosos resultados seguen sen achegarse as de outros estudos en diversas localizacións de Europa.

De entre os suxeitos fumadores, a idade resultou ser relevante, xa que os fumadores máis maiores e veteranos recoñecían este risco con menor frecuencia. É posible que tras tanto tempo sexan menos receptivos a aceptar considerar o risco que imprica o tabaco na súa saúde, aínda que tamén é posible que as persoas que poidan comprender e recoñecer este risco sexan máis receptivas a idea de abandonar o tabaco antes.

O alcohol, polo contrario parece ser moito menos recoñecido como factor de risco de cancro oral, tanto en contraste con o tabaco, como comparando os nosos resultados cos de outras áreas de Europa. Lamentablemente as taxas de consumo de alcohol mostráronse particularmente elevadas o que fai esta carencia de coñecemento particularmente relevante. Quizais debido a curiosidade persoal, ou a que recibiron información de terceiras persoas que coñecesen os hábitos alcohólicos deste suxeitos, as persoas consumidoras de alcohol mostraban un maior porcentaxe de usuarios conscientes do risco que este hábito presenta para o cancro oral.

O coñecemento de que a dieta pode influir favorablemente na prevención de cancro oral resultou presentarse moi pouco extendido, sendo poucos participantes os que consideraron este factor, aínda que por outra parte, foron máis de dous tercios os que confirmaron inxerir cinco ou máis pezas de froita ao día. O contrario móstrase en Portugal, donde reportouse unha maior taxa de coñecemento de esta relación entre dieta e cancro oral, e sin embargo a porcentaxe de consumo de cinco ou máis pezas de fruta mostrouse considerablemente inferior comparado cos nosos resultados.

Considerando o recoñecemento de signos e síntomas como un factor clave para o control do retraso diagnóstico no cancro oral, a capacidade de recoñecemento de posibles lesións asociadas ao cancro oral resulta un factor clave para avaliación. Neste area, parecen ser mais eficientes os grupos mais maiores, onde mostrouse un maior porcentaxe de probabilidade de recoñecer signos de cancro oral, aínda que este resultado mostrou unha gran excepción no caso de tratarse de lesións vermellas, onde mostrouse moi baixa probabilidade de asociar a lesión con a posibilidade de cancro oral.

Tamén o nivel de educación dos suxeitos mostrouse como un factor relevante, habendose observado unha mellor taxa de respostas nos usuarios con coñecementos universitarios. O estatus socio-económico dos participantes non foi analizado nesta tese, sin embargo outros estudos mostran unha asociación entre o estatus dos participantes e o risco de cancro oral, e da mesma maneira, o nivel de educación coa taxa de emprego.

Cando avaliamos a asistencia ao dentista por parte dos suxeitos, observouse unha influencia negativa no recoñecemento dos síntomas mais característicos de cancro oral. Nesta tese non hemos profundizado neste tema e non ha sido posible inferir a cause destes resultados, aínda que parece razoable considerar un traballo deficiente por parte dos clínicos a hora de educar os pacientes nunha boa formación para control e prevención de cancro oral.

Tralo diagnóstico inicial por parte do doente das primeiras aparicións de signos e síntomas, o seguinte factor e a secuencia de actuación do doente, o que debería acudir ao seu dentista ou médico de atención primaria a maior brevedade posible.

O noso cuestionario mostrou que unha elevada proporción de participantes consultaría cun médico de atención primaria, no caso de presentarse a situación dunha lesión oral ulcerosa, especificamente se é de larga duración.

A preferencia de cara a consulta cun médico de atención primaria fronte a posibilidade de ir a un dentista é común, e parece ser particularmente relevante en homes de menos de 64 anos, sen coñecementos de cancro oral nin educación superior. Por outra parte, un tercio dos suxeitos con estudos universitarios elixirían un dentista como primeira opción.

En gran parte, esta elección de médicos frente a dentistas vese influenciada pola percepción da poboación xeral hacia as competencias dos dentistas, onde parece predominar a idea de que o límite nas súas competencias establécese onde rematan os dentes.

Tendo en conta a necesidade de formación do público xeral ante o cancro oral, temos que considerar a importancia das plataformas multimedia, onde os usuarios poden acceder a múltiples vídeos de maneira sinxela e gratuita. Esta importancia faise máis relevante se temos en conta que algunhas destas plataformas teñen máis de dous billons de usuarios rexistrados, o que permitiría potencialmente promocionar moito os coñecementos relevantes ao cancro oral (e temas sanitarios en xeral).

O noso estudo presenta algunhas limitacións inherentes debido ao seu carácter transversal e a súa recolección de datos nun momento fixo no tempo, o que reduce a capacidade de obter unha imaxe estable da situación. Por outra parte, esta é a primeira avaliación dos vídeos en Castelan sobre cancro oral, e inclúe unha búsqueda moi extensa e con tres revisores de moi variado trasfondo.

Estos vídeos analizados mostráronse habitualmente decepcionantes, raramente superando 3 puntos de comprensión (sobre 6). Incluso os vídeos preparados por profesionais incluían pouca información sobre factores preventivos do cancro oral, en ata un 70% dos vídeos incluían información que non estaba soportada por evidencia científica.

Estando estes repositorios caracterizados pola facilidade para subir media sen filtros, o que permite un crecemento en volumen de arquivos enorme, tamén significa unha debilidade en aspectos sanitarios xa que mézclase data útil, con data non contrastada ou incluso incorrecta.

Púidose observar unha correlación negativa significativa entre os vídeos máis útiles sobre a transmisión de información de cancro oral, e o número de visitas que tiñan, o que coincide cun estudo previo realizado sobre vídeos en inglés. Igualmente, coinciden tamén cos nosos resultados en que os vídeos producidos por institucións educativas ou profesionais da saúde resultan máis útiles que os xerados por usuarios da poboación xeral, independentemente da capacidade de xerar visitas a partir de dichos vídeos.

Conclusións

-A poboación xeral ten un baixo grao de alerta e coñecemento sobre o cancro oral, os seus factores de risco e signos de alarma. As persoas con maior risco acadaron peores puntuacións nas principais variables analizadas. Incluso aqueles con maior educación amosaron coñecemento e alerta insuficientes ante este neoplasma. Son necesarias intervencións educativas axeitadas para promover a prevención primaria do cancro oral e minimizar a demora diagnóstica.

-A poboación buscaría atención profesional se notase unha úlcera de longa duración acudindo maioritariamente ao seu médico de Atención Primaria. Os que ignorarían estas lesións son persoas maiores, con educación básica, e descoñecedoras do cancro oral.

-Os recursos audiovisuais dispoñibles en liña sobre cancro oral en castelán son incompletos, dunha utilidade limitada, e que inclúen con frecuencia información sen base científica. A maioría destes vídeos son producidos por medios de comunicación e profesionais sanitarios con contribucións menores de institucións educativas e sanitarias. As taxas de visualización correlacionáronse negativamente coa utilidade e amplitude dos contidos destes obxectos dixitais.

RESUMEN

El cáncer oral es la séptima causa de muerte en hombres y décima en mujeres en Europa, con una tasa de supervivencia en España del 53%. A pesar de ser la boca fácilmente accesible a la exploración, casi la mitad de estos cánceres se diagnostican en estadios avanzados. Si todos ellos fueran diagnosticados en estadios tempranos, la supervivencia a los 5 años aumentaría hasta el 80%. Siendo el mayor contribuyente al retraso diagnóstico el propio paciente mientras decide si consultar por un síntoma, la probabilidad de que acuda a consulta depende de si concluye que ese síntoma es importante.

Los importantes avances producidos en los últimos 20 años en oncología se han traducido en una exigua mejoría del 5% en la supervivencia que parecen indicar que futuros incrementos significativos en la supervivencia sólo vendrán de la mejora del diagnóstico precoz. Determinar los conocimientos y la alerta de la población ante esta patología parece ser fundamental para afrontar este problema.

Los conocimientos del público sobre esta neoplasia son bajos en todo el mundo. La información referente a España procede de un único estudio en una ciudad, y muestra que 22% de los participantes nunca habían oído hablar del cáncer oral y que sus conocimientos sobre signos, síntomas, y factores de riesgo eran pobres.

Además de los profesionales sanitarios, la población busca información en otras fuentes. Los recursos audiovisuales en línea son fáciles de usar y proporcionan un cómodo acceso a la información. Investigaciones recientes muestran que los vídeos más útiles sobre cáncer oral en inglés y portugués tienen menos posibilidades de llegar a ser vistos por personas potencialmente interesadas.

Objetivos

-Investigar la alerta ante el cáncer oral en Galicia y el grado de conocimiento de sus factores de riesgo, signos y síntomas.

-Investigar el comportamiento de la población cuando notan una lesión compatible con cáncer oral.

-Estudiar la información sobre cáncer oral disponible en línea y si ésta podría ser útil para disminuir el intervalo de toma de conciencia de los pacientes.

Material y métodos

1. Estudio transversal comunitario sobre sujetos seleccionados aleatoriamente en las cuatro capitales gallegas en diferentes localizaciones en una suerte de método “pathfinder”.

2. Estudio transversal realizado en tres repositorios de intercambio de vídeos usando las palabras clave “cáncer de boca” y “cáncer oral”. Se analizaron los primeros 100 resultados (una búsqueda por cada palabra clave y repertorio) de cada búsqueda en tres ámbitos (etiología, factores de riesgo, prevención, detección precoz, tratamiento, y pronóstico). Se calcularon índices de visualización, interacción y utilidad, así como la presencia información sin base científica.

Resultados

5.727 personas participaron en el estudio (tasa de respuesta 53%), principalmente entre los 45 y 64 años (30,2%; n=1.728), 47,7% de ellas fueron hombres (n=2.729).

El cáncer oral se mencionó por el 3% de los participantes como primera respuesta no evocada. 1.024 personas (17,95%) mostraron conocimiento activo sobre cáncer oral (no evocado), que subió al 73,1% (n=4.189) cuando se les preguntó específicamente (conocimiento pasivo). La alerta ante el cáncer oral alcanzó un OR=1,30 (1,14-1,48) en mujeres frente a hombres y se incrementa con el nivel educativo.

Las úlceras que no curan fueron el signo más sugestivo (tanto evocado como no), seguido de hinchazón en la boca (no evocado), y dolor en lengua o boca (evocado).

El tabaco fue el factor de riesgo más frecuentemente identificado (55,3%; n=3.169), seguido del alcohol (12,5%; n=708), mala higiene

oral (10,8%; n=618), dieta (6,5%; n=377), y herencia (4,5%; n=248). Los fumadores resultaron ser más conscientes del papel del tabaco como factor de riesgo. Los participantes en riesgo presentaron un menor grado de alerta.

Cuando se preguntó a los participantes qué harían si notasen una herida/úlceras que no hubiese curado en 3 semanas, el 62,8% acudiría a su médico de Atención Primaria (n=3.597) y el 23,8% (n=1.371) irían a su dentista. La automedicación (1,8%) fue predominante entre aquéllos que eligieron un circuito alternativo (11,5%) para llegar al diagnóstico. Los que no conocían el cáncer oral visitarían a su médico de familia (68,7% frente al 31,3%) y serían más propensos a comportamientos estoicos o de riesgo.

La mayoría de los recursos audiovisuales se obtuvieron de YouTube® (92,2%; n=117) y fueron producidos por medios de comunicación (46,5%; n=59), seguidos de individuos que se identificaron como personal sanitario (21,2%; n=27). En términos generales, estos vídeos proporcionaron información incompleta sobre cáncer oral, con una mediana de dos ámbitos recogidos (RIQ: 1,00-4,00) y una utilidad mediana de 5,00 (RIQ: 3,00-7,00). Los vídeos producidos por individuos legos resultaron ser los menos útiles y los menos completos. Los más útiles fueron producidos por instituciones educativas y ofrecieron la perspectiva más amplia y el mayor índice de interacción. Sus fortalezas fueron la inclusión de imágenes representativas (p=0,005), la mención del tabaco masticado (p=0,257), la inclusión de la úlcera como signo de sospecha, y las recomendaciones explícitas de revisiones (p=0,263) y evitar factores de riesgo (p=0,160).

Se encontró una correlación positiva (0,643; p<0,001) entre la utilidad del vídeo y su amplitud, así como entre ésta y su tasa de visualización.

Conclusiones

-La población general tiene un bajo grado de alerta y conocimiento sobre cáncer oral, sus factores de riesgo y signos de alarma. Las personas con mayor riesgo alcanzaron menores valores en las principales variables analizadas. Incluso los mejor educados mostraron insuficiente conocimiento y alerta ante esta neoplasia. Son necesarias

intervenciones educativas adecuadas para promover la prevención primaria del cáncer oral y minimizar la demora diagnóstica.

-El público buscaría atención profesional si notase una úlcera oral de larga duración, acudiendo mayoritariamente al médico de atención primaria. Los que ignorarían estas lesiones son personas mayores, con formación básica, y desconocedores del cáncer oral.

-Los recursos audiovisuales disponibles en línea sobre cáncer oral en español son incompletos, de utilidad limitada, y que incluyen con frecuencia información no apoyada científicamente. La mayoría de esos vídeos son producidos por medios de comunicación y profesionales sanitarios con contribuciones menores de instituciones educativas y sanitarias. Las tasas de visualización de concrecionaron negativamente con la utilidad y amplitud de los contenidos de estos objetos digitales.

ABSTRACT

Oral cancer-related deaths rank seventh for males and tenth for females in Europe, with Spain showing overall five-year survival rates of 53%. Despite the oral cavity offers no difficulties for routine exploration, almost 50 % of oral cancers are diagnosed at advanced stages. It has been suggested that if this neoplasm were diagnosed and treated at early stages, five-year survival rates would exceed 80%. Considering the most important contributor to diagnostic delay is the patient while assessing whether a sign/symptom is worth consultation, the chances for seeking help depend on the interpretation of a symptom as dangerous for the person's welfare.

Since despite of therapeutic advances only a 5% improvement in overall survival has been achieved in the last 20 years with half of all oral cancers diagnosed at advanced stages, significant improvements in survival may most probably come from the side of early diagnosis, and assessing public's awareness and knowledge of this neoplasm seems to be the stepping stone for any attempt to tackle this problem.

Knowledge about of this neoplasm is reported to be low worldwide. Data from Spain rely on a single study undertaken in a sole city and shows that 22% of the participants had ever heard of oral cancer with poor knowledge of its signs, symptoms and risk factors.

Apart from health professionals and individuals alike, members of the public can obtain health-related information from other sources. Online audio-visual resources are easy to use and provide effortless access to information. Recent reports disclosed most useful oral cancer videos in English and Portuguese languages have less chances to be viewed by the public than worse ones.

Objectives

-To investigate oral cancer awareness in Galicia and knowledge of risk factors, signs and symptoms.

- To investigate the health-seeking behaviour of lay people when experiencing a lesion compatible with oral cancer.
- To disclose the information about oral cancer are available at video-sharing online platforms, and whether it may be useful to shorten patients' appraisal time.

Methods & materials

1. A cross-sectional, community-based survey of randomly selected respondents undertaken in all four capitals of the Galician provinces at different areas in each city in a sort of pathfinder method.
2. A cross-sectional study undertaken at the arguably three most popular video-sharing sites using “*cáncer de boca*” and “*cáncer oral*” as keywords. The first 100 results (one search per keyword per platform) were retrieved and analysed in six dimensions (aetiology, risk factors, prevention, early detection, treatment, and prognosis). Visualization rate and interaction and usefulness indices were calculated and the presence of non-scientifically supported information assessed.

Results

A total of 5,727 people entered the survey (response rate: 53%), mostly in the 45-64 age group (30.2%; n=1,728), 47.7% males (n=2,729).

Oral cancer was mentioned by 3% as their first, unprompted response. Active knowledge of oral cancer (unprompted) was shown by 1,024 individuals (17.95%). This percentage increased to 73.1% (n=4,189) when asked about this neoplasm (passive knowledge). Awareness had an OR=1.30 (1.14-1.48) in women regarding to men and increased with the educational level.

Responses on oral cancer symptoms ranked non-healing ulcerations as the most suggestive sign, (prompted and unprompted), followed by mouth swelling (unprompted), and sore tongue or mouth (prompted).

Regarding risk factors, the most frequently identified was tobacco (55.3%; n=3,169), followed by alcohol (12.5%; n=708), poor oral hygiene (10.8%; n=618), diet (6.5%; n=377), and genetics (4.5%; n=248). Current smokers were significantly more aware of tobacco as

risk factor. Participants considered at risk were less aware of oral cancer.

When questioned what they would do if they had a wound/ulceration lasting longer than 3 weeks, 62.8% would see their primary care physician (n=3,597) and 23.8% (n=1,371) would see their dentist. Self-treatment (1.8%) is the reported behaviour predominant among those circulating an alternative path (11.5%) to diagnosis/treatment. Knowledge about the existence of oral cancer also influences behaviour: people reporting no knowledge on oral cancer would visit a physician (68.7% vs. 31.3%) and were more prone to stoic or risky behaviours.

Regarding audio-visual resources, most were retrieved from YouTube® (92.2%; n=117) and were produced mainly by mass-media (46.5%; n=59), followed by individuals who identified themselves as healthcare professionals (21.2%; n=27). Generally speaking, these videos did not provide comprehensive information on oral cancer, with a median of two oral cancer dimensions considered (IQR: 1.00-4.00) and a median usefulness score of 5.00 (IQR: 3.00-7.00). Despite being the most viewed, videos by laypersons were the least useful and the least comprehensive. The most useful videos were authored by educational institutions, which offered the widest perspective and a higher interaction index. Their main strengths were including representative images (p=0.005), mentioning tobacco chewing (p=0.257), the inclusion of ulceration as a suspicious symptom (p=0.271), and explicit recommendations for check-ups (p=0.263) and risk factors avoidance (p=0.160).

A highly significant positive correlation (0.643; p<0.001) could be observed between usefulness and comprehensiveness, together with negative correlations between visualization rate and usefulness (-0.186; p<0.05), and visualization rate and comprehensiveness (-0.183; p<0.05).

Conclusions

- General population has low awareness of oral cancer with poor knowledge of risk factors and main alarm signs. In addition, laypersons in the risk group scored lower values in the main variables analysed;

even those highly educated showed insufficient awareness and knowledge of oral cancer. Thus, there is a clear need for educational interventions tailored to the target audience and aimed at increasing knowledge and awareness of oral cancer to promote primary prevention of oral cancer and minimising the time interval of patients with symptomatic oral cancer in their path to treatment.

- General Galician population would seek professional consultation about a long-standing oral ulceration, relying mostly on primary care physicians. Those neglecting these lesions are elderly, less-schooled people and unaware of oral cancer.
- Online audio-visual material about oral cancer in Spanish is incomplete, of limited usefulness, and often includes non-scientifically supported information. Most of these resources are produced by mass media and healthcare professionals, with minor contributions from educational and healthcare institutions. Visualization rates negatively correlated with the usefulness and comprehensiveness of the contents in these digital objects.

1 INTRODUCTION

The Oxford English Dictionary (2021) originally defined “cancer” as any of various types of non-healing sore or ulcer, which in later use defines a “*malignant neoplastic disease, in which there is an uncontrolled proliferation of cells, typically with invasion and destruction of adjacent normal tissue, and often with metastatic spread to distant parts of the body via lymphatics or blood vessels; an instance of this, a malignant tumour. Frequently with distinguishing word, usually indicating the type or site of origin of the cancer.*” For cancers occurring in the mouth, this distinguishing word is usually “oral” which means “*of or relating to the mouth*” (Oxford English Dictionary, 2021). This apparently intuitive term (oral cancer) offers some complications when it comes to epidemiological studies as some reports include all malignancies arising from the lips, oral cavity, oropharynx, nasopharynx, and hypopharynx, whereas other descriptions included just intraoral sites and pharynx. Another close term, “*head and neck cancer*” includes cancers of the oral cavity, pharynx and larynx (García-Martín et al, 2019). An example of this situation are the series of reports published by the International Agency for Research on Cancer (IARC) and the International Association of Cancer Registries (IARC, 2021) which gather under the heading “oral cancer” neoplasm arising in lip, tongue and salivary gland cancer. The particularity of this grouping is that tongue sites include the base of the tongue, and salivary gland cancers include those located in the parotid. In addition, lip locations include also includes de vermillion of the lip (Forman et al, 2014).

This wide variations in sites considered under the concept of oral cancer hinder data interpretation and comparison and constitute an additional barrier for research on this topic because it is not always possible to isolate data from those sites sharing common risk factors, biological behaviour, and treatment pathways.

Up to 90% of tumours arising within the oral cavity are squamous cell carcinomas (Silverman, 2001). The other 10% is made of a heterogeneous group of neoplasms which includes *melanomas* (less than 1%) (Sortino-Rachou et al, 2009); about 40 different histological subtypes of *minor salivary gland tumours* which jointly account for about 3% of all head and neck cancers (Cianchetti et al, 2009); *sarcomas* (less than 1%); *lymphomas*, which are the second most frequent malignancies in the head and neck territory (De Peña et al, 1990); and metastatic tumours from almost any primary tumour (approximately 1%) (Seoane et al, 2009).

The squamous cell carcinoma originates from the stratified epithelium characterised by the formation of keratin. This neoplasm is capable of both local invasion and distant metastasis and it can arise from a previously altered epithelium (potentially malignant disorders) or from an apparently healthy tissue. Lesions are usually symptomless until their growth or particular location causes some kind of discomfort such as anaesthesia or paraesthesia, non-healing sore, or frank pain as the disease progresses (Bagán et al, 2010).

1.1 CLINICAL CHARACTERISTICS

The most common presentation of early oral cancer is arguably an ulceration characterised by irregular limits with elevated, firm margins caused by the infiltration of the surrounding tissues. An alternative presentation is an exophytic lesion with a verrucous surface and ill-defined margins which is firm to palpation (Sankaranarayanan et al, 2002). A mixed exophytic and ulcerated pattern is also possible.

Regarding colour, early lesions are usually of an erythroleukoplastic type combining slightly rough red and white areas, where the tissue feels less elastic and tend to evolve to a sensation of firmness when palpated (Mashberg et al, 1989). White (leukoplactic) and red (erythroplastic) variants are possible alternatives.

1.2 PATHOLOGIC CHARACTERISTICS

Oral cancers are solid, infiltrating tumours with different histologic subtypes classified as less aggressive (verrucous, papillary, cuniculatum, and acantholytic) and more aggressive (basaloid, spindle

cell, and adenosquamous) (Pereira et al, 2007). The less aggressive variant (verrucous) usually arises on the buccal mucosa and hard palate as a cauliflower-like lesion with a warty, greyish surface with occasional erythematous areas (Rajendran et al, 1989). It can be locally invasive but regional lymph node involvement and distant metastases are rare (Pereira et al, 2007). Conversely, the most aggressive variant (basaloid squamous cell carcinoma) occurs mainly in the larynx, hypopharynx, oropharynx, and the base of the tongue (Klijanienko et al, 1993) and appears clinically as an ulcerated, exophytic, firm mass (de Sampaio et al, 2004). Its main histologic feature is its appearance as a squamous cell carcinoma in intimate relation with a basaloid component, which not always can be identified when small specimens are available for biopsy (Abiko et al, 1998).

The squamous cell carcinoma is characterised pathologically by the invasion of malignant epithelial cells forming nests or chords with an eosinophilic cytoplasm and disproportionately big nuclei compared to healthy cells. The change in the size of the nucleus is accompanied by changes in shape of both nucleus and cytoplasm (cellular pleomorphism). A typical feature is the formation of keratin pearls: cell islands maturing within the epithelium with central foci of keratin. This picture is completed by the formation of small blood vessels surrounding the lesion (angiogenesis) and a chronic inflammatory infiltrate (Neville et al, 1995).

1.3 INTRAORAL SITES

For the sake of this PhD thesis, we considered oral cancer only those arising within the boundaries of the oral cavity:

- Oral mucosa
- Inner lining of the lips (not vermillion)
- Gingivae
- Floor of the mouth
- Trigone
- Hard and soft palate
- Mobile tongue (not base of the tongue)

Tumour site is important for this disorder. In general, survival to this neoplasm decreases as lesions arise more internally in the mouth. This

finding has been put down to a later diagnosis, to a higher difficulty to obtain “clean” borders when surgically removing these lesions, and also to a different pattern of node involvement. Tumour site also conditions metastatic pathways and tumours’ response to radiotherapy (Lin et al, 2010).

Tumours arising on the oral mucosa are usually found near to wisdom teeth and seem to be diagnosed at more advanced stages. These locations have been linked to the use of smokeless tobacco and to difficulties in the identification of potentially malignant disorders at these locations (Camilon et al, 2014). The poorer survival to tumours on these sites compared to those close to the corners of the mouth has been attributed to a higher frequency of recurrences (De Conde et al, 2012).

Gingival tumours are more frequent on the molar and premolar areas of the mandible in males. The topographical particularities of the gingiva (closeness to bone and the periodontal ligament) favours its diagnosis at advanced stages due to the early invasion of neighbouring structures and turns relatively small lesions in advanced disease with an impact on survival. Early diagnosis is difficult because their clinical presentation often mimics frequent inflammatory gingival conditions (Seoane et al, 2006).

Squamous cell carcinomas of the floor of the mouth are more common among black patients and are relatively frequent, which has been attributed to the thin mucosa lining this area that is in permanent contact with saliva easing the action of carcinogenetic agents. These tumours tend to metastasize more frequently and often elicit certain genetic particularities (Neville et al, 1995).

Tongue cancers account for approximately 40% of all oral cancers and arise on the lateral borders and the ventral surface of the tongue. These latter tumours often show more aggressive biological behaviours with a negative influence on survival.

The inner side of the lip (together with the floor of the mouth) are the oral sites where the human papillomavirus (HPV), a well-known carcinogenetic agent, is more frequently isolated. Lip tumours have a marked tendency to develop distant metastases (Neville et al, 1995).

1.4 TUMOUR STAGING

The TNM classification by the American Joint Committee on Cancer (AJCC) is the most internationally accepted system for tumour staging (Brierling et al, 2017) and has proved useful for treatment planning and disease prognosis.

The TNM system is based upon three main parameters: tumour size (T), node involvement (N), and distant metastases (M). Oral cancer status is defined according to the following scheme:

1.4.1 Tumour size

Tx: Primary tumour not identified.

T0: No evidence of a primary tumour.

Tis: Carcinoma “in situ”.

T1: Tumour up to 2 cm at its maximum diameter with a depth of invasion up to 5 mm.

T2: Tumour up to 2 cm at its maximum diameter with a depth of invasion of 5 to 10 mm, or tumour between 2 and 4 cm at its maximum diameter with a maximum depth of invasion of 10 mm.

T3: Tumour larger than 4 cm at its maximum diameter with more than 10 mm of depth of invasion.

T4: The tumour invades neighbouring structures; T4a: the tumour invades cortical jawbone (with the exception of the superficial erosion of the bone or dental alveolus by a gingival primary tumour), maxillary sinus, or skin of the face. T4b: the tumour invades the masticatory space, pterygoid apophysis, or surrounds the internal carotid artery.

1.4.2 Node involvement

Nx: It is impossible to determine node involvement.

N0: No involvement of regional nodes.

N1: Involvement of a single, ipsilateral node up to 3 cm at its maximum diameter with no extranodal involvement.

N2: N2a: Involvement of a single, ipsilateral node of 3 to 6 cm at its maximum diameter with no extranodal involvement; N2b: Involvement of several ipsilateral nodes up to 6 cm at its maximum diameter with no extranodal involvement; N2c: Involvement of several

ipsilateral, contralateral, or bilateral nodes up to 6 cm at its maximum diameter with no extranodal involvement.

N3: N3a: Involvement of a single node up to 6 cm at its maximum diameter with no extranodal involvement; N3b: Involvement of one or more nodes with extranodal involvement.

1.4.3 Distant metastases

M0: Absence of distant metastases.

M1: Presence of distant metastases.

According to the scores achieved at each component, the status of the disease can be classified into four different stages:

Stage I: T1 N0 M0.

Stage II: T2 N0 M0.

Stage III: T3 N0 M0, or any T N1 M0.

Stage IV A: T4a N0 or N1, or any T N2 M0.

Stage IV B: T4b any N M0, or any T N3 M0.

Stage IV C: any T any N M1.

1.5 EPIDEMIOLOGY

Oral cancer (OC) is estimated to account for 2% of all new cancer cases worldwide and for about the same proportion of neoplasms-related deaths. It is the most frequent cancer by incidence in Afghanistan, Papua-New Guinea, India, Pakistan, and Sri Lanka, and the most common type of cancer mortality for males in the latter three countries (Bray et al, 2018). While certain countries witness a slow decrement of oral cancer incidence because of a substantial decline in smoking habit among the general populations (Edwards et al, 2005; Politis et al, 2015), other areas such as Eastern and Northern Europe are experiencing increments in their incidence, particularly in Czech Republic, Slovakia, Slovenia, Denmark, Estonia, Iceland, Ireland and Finland (Chi et al, 2015).

The Indian subcontinent maintains high incidences accounting for one-third of all oral cancers worldwide (Khan et al, 2015). However, the region with highest recorded incidence is Melanesia, with about 22 oral cancer cases per 100,000 male inhabitants (Bray et al, 2018).

Conversely, Western Africa and Eastern Asia (with the exception of Japan) show the lowest incidence (Torre et al, 2015).

Globally, oral cancer is more frequent among males (Abel et al, 2015) with an overall male:female ratio of 1.9:1 in 2012 (Bray et al, 2018), with wide differences among countries ranging from 10.5:1 in Taiwan to a 1:1.56 in Thailand (Krishna Rao et al, 2015). Oral cancer incidence has increased among Western European women, particularly in France and Italy (Simard et al, 2014).

The average age at diagnosis has been stable around 62 years-old in the decade 1993-2003 and its incidence is reported to increase with age (Shoae et al, 2015), although cases in the group <40 are growing, and oral cancer already ranks high among the neoplasms affecting this age group in certain areas (Kao & Lim, 2015).

Oral cancer also appears to be linked to socioeconomic conditions, with higher incidence in developing countries, suburban neighbourhoods, and among those who had experienced lower socioeconomic conditions in their early childhood (Krishna Rao et al, 2015).

Tongue cancer is the most common intraoral malignancy, accounting for 20% to 45% of oral neoplasms (Osazuwa-Peters et al, 2016). Although India has the highest prevalence of oral cancer, when it comes to male population, the Somme region in France ranks second (Forman et al, 2014). Spain is in an intermediate position in Europe regarding oral cancer both in incidence and survival (IARCC, 2021), and cases have been steadily growing throughout the years reaching a male incidence of 7.4/100,000 inhabitants for males and 2.3 for females.

1.6 RISK FACTORS

More than thirty years ago, the International Agency for Cancer Research identified alcohol and tobacco as the main risk factors for oral cancer (IARC 1987). Many investigations have been undertaken ever since whose results not always were easy to interpret as participants used to be exposed to both risk factors simultaneously. However, this research managed to establish that not all oral neoplasias could be attributed to tobacco and/or alcohol consumption (Kari et al, 1997), and

disclosing other potential agents such as diet, oral hygiene, oral health status, and repetitive traumatic or thermal aggressions to the oral cavity. Epidemiological evidence soon highlighted the relationship between oral cancer and the amount of tobacco consumed and length of the habit, with studies reporting on the presence of a high number of potential carcinogens both in tobacco smoke and in its particulate phase (Chiva & Masironi, 1992).

The identification of alcohol intake as a risk factor followed a similar pattern, identifying an increase in the risk with the increase of alcohol consumed (Boffetta et al, 1992), but failing to unveil a link between the percentage of alcohol in a drink and the risk for oral cancer (Marshall & Boyle, 1996).

Historically, the combined consumption of alcohol and tobacco has been associated to a 20-fold increase in oral cancer risk compared to non-consumers' (Wynder et al, 1957) and thus attributing to alcohol intake a synergistic effect that considerably increases the carcinogenic capacity of tobacco.

Tobacco can also be used in ways other than smoking. This use is known as smokeless tobacco and includes more than twenty-five compounds in preparations named chewing tobacco, naswar, snuff, snus, gutka, etc. These products are distinctly different from each other, but epidemiologic evidence shows that any of them is harmful (IARCC, 1987b) and their consumption should be discouraged because of the presence of tobacco-specific nitrosamines whose levels are directly related to the risk of oral cancer (Janbaz et al, 2014).

The carcinogenetic potential of human papillomavirus (HPV) in oral cancer was first suggested almost 40 years ago (Syrjanen et al, 1983). Nowadays the association of HPV16 with oral carcinomas is widely accepted, particularly for those arising in the posterior area of the oral cavity and about 40% of all cancers are HPV+ (Chaitanya et al, 2016). These tumours generally show better survival rates than their HPV-counterparts (Syrjanen, 2018) and their growing importance in the aetiology of oral cancer is related to the changes in sex practices and the widespread practice of oral sex without protection (Goicouria et al, 2019).

About 15% of all oropharyngeal are related to an imbalanced diet (Stewart & Kleihues, 2003) either through the presence of carcinogens in food or through synthesis of these carcinogens within the human body because of altered dietary habits, as well as because of the effect of diet on the metabolic responses related to energy balance (Taghavi & Yazdi, 2007). Low intake of antioxidants and fiber, high intake of monounsaturated fat, and low intake of micronutrients have been proposed as risky nutritional behaviours, together with high calorie intake and obesity (Ogden & Wight, 1998).

Among the risk factors in the clinicians' mind, chronic trauma to the oral mucosa is frequently present. This hypothetical relationship remains controversial (Thumfart et al, 1978; Mashberg & Samit, 1989; Milián Masanet et al, 1991) and, when adjusting for alcohol and tobacco consumption, its importance diminishes (Marshal et al, 1992).

1.7 SURVIVAL

The importance of oral cancer relies more on its mortality rates and important morbidity with all related implications than on its actual incidence.

Overall five-year survival rate is estimated to be about 50% (Hayat et al, 2007) to diminish to 30.8% after 10 years. Race and ethnicity have an influence on survival with white patients performing better than black ones (Osazuwa-Peters, 2016) and Hispanic better than non-Hispanic (Molina et al, 2008). Lower socioeconomic status is also associated with poor survival after adjusting for known predictors such as disease stage, age, and gender (Chu et al, 2016). Inadequate lifestyles, HPV status, presence of co-morbidities and type of treatment have also been related to survival to this neoplasm (Lydiatt et al, 2017). Oral cancer-related deaths rank seventh for males and tenth for females in Europe (Ferlay et al, 2012), with Spain showing overall five-year survival rates of 53% (37.4% for males and 51.6% for females for oropharyngeal cancer) (Gevara et al, 2020).

1.8 DIAGNOSTIC DELAY

Despite the oral cavity offers no difficulties for routine exploration, almost 50 % of oral cancers are diagnosed at stages III or IV

(Warnakulasuriya 2009). As mortality rates have been linked to disease stage (van der Waal 2013), it has been suggested that if this neoplasm were diagnosed and treated at early stages, five-year survival rates would exceed 80% (Silverman et al, 2010).

An ideal early diagnosis would take place during the carcinogenesis process, but current molecular biology techniques have not achieved this goal (Mydlarz et al. 2010), and therefore early diagnosis at a cellular level and the identification of hypothetical diagnostic markers remain as an objective for the future.

Currently, the diagnosis of oral lesions suspicious for oral cancer relies mostly on clinical findings identified by healthcare professionals who are not familiar with the disease: while a general dental practitioner might face no more than 10 oral cancer patients, a family physician would hardly witness more than one case during his/her working life (van der Waal 2013; Pitchers & Martin 2006). In addition, these lesions usually mimic minor or benign conditions of the mouth (van der Waal 2013; Pitchers & Martin 2006; Neal 2009), which poses further difficulties for the correct identification of these lesions and increase the chances for a delay in diagnosis. In fact, although family physicians agree they should have a role in early oral cancer detection (Macpherson et al. 2003), they acknowledge insufficient training in this field, inadequate equipment, and tight working schedules (Carter & Ogden 2007; Macpherson et al. 2003; Wade et al. 2010; Greenwood & Lowry 2001) which limit their performance on this issue. Moreover, physicians' knowledge about risk factors for oral cancer appears to be lower than dentists', with more difficulties in recognising red or mixed precancerous lesions (Carter & Ogden 2007; Macpherson et al. 2003; Greenwood & Lowry 2001). This circumstance is particularly relevant as physicians refer their oral cancer patients for treatment at more advanced stages than do dentists (Holmes et al, 2003), but physicians refer about 56% of all oral cancer whereas about a third (32%) of referrals come from dental practitioners (Crossman et al, 2016).

As oral cancer screening programmes have proved to be no cost-effective but in highly-prevalence regions (Sankaranarayanan et al. 2005; Subramanian 2009; Sankaranarayanan et al. 2013), opportunistic screening gains importance and it should be considered a must in a

dentist daily practice (Sciubba 2001; Seoane et al. 2010). Unfortunately, and despite this clinical examination takes no more than two minutes, a large proportion of dentists do not conduct routine oral cancer explorations yet (Horowitz 2001).

Healthcare systems also have a part on diagnostic delay of oral cancer, not only because of how treatment pathways are organised and their length but also on the way people seek health care. Western health services usually are based on the “double gate-keeping system”, where Primary Care is the entrance to the system and hospital specialists act as the second gatekeeper for patients reaching them and decide whether these persons require further diagnostic tests or treatments (Andersen et al. 2011). In this situation, some health services have introduced schemes for reducing waiting times for patients with symptoms suspicious of cancer (Richards 2009; Olesen et al. 2009; Baughan et al. 2009), but some others restrict these fast tracks for common cancers, and oral cancer is not usually included (Borràs et al. 2010).

Patients usually seek care when a symptom is perceived at least two or three times a week (Petrie & Weinman 2003) and about 30% wait longer than 12 weeks (Scott et al. 2007). Individuals consider an experience as threatening for their wellbeing by comparing it with previous experiences (Leventhal et al. 2003). Thus, the chances for seeking help depend on the interpretation of a symptom as dangerous for the person’s welfare (Scott et al. 2013). Unfortunately, cancer-related symptoms are often interpreted as banal conditions (aphthae, physical trauma, dental problem) discarding oral cancer as a feasible explanation (Scott et al. 2007; Rogers et al. 2011, Al-Dakka 2010). These circumstances make the time taken by the patients to seek consultation when experiencing a sign/symptom compatible with oral cancer the main part of the total time elapsed until these patients are diagnosed and treated (Varela-Centelles et al, 2018). Bearing in mind that in spite of therapeutic advances only a 5% improvement in overall survival has been achieved in the last 20 years with half of all oral cancers diagnosed at advanced stages (Warnakulasuriya, 2009b), significant improvements in survival may most probably come from the side of early diagnosis.

The main reported causes for patients delaying consultation are the patient's knowledge of oral cancer, the severity of life events during this period, and the perceived ability to seek help for oral symptoms (Scott et al, 2008). Therefore, a logical step to tackle the problem of low survival rates for the approximately 50% of patients diagnosed at advanced-disease stages (Gigliotti et al, 2019) would be to diminish their proportion by shortening diagnostic delays by reducing patients' delay through improving public awareness of oral cancer. Many oral cancer educational campaigns have been undertaken worldwide with inconsistent results for the individuals at higher risk and whose long-term impacts in terms of oral cancer diagnosed at earlier stages have yet to be seen (Mcperson, 2018). In fact, knowledge about of this neoplasm is reported to be low worldwide, as only 56% in a sample of Britons had heard of oral cancer (Warnakulasuriya et al. 1999), and just 25% of Americans were able to identify a sign of oral cancer (Horowitz & Nourjah, 1995). Although awareness is reported to have improved recently (West et al 2006), there still are a lack of concern about both the signs of oral cancer and its relationship with alcohol consumption. It is essential to define the epidemiological state and reportage of oral cancer in different areas to aid policy makers in defining adequate prevention and control strategies (Sarode et al, 2020), and public awareness should be a part of this assessment.

Awareness of a condition is often assessed by investigating whether people have heard of it (Mun et al, 2015). Data on oral cancer awareness are usually obtained from convenience samples recruited during oral health promotion campaigns/activities or at healthcare premises. Unfortunately, population-based studies on oral cancer awareness are relatively scarce, focused on a handful of countries, and undertaken mostly at regional/county or city levels from a range of approaches. This results in a myriad of small studies with distinct methodologies and varied quality scattered all over different territories that hamper the obtention of an accurate picture of the size of the problem of oral cancer awareness globally. Data from Spain rely on a single study undertaken in a sole city and shows that 22% of the participants had ever heard of oral cancer and that public knowledge of its signs and symptoms and risk factors is poor (Varela-Centelles et al, 2018b).

1.9 RESOURCES FOR PATIENT INFORMATION

People can get information about oral cancer from healthcare professionals but also from other sources including friends, relatives, self-appointed health experts, mass media, or even social networks.

Dental problems may represent a similar burden on general medical practice as some other conditions of the head and neck (Cope et al, 2015) as many patients prefer to consult their physician about common oral problems rather than their dentist (Madrid et al, 2006). However, some investigations have reported a lack of knowledge of primary care physicians about oral disorders (Rabiei et al, 2012) and oral cancer is not an exception (Carter & Ogden, 2007). This inadequate knowledge is reported to contribute to delays in diagnosis, referral, and treatment (Saleh et al, 2014).

Despite nursing education programs show an overlap (up to 38%) of core competencies and learning objectives with dentists' (Spielman et al, 2005), knowledge on specific aspects of oral health is also reported to be inadequate (Philip et al, 2019). Primary care nurses are in an advantageous position to promote oral health but only about 30% consider their overall oral cancer knowledge is sufficient. Interestingly, 83% believe they have the ability to perform oral cancer examinations (Meng et al, 2007).

Although dentists play a key part on oral cancer diagnosis and they recognized this role falls within their professional responsibilities (López-Jornet et al, 2010), only 49.7% of Spanish dentists participating on an e-mail survey on this topic considered themselves to have up-to-date knowledge about oral cancer. Yet, almost all participants acknowledged tobacco and alcohol as risk factors for this neoplasm but only 41.5% had received training on tobacco counselling and just 52.6% felt adequately trained to perform exploration for neck adenopathies (López-Jornet et al, 2010). Conversely, 87.5% of dentists working in the public sector reported to conduct routine oral cancer examinations and 84.4% also provided advice to their patients on risk-factor modifications. These practitioners showed a 61.4% sensitivity in visual diagnosis of oral cancer and 59.5% for precancerous lesions (Seoane et al, 2006b).

Regarding dental hygienists, a study undertaken in Southern Spain showed that all participants were aware of smoking as a risk factor for oral cancer, and 90% also recognised alcohol consumption (López-Jornet et al, 2007) but only 42.1% mentioned that low intake of fruits and vegetables increased an individuals' risk for oral cancer. Surprisingly, and despite dental hygienists' work is mainly devoted to patient education, only 51.4% reported to advice their patients on oral cancer prevention while 95% give routine advice on improving oral hygiene (López-Jornet et al, 2007).

Considering the increasing workload at primary health care services worldwide, community pharmacies are often becoming the first port of call for patients seeking counselling on minor ailments such as oral sores or other banal conditions of the oral cavity. As mentioned earlier in this dissertation, oral cancer can mimic such conditions and an inadequate management of this first consultation may result in a delay in diagnosis which is associated with a threefold increase in mortality by this neoplasm (Seoane et al, 2012). Community pharmacies are actual agents for referral and a frequent “stepping-stone” to public health services (Hassell et al, 1997). A study undertaken in Galicia using the “mystery shopper” approach showed that 74.8% of these simulated early oral cancer patients were referred to a dentist or to a physician when they related their problem to a pharmacist. If the simulated patient happened to describe the same condition to a pharmacy assistant, just 33.3% were advised to seek consultation with a physician or a dentist (Varela-Centelles et al, 2012).

The growing public confidence on the so-called alternative or complementary therapies are increasing their use (Schnabel et al, 2014; Rashrash et al, 2017). Although no specific training is required to keep alternative medicine's shops in many countries, the public may perceive these persons as health experts and their advice may be sought for a range of disorders. Regarding oral conditions, a survey undertaken in Spain unveiled that when facing a person describing a situation potentially related with oral cancer, less than 4% of these shopkeepers would refer this individual to a dentist or to a physician (Varela-Centelles et al, 2012). Most (86.4%) would limit their advice to the use of an over-the-counter preparation.

Apart from health professionals and individuals alike, members of the public can obtain health-related information from a number of sources that include mass media. In fact, there has been a boost of health information in the press with many newspapers now including regular sections on health and wellbeing topics. Unfortunately, the coverage of oral cancer has been disproportionately low (Canto et al, 1998) and continues to be minimal or non-existent according to a study of the US popular press (Graham et al, 2004) so newspapers' contribution to increase oral cancer awareness among the general population is still to be developed. The same may occur in other conventional media, like radio and television, but no information could be retrieved beyond their use for health promotion campaigns during a limited period of time.

The dramatic increase in the number of Internet users (1,157%) in the first decade of the century (Internet World Stats, 2019) has produced a shift on how people access to information and health issues are not an exception. In fact, the topic "health" aroused 100% interest in February 2004: it was in that month when more health-related terms were introduced in all languages, with Australia as the most concerned country. Spain ranked 28th out of 67 nations considered (Google Trends, 2018). Users looking for online health information mostly do it for cardiovascular and cancer issues (Couper et al, 2010) and about 54% of head and neck cancer patients rely on the Internet to find information about their treatment, collateral effects and how to keep their health standards in the future (Rogers et al, 2012).

Concerns about the quality of health content on websites have led to the creation of tools and guidelines to evaluate the quality, usability, and reliability of the information available online (Gagliardi & Jadad, 2002). In the particular case of oral cancer, information in Spanish resulted to be low and of worse quality than that published in English, which could put Spanish speaking population at a disadvantage when searching the Internet for oral cancer-related issues (Irwin et al, 2011). Health-related websites have also to be understandable for the average person and readability analyses can be used to determine the complexity and suitability of a given text. Readability is important to ensure an adequate comprehension of the contents but also to avoid biased opinions on controversial subjects. Drinking water fluoridation

could be an example of this situation, as anti-fluor information found in Google® turned out to be more readable than the pro-fluor content, although anti-fluor websites accounted for only 29% of total publications (Basch et al, 2019). Oral cancer websites rank within the range of difficult to very difficult to read and require a high level of understanding from the reader, posing a barrier for the less educated individuals in a particularly sensitive subject because of the higher prevalence of oral cancer amongst the less affluent socioeconomic strata of the population (Varela-Centelles et al, 2015).

Information on the Internet is not only available from webpages: social networks and participatory video websites are gaining influence in opinion formation on health issues by members of the general public (Randree, 2009). The most popular social network platform, Facebook® (<https://www.facebook.com>), has more than 1.5 billion registered users and therefore has a tremendous potential for effective communication and education. A report on Facebook contents about oral cancer (Hassona et al, 2016) disclosed that most contents on this topic (65.79%) were created by academic institutions or professional organizations. Advertisements for fundraising or awareness events were the most common type of posts (48.1%) and posts describing a patient's story achieved the highest engagement rate with the audience (24.1%), but the quality of the materials about oral cancer available through this platform are limited in quality and quantity (Hassona et al, 2016).

The successful history of online public video repositories of audiovisual resources depends greatly on the convenience and ease of uploading contents by anybody without requiring specified credentials, as well on an easy access to an overwhelming number of free films. These advantages turn into weaknesses when dealing with health-related issues because the lack of supervision and control of the information contained in these videos may be inadequate, outdated, or even dangerous (Camm et al, 2013). A recent study on the information about oral cancer available from YouTube® (<https://www.youtube.com>) disclosed a wide range of authors and contents with the most useful videos ranking late on the viewing list (Hassona et al, 2016b) and, therefore, with less chances to be viewed

by the public. As occurred in social networks, videos describing individual experiences were more viewed than those including useful information. In fact, most videos failed to present early features of oral cancer and include limited information on their risk factors thus restricting the effectiveness of YouTube® in diminishing cancer risk. A recent study on audio-visual resources on Brazilian Portuguese language in this platform reached similar results (Passos et al, 2020).

2 OBJECTIVES

1. To investigate public awareness of oral cancer in Galicia, as well as knowledge of risk factors, signs and symptoms.
2. To investigate the health-seeking behaviour of lay people in Galicia if experiencing a long-standing oral ulceration.
3. To disclose the type of information about oral cancer are available through the main video-sharing online platforms, and whether the information they provide may be a useful contribution to shorten the patients' appraisal time-interval in their path to a diagnosis of symptomatic oral cancer.

3 RESEARCH DEVELOPMENT

3.1 CHAPTER 1

The research results contained in this chapter have been published in the following paper:

ORAL CANCER AWARENESS IN NORTH-WESTERN SPAIN: A POPULATION-BASED STUDY.

Varela-Centelles P: Lugo Health Area. Galician Health Service. Lugo. Spain

Seoane J: Dpt of Surgery & Medical-Surgical Specialities. University of Santiago de Compostela. Spain.

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García-Pola MJ: Dpt of Surgery & Medical-Surgical Specialities. University of Oviedo. Spain.

Seoane-Romero JM.: Dpt of Surgery & Medical-Surgical Specialities. University of Oviedo. Spain.

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Author's contributions

All authors contributed equally to this investigation. Ms Ulloa-Morales conceived the study and designed the investigation and coordinated the acquisition of data. Ms Ulloa-Morales also focused on

data analysis and interpretation. All authors critically reviewed all drafts of the manuscript and approved its final version.

Oral cancer is considered a major public health problem, with variations in survival between countries and patient groups. Oral cancer represents the 11th most incident neoplasm (Ghantous & Abu Elnaaj, 2017), with over 202,000 with a male:female ratio 2:1 (Conway et al, 2018). In the particular case of Spain, oral cancer ranks 16th among all neoplasms by incidence and 19th by mortality (Fitzmaurice et al, 2019).

Variations in survival between and within countries are multifactorial and complex in nature, but a growing body of research suggests disease stage at the time of treatment could explicate some of them. Unfortunately, a large proportion of patients present with advanced disease (stages III and IV) mainly due to delay in self-referral (Rogers et al, 2007).

Diagnostic delay in oral cancer has been found to be related to advanced stage at diagnosis and to influence patient survival (Seoane et al, 2012), conditioned by the biological characteristics of the tumour.

Considering the limited improvements on survival rates to this neoplasm evidenced in the last decades despite the important technological advances in diagnosis and treatments, more attention is being paid to the events occurring since the first cancer-related symptom is experienced until healthcare is sought. This time interval represents a major component of waiting times since symptoms detection to definitive diagnosis of oral cancer (Varela-Centelles et al, 2018), and it is reported to be associated to low awareness of cancer symptoms and risk factors (Smith et al, 2005).

Oral cancer is largely preventable (World Health Organization, 1984) by avoiding known risk factors and adopting healthy lifestyles. In addition, the oral cavity is easily accessible for self-examination to detect suspicious lesions. Both approaches may have an impact on patient survival, but they clearly depend on the degree of patient awareness, which is reported to be very variable throughout Europe, ranging from the 96.6% of patients reporting they had heard of oral

cancer in the UK in 2005 (West et al, 2006) to the 23.7% in the city of Porto (Portugal) (Monteiro et al, 2016). No information about oral cancer awareness in Spain could be retrieved beyond a pilot study undertaken by our group in a single city, which showed 22% of the participants had ever heard about oral cancer (Varela-Centelles et al, 2018b).

Several campaigns to increase oral cancer awareness have been undertaken in Spain throughout the years with apparently poor results. Although lack of information on cancer causes and knowledge on signs and symptoms has often been linked to a late diagnosis (Monteiro et al, 2016), raising awareness through this kind of campaigns seems to make little difference to the delay of patients seeking help (Rogers et al, 2011b).

Therefore, the aim of this investigation was to investigate public awareness of oral cancer in Galicia (NW Spain), as well as knowledge of risk factors, signs and symptoms.

3.1.1 Methods and materials

This was a cross-sectional, community-based survey of randomly selected respondents from Galicia (North-western Spain) conducted from March 1, 2015 to 30 June 2016. The questionnaire was applied face-to-face by 14 specifically trained interviewers (postgraduate (n=7) and undergraduate dental students (n=2), 1 undergraduate medical student, 2 nurses, and 2 nurse assistants).

3.1.1.1 Instrument development

We used a modification of the questionnaire originally developed by Rogers et al (2011b) in English language. The original instrument was translated into both Spanish and Galician and then back into English (double translation). Sociodemographic items in the instrument were adapted to the Galician environment, and an additional question on fruit intake was introduced in the questionnaire. The resulting questionnaire was piloted in a group of 5 clinicians and some items were reformulated, corrected, or deleted. This second draft was piloted in a group of 10 undergraduate dental students at the School of Medicine and Dentistry of the University of Santiago de Compostela

and in a group of senior volunteers at a community centre of the Lugo city council.

3.1.1.2 Participants and setting

Sample size was determined by quota sampling considering an accessible population of 5% and an expected percentage of response of 28% (Rogers et al, 2011b). The resulting sample size of 10,804 people permitted a power of 0.8% for estimating the proportion of oral cancer aware people, presuming a value of 25%.

Only people over 18 entered the study. The exclusion criteria were: (i) being mentally disabled and (ii) poor command of any of the official languages of the region (Galician or Spanish).

3.1.1.3 Data collection

The study was undertaken in Galicia (North-western Spain), an autonomous region with 2,708,339 inhabitants unevenly distributed in 29,574.4 Km², whose annual gross domestic product per capita is 21,358 € and their life expectancy at birth is 82.78 years. Data were obtained in all four capitals of the Galician provinces at four different areas in each city. These zones included administrative areas, and affluent and average-income commercial streets and shopping centres, in a sort of pathfinder survey method, according to the quota sampling procedure suggested by Rogers et al (2011b). The instrument was applied face-to-face in the community to randomly selected individuals who were approached by the interviewers in different weekdays and times at each location.

The interviewers participated in a 1 hour-long workshop which included discussion of the items in the instrument and their related ethical aspects, together with a role-playing session and a series of interviews to volunteer subjects (undergraduate dental students) under the supervision of a psychologist.

Data were coded and entered into a database. Each questionnaire was identified by a single number to permit an evaluation of the process of data coding and mechanization in a sample of randomly selected sets of data. Data were then transferred to statistical packages (R v3.3.2, MASS, and nnet) for analyses.

3.1.1.4 Data analysis

Participants over 45, smokers and alcohol consumers, with a reported daily intake of less than 5 pieces of fruit per day were defined as “at risk” for the sake of data analysis.

A descriptive analysis was undertaken, and results presented as frequencies and percentages. Bivariate analysis was undertaken using the Chi Square/Fisher’s exact test. Results are expressed in terms of odds ratio with their 95% confidence intervals [OR (IC95%)]. Logistic regression analyses were also undertaken to disclose the variables influencing oral cancer awareness and to identify factors conditioning the recognition of main alarm signs. The level of significance chosen for all tests was 5%.

3.1.1.5 Ethical considerations

The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600). This investigation complied with the Spanish regulations and the Helsinki Declaration on ethical principles for medical research involving human subjects.

The results obtained from this research protocol are reported following the STROBE guidelines (Strengthening The Reporting of OBservational studies in Epidemiology) (Vandenbroucke et al, 2009).

3.1.2 Results

A total of 5,727 persons accepted to participate in the survey (response rate: 53%). Participants were mostly in the 45-64 age group (30.2%; n=1,728), with a 47.7% of males (n=2,729).

3.1.2.1 Oral cancer awareness

Participants were asked to mention all cancers they knew, and the first 10 responses were recorded. Breast (27.8%), lung (18.6%) and colorectal (12%) were the cancers most frequently mentioned as the first response. Oral cancer was mentioned by 3% of interviewees as their first response. It was recorded among the first three answers by 8.2% of the sample; 20.3% participants mentioned oral cancer amongst

their responses in any position (table 1). More than one third of participants (37.2%; n=415) had a relative or an acquaintance with oral cancer.

Table 1. Cancers the sample had heard about mentioned in the first ten positions. Open, unprompted question

Cancer mentioned	Mentioned as first response	Mentioned in first 3 responses	Mentioned among the first 10 responses
Breast	1561 (27.8)	2674 (46.6)	3691 (64)
Colorectal	672 (12)	1834 (32.2)	2901 (50.5)
Prostate	386 (6.9)	1017 (17.7)	1724 (30)
Pancreas	225 (4)	885 (15.4)	1626 (28.4)
Skin	221 (3.9)	708 (12.3)	1588 (27.7)
Oral cancer	166 (3)	473 (8.2)	1172 (20.3)
Cervix	164 (2.9)	696 (12.1)	1252 (21.8)
Leukaemia	162 (2.9)	507 (8.8)	1242 (21.7)
Stomach	150 (2.6)	633 (11)	1324 (23.1)
Pharynx	125 (2.2)	486 (8.4)	1088 (18.9)
Liver	117 (2.1)	586 (10.2)	1343 (23.4)
Bone	81 (1.5)	312 (5.4)	937 (16.3)
Brain	84 (1.5)	291 (5)	778 (13.6)
Lymphoma	72 (1.3)	198 (3.4)	485 (8.4)
Kidney	60 (1.1)	212 (3.7)	608 (10.6)
Ovaries	60 (1.1)	343 5.9()	670 (11.7)
Oesophagus	50 (0.9)	214 (3.7)	530 (9.2)
Larynx	34 (0.6)	104 (1.8)	242 (4.2)
Testis	30 (0.5)	121 (2.1)	300 (5.2)
Melanoma	19 (0.3)	55 (1)	134 (2.3)
Bladder	20 (0.3)	100 (1.7)	231 (4.1)
Bone marrow	12 (0.2)	34 (0.6)	83 (1.4)
Heart	8 (0.1)	49 (0.9)	118 (2)

Values in absolute cases and percentages in brackets

Active knowledge of oral cancer (unprompted mention) was shown by 1,024 individuals (17.95%). This percentage increased to about three quarters of the sample (73.1%; n=4,189) when specifically asked about this neoplasm (passive knowledge).

A logistic regression was performed (fig 1), and it was found that awareness had an OR=1.30 (1.14-1.48) in women regarding to men; we also found that all age ranges studied had a significant risk comparing to the reference category; and also, that awareness increased with the educational level compared to compulsory education.

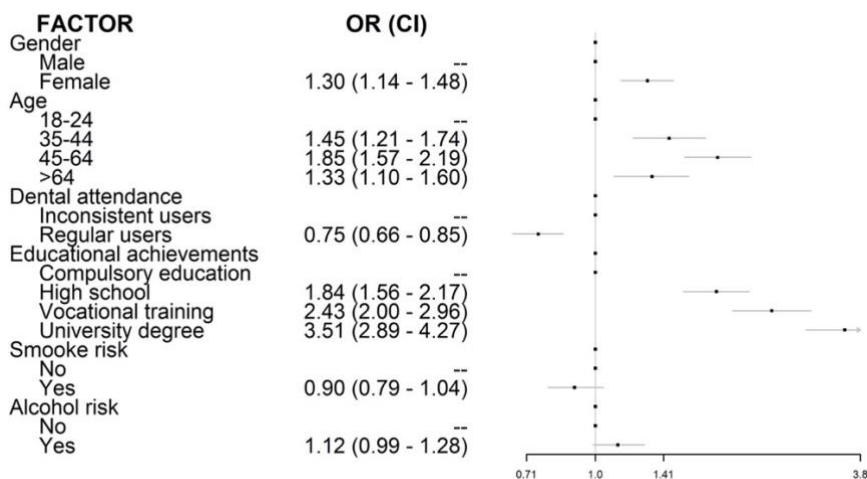


Figure 1. Factors influencing oral cancer awareness. Logistic regression analysis.

3.1.2.2 Preventive attitudes

Participants were asked about their daily intake of fruit and most of them reported to have 5 or more servings (pieces) of fruit per day (79.2%; n=4,538). When questioned about how frequently they attend their dentist, most interviewees (57.3%; n=3,281) reported to do it at least once a year. Regular dental visits were significantly associated with oral cancer awareness (77.9%; n=2,559 vs. 67.6%; n=1,576), with an adequate intake of fruits (23.4%; n=770 vs. 17.8%; n=416. p<0.001) and also with no smoking (59.9%; n=1,964 vs. 46.7%; n=1,092. p<0.001).

3.1.2.3 Recognition of warning signs/symptoms

Responses on oral cancer symptoms (detailed in table 2) ranked non-healing ulcerations as the most suggestive alarm sign, both prompted and unprompted, followed by mouth swelling as unprompted response, and sore tongue or mouth when prompted. Red or white patches gathered far lower percentages of participants connecting them with a possible oral neoplasm.

Table 2. Recognition of oral cancer warning signs/symptoms

Symptom	Unprompted response	Prompted response
Non-healing wound/ulceration	1393 (24.3)	4597 (85.8)
Gumboil or swelling	1246 (21.7)	4096 (76.3)
Pain in the mouth	1112 (19.4)	4034 (75.1)
Discomfort in tongue or mouth	715 (12.5)	4118 (76.6)
Bump in the mouth	605 (10.5)	3818 (71.1)
White spot/patch in the mouth	443 (7.7)	3104 (58.9)
Red spot/patch in the mouth	423 (7.3)	3365 (62.6)
Bleeding gums	1116 (19.5)	2128 (39.5)
Limitation to mouth opening	334 (5.8)	2862 (53.1)
Loose teeth	389 (6.8)	2000 (37.1)
Loose/irritating dentures	216 (3.7)	2034 (37.7)

Values in absolute cases and percentages in brackets.

Females recognized not-healing ulcerations as a potential symptom more frequently than their male counterparts (table 3). Education also seems to have a part on this phenomenon: each step in the education ladder makes the participant 15% more likely of recognizing a red patch as an early cancer sign. In the case of white patches, each level beyond compulsory education increases the chances by one third the chances in the precedent level for acknowledging these lesions as potentially

Table 3. Characteristics of the sample and responses to key issues in the study.

	N	Mentions oral cancer unprompted	Mentions oral cancer prompted	Smoking as risk factor unprompted	Alcohol as risk factor unprompted	Non-healing ulcer as symptom unprompted	Non-healing ulcer as symptom prompted
GENDER							
Male	2729	421 (15.4) ^B	1904 (69.7) ^C	1468 (53.8) ^A	330 (12.1)	577 (21.1)	2159 (84.4) ^B
Female	2998	603 (20.1) ^B	2285 (76.2) ^C	1701 (65.7) ^A	392 (13.1)	816 (27.2)	2438 (87.2) ^B
AGE							
18-34	1651	359 (21.7) ^C	1146 (69.3) ^C	1027 (62.2) ^C	229 (13.8) ^C	385 (23.3)	1261 (81.9) ^C
35-44	1210	232 (19.2) ^C	947 (78.2) ^C	749 (61.9) ^C	180 (14.8) ^C	364 (30.1)	944 (87.3) ^C
45-64	1728	282 (16.3) ^C	1356 (78.4) ^C	984 (56.9) ^C	224 (12.9) ^C	439 (25.4)	1436 (87.7) ^C
64+	1138	151 (13.2) ^C	740 (65) ^C	409 (35.9) ^C	89 (7.8) ^C	205 (18.1)	956 (87.1) ^C
TOBACCO							
Former smoker	862	157 (18.2)	629 (72.9)	435 (50.4) ^C	91 (10.5)	211 (24.4)	728 (88.2)
No	3056	565 (18.5)	2283 (74.6)	1699 (55.5) ^C	415 (13.5)	746 (24.4)	2460 (85.3)
Yes	1701	296 (17.4)	1221 (71.7)	1017 (59.7) ^C	212 (12.4)	419 (24.6)	1316 (85.4)
ALCOHOL							
Daily	485	53 (10.9) ^C	338 (69.7) ^B	204 (42) ^C	47 (9.6) ^C	40 (9.4)	403 (84.3)
Almost daily	875	131 (14.9) ^C	613 (70) ^B	459 (52.4) ^C	94 (10.7) ^C	212 (24.2)	684 (86.1)
Never	1509	243 (16.1) ^C	1083 (71.7) ^B	763 (50.5) ^C	155 (10.2) ^C	384 (25.4)	1250 (88)
Once month	a 1030	248 (24.1) ^C	788 (76.5) ^B	666 (64.6) ^C	156 (15.1) ^C	280 (27.1)	797 (83.5)
Once week	a 1719	343 (19.9) ^C	1310 (76.2) ^B	1071 (62.3) ^C	266 (15.4) ^C	454 (26.4)	1363 (85.5)
EDUCATION							
Compulsory	1600	184 (11.5) ^C	963 (60.1) ^C	611 (38.1) ^C	132 (8.2) ^C	303 (18.9) ^C	1218 (83.4) ^B
High School	1614	320 (19.8) ^C	1186 (73.4) ^C	896 (55.5) ^C	192 (11.9) ^C	434 (26.8) ^C	1317 (87.4) ^B
Vocational training	983	199 (20.2) ^C	772 (78.5) ^C	638 (64.9) ^C	130 (13.2) ^C	253 (25.7) ^C	767 (83.9) ^B
University	1418	313 (22) ^C	1210 (85.3) ^C	1016 (71.6) ^C	263 (18.5) ^C	385 (27.1) ^C	1199 (87.8) ^B

Values in absolute cases and percentages in brackets.

^A 0.01<p<0.05

^B 0.001<p<0.01

^C p<0.001

malignant. Volunteers with high school as their maximum scholar achievement elicited the highest chances for recognizing a non-healing ulceration as a suspicious sign, three-fold higher than those having completed vocational training courses.

3.1.2.4 Knowledge about risk factors

Regarding active knowledge on oral cancer risk factors, the most frequently identified one was tobacco (55.3%; n=3,169), followed by alcohol (12.5%; n=708), poor oral hygiene (10.8%; n=618), diet (6.5%; n=377), and genetics (4.5%; n=248).

Current smokers resulted to be significantly more aware of the part of tobacco as a risk factor, a circumstance that does not occur with daily alcohol consumers who identified tobacco or alcohol as risk factors in lower percentages (table 3). Progress in educational achievements ensures significantly more knowledge about oral cancer, as shown in table 3.

A new variable was constructed in order to explore the knowledge individuals at high risk have about oral cancer. This subgroup of participants was defined by those over 45, current smokers and alcohol consumers, with a reported daily intake of less than 5 pieces of fruit per day. These people (7.5%; n=431) were mainly males, younger than 64 with compulsory education as their highest academic achievement (36.6%; n=158). Participants in the risk group were less aware of oral cancer, and this difference reached statistical significance in terms of active knowledge (table 3). They also elicited differences in terms of recognition of potential cancer symptoms (table 2).

In order to gain insight into the features conditioning the recognition of the most relevant oral cancer signs/symptoms and risk factors, additional logistic regression analyses were undertaken (fig. 2), resulting that females consistently recognize them better and that regular dental attenders perform worse than erratic users of dental services.

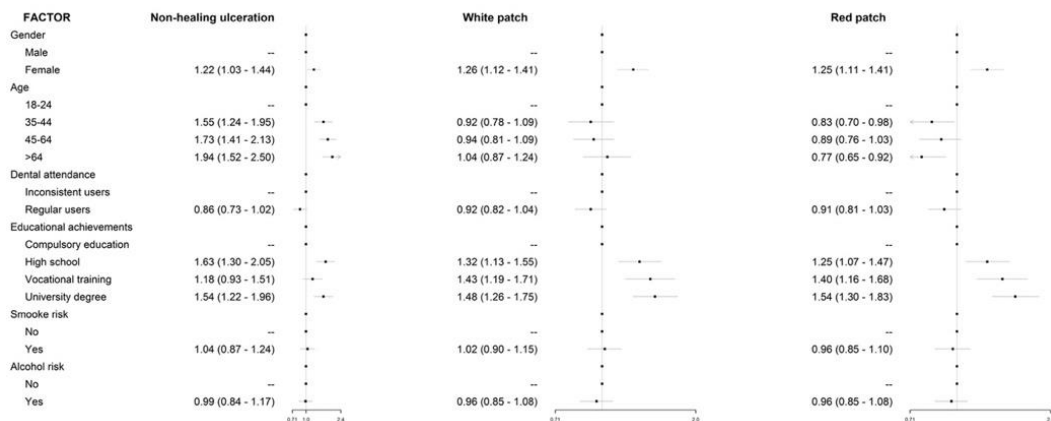


Figure 2. Factors influencing the recognition of main oral cancer warning signs/symptoms. Logistic regression analyses.

The elder subgroup of participants is more likely to recognize tobacco and alcohol as risk factors or a red patch as an early sign of oral cancer than to identify white patches or non-healing ulcerations. Holding a university degree eases recognition of risk factors and early oral cancer signs with the exception of persistent ulcerations.

3.1.3 Discussion

Our research approach permitted a reasonable balance of age and gender in the sample and a better feeling for people's responses than is possible with a postal survey (Rogers et al, 2011b) or by telephone interview, with a clear advantage over this latter method given the growing number of homes using only mobile phones (Hertrampf et al, 2012). Conversely, our study is limited by the fact of not having reached the intended sample size. In this circumstance, the precision of the study was recalculated for the sample size finally achieved (5,727) considering it an infinite population. It resulted a probability for a precision error of 1.16 in the estimation of a proportion by asymptotic 95% bilateral confidence interval, assuming an expected proportion of 28%. In addition, the recruitment method (at the busiest commercial and administrative areas in the four provinces of the region during several months at different times) and the participation of knowledgeable, specifically trained interviewers, may have contributed

to counterweigh this drawback. However, the limitation of relying on self-reported data is inherent to this kind of studies (West et al, 2006) and may have influenced responses on habits and attitudes, as with knowledge items there is no objective criteria against which responses could be validated.

Another hypothetical bias may come from self-selection of participants, as those with lower health literacy may have declined the invitation to enter the study more frequently than other people. This phenomenon, if occurred, would only highlight the important deficit disclosed by our results.

The fact of having used the methodology suggested by Rogers et al (2011b) permitted interesting comparisons: 3% of our sample mentioned oral cancer in their first unprompted answer vs 1% in the Rogers' group paper. The participants mentioning oral cancer in their first three or first ten responses (table 1) double the percentages described in 2011 for the Mersey region (4% and 11% respectively) in England (Rogers et al, 2011b) but are far from the 56% reported for the whole Great Britain in 1999 through face-to-face interviews (Warnakulasuriya et al, 1999) or from the 95.6% identified by a postal survey undertaken all over Britain later in 2006 (West et al, 2006).

A similar study in the Portuguese city of Oporto in 2016 found that only 23.7% of the participants had heard of oral cancer (Monteiro et al, 2016), a finding that almost mimics our results (20.3%). Awareness can be related to prevalence, as persons should be more aware of the disorders more frequently found in their communities: oral cancer was ranked in 11th position by awareness by our sample while it is the 13th most incident cancer (including lip) in the region.

As occurred in previous studies (Warnakulasuriya et al, 1999; West et al, 2006; Rogers et al, 2011b; Hertrampf et al, 2012; Monteiro et al, 2016), tobacco was the most frequently acknowledged risk factor (55.5%); the same as reported from Oporto (Portugal, 2015) (Monteiro et al, 2016), but far from the percentages reported from Northern Europe (84.7% in Great Britain (2006) (West et al, 2006); 76% in Schlesweiss-Holstein (Germany, 2012) (Hertrampf et al, 2012); or 74% in the Mersey Region (UK, 2011)). Elder smokers recognized this risk less frequently: either they are less willing to accept their behaviour

carries risk, or individuals recognizing the risk of smoking are more likely to stop (West et al, 2006). Our results indicate there is still a long way both in divulging the part of tobacco in oral cancer and in smoking cessation campaigns, particularly when current smokers are significantly more aware of the deleterious effect of tobacco smoking (Rogers et al, 2011b; Humphris et al, 2004; Monteiro et al, 2016).

Alcohol consumption and its synergistic effect with tobacco smoking (Blow, 1992), seems to be less known to the public (Monteiro et al, 2016) as only 12.5% interviewees are aware this risk in contrast to the 19.4% reported for Great Britain (West et al, 2006), 21% for the Mersey region (Rogers et al, 2011b), to the 24.6% registered in Oporto (Monteiro et al, 2016); or the 50% in Schlesweiss-Holstein (Hertrampf et al, 2012). This finding is particularly alarming, provided one quarter of participants reported to consume alcohol on a daily or almost daily basis. Alcohol consumers were more likely to identify alcohol intake as a risk factor than smoking. This may be a matter of concern, as could be the lower probability for regular dental attenders to recognize both risk factors.

Although few participants included diet among oral cancer risk factors, more than two thirds of the sample reported to consume five or more servings (pieces) of fruit per day. The Portuguese sample (11%) doubled our percentage of participants recognising the part of fruit intake in preventing oral cancer, but the number of people reporting to eat 5 pieces of fruit is three-fold larger in our sample. However, both samples are far from the 32% of Germans identifying a part for diet on risk for oral cancer (Hertrampf et al, 2012).

Recognition of oral signs and symptoms is the start point in the pathways to treatment of oral symptomatic cancer. In this vein, the probability for recognizing early signs of oral cancer increases with age, with elder groups more likely to identify them. This apparently positive circumstance -oral cancer is largely a disease of elderly people (Hussein et al, 2017)- does not apply to red patches, where participants over 64 are less likely to recognize this sign of alarm with higher risk for malignant transformation (Villa et al, 2011). The poor active knowledge on potential oral cancer symptoms -particularly white and red patches (West et al, 2006; Monteiro et al, 2016)- increased

significantly when a response was prompted (Rogers et al, 2011b), but the low performance of individuals in the risk group may point at many precancerous lesions failing to be recognized along with opportunities to diagnose invasive carcinomas being missed (West et al, 2006).

The number of years of education completed has an effect on health-related outcomes (Brunello et al, 2016). University graduates scored significantly higher percentages of correct answers (Hertrampf et al, 2012). Although our survey did not analyse the socio-economic status of the participants -which has been linked to risk for oral cancer (Dalton et al, 2008; Conway et al, 2008)- education is usually linked to employment and income (Hertrampf et al, 2012) so our findings for the group with compulsory education as their highest educational achievement are particularly interesting.

Regular use of dental services also seems to have a negative influence on the recognition of the main oral cancer warning signs. Although it was not the aim of this study, and cross-sectional designs do not permit causal inferences, our results may well point at a low performance of dental clinics in educating patients for oral health (McConaughy et al, 1995) which may be worth of further investigation. Reasons for this low performance may include patient resistance, lack of time, lack of reimbursement mechanisms, and absence of readily accessible patient education materials (Allard, 2000).

The proportion of people aware of oral cancer significantly decreased in the elder group of participants (Warnakulasuriya et al, 1999; West et al, 2006; Monteiro et al, 2016). This finding, along with the known effects of age in health literacy, highlights the need for educational interventions specifically addressed to this population subgroup at increased risk. The use of awareness campaigns to promote early diagnosed of oral cancer can increase knowledge and the number of patients presenting at healthcare clinics in the short term (mainly those at lesser risk), but with limited evidence of long-term effectiveness (Macpherson, 2018). This seems to be valid for both individual and community-based interventions (Austoker et al, 2009), with tailored printing information as the most effective medium for the former, and small groups and printed information for the latter. Mass-media campaigns have proved their usefulness in increasing cancer

awareness (Wakefield et al, 2010), as well as the engagement of celebrities in delivering health-related messages (Casey et al, 2010).

In these circumstances, future oral cancer awareness programs should be tailored to the target audience and based on longer-term, multi-faceted approaches (Macpherson, 2018) that consider the social determinants of the disease and include adequate instruments for assessment. Systematised, opportunistic health education in clinical settings may also offer advantages over individual conventional approaches (Randall, 2018).

3.1.4. Ethics

The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600). This investigation complied with the Spanish regulations and the Helsinki Declaration on ethical principles for medical research involving human subjects.

3.2 CHAPTER 2

The research results contained in this chapter have been published in the following paper:

PEOPLE WOULD RATHER SEE A PHYSICIAN THAN A DENTIST WHEN EXPERIENCING A LONG-STANDING ORAL ULCERATION. A POPULATION-BASED STUDY IN SPAIN.

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Author's contributions

All authors contributed equally to this investigation. Ms Ulloa-Morales conceived the study and designed the investigation and coordinated the acquisition of data. Ms Ulloa-Morales also focused on data analysis and interpretation. All authors critically reviewed all drafts of the manuscript and approved its final version.

Oral cancer constitutes a public health problem for most countries with an average 5- survival of 50-60%. A large proportion of patients (about 50%) had been diagnosed at late stages during the last four decades. In addition, mouth cancer incidence is increasing worldwide -particularly for lip and oral cavity- and estimations point at 545,396 new cases in 2040 (IARC, 2019).

It has been suggested that early diagnosis is the most important prognostic factor for overall survival (Ghantous et al, 2015). Thus, long time intervals to oral cancer diagnosis seem to influence both advanced TNM-stage at diagnosis (2-fold risk) and survival to this tumour. Particularly, the patient and the primary care intervals are the longest time-periods in the path to diagnosis and they have proved to be a risk factor for advanced stage at diagnosis (Gómez et al, 2009) and mortality from oral cancer (Seoane et al, 2012). In this vein, detection of bodily changes and perception of reasons to discuss symptoms with a primary healthcare professional are paramount and define the appraisal and help-seeking intervals by the patient (Weller et al, 2012). Therefore, approaches to improve survival rates have to focus on the patient interval and disclosing patients' attitudes when noticing the most frequently reported first oral cancer sign -an unexplained oral ulceration standing longer than three weeks- (Tikka et al, 2016) seems to be a logical basis for any educational intervention on this issue.

Thus, the aim of this study was to investigate the health-seeking behaviour of lay people in Galicia (North-western Spain) if experiencing a long-standing oral ulceration.

3.2.1 Methods and Materials

A cross-sectional, population-based study was designed using a questionnaire applied face-to-face to randomly selected members of the public in Galicia (North-western Spain) from 1 March 2015 to 30 June 2016, by 14 specifically trained interviewers (postgraduate (n=7) and undergraduate dental students (n=2), 1 undergraduate medical student, 2 nurses, and 2 nurse assistants).

The instrument used in the study was a modification of the questionnaire originally developed by Rogers et al (Rogers et al, 2011b) in English language. The original instrument was translated into both Spanish and Galician and then back into English (double translation). Some items in the instrument (employment, academic achievements, and registration with dentist) were also modified to adapt them to the Galician sociocultural environment. The resulting instrument was piloted in a group of clinicians in a first instance and, after reformulations and corrections, was piloted again in a group of undergraduate dental students and senior volunteers at a community centre.

Sample size was determined by quota sampling considering an accessible population of 5% and an expected percentage of response of 28% (Rogers et al, 2011b). The resulting sample size of 10,804 people permitted a power of 0.8% for estimating the proportion of oral cancer aware people, presuming a value of 25%.

Only pedestrians over 18 entered the study. The exclusion criteria were being younger than 18, mentally disabled, or poor command of any of the official languages of the region (Galician or Spanish).

Galicia is an autonomous region with 2,708,339 inhabitants unevenly distributed in 29,574.4 Km², with a yearly gross domestic product per capita of 21,358 € and a life expectancy at birth of 82.78 years (Galician Institute for Statistics, 2018). The region is served by a public, free, universal health service, characterised by a strong and accessible primary care level.

Data were obtained in all four capitals of the Galician provinces at four different commercial and administrative areas in each city on different days and times, in a kind of pathfinder survey method (WHO, 2013).

The interviewers participated in a 1 hour-long workshop which included discussion of the items in the instrument and their related ethical aspects, together with a role-playing session and a series of interviews to volunteer subjects (undergraduate dental students) under the supervision of a psychologist.

Each questionnaire was numbered, which permitted an assessment of the data coding and mechanization process, before transferring them to the R v3.3.2, MASS, and nnet statistical packages (R Core Team, 2014) for analyses.

The results of the descriptive analysis are presented as frequencies and percentages. Bivariate analysis was undertaken using the Chi Square/Fisher's exact test. A logistic regression analysis to disclose the features of those choosing between a primary care physician and a dentist was also performed. The significance level chosen for all test was 5%.

The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600). This investigation complied with the Spanish regulations and the Helsinki Declaration on ethical principles for medical research involving human subjects. The results are presented according to the STROBE guidelines (Strengthening The Reporting of Observational studies in Epidemiology) (Vandenbroucke et al, 2009).

3.2.2 Results

A total of 5,727 pedestrians entered the study (response rate: 53%), mostly in the 45-64 age group (30.2%; n=1,728), 47.7% of them (n=2,729) were males. Most participants (42.1%; n=2,411) reported to visit their dentist once a year and had secondary or compulsory education as their highest educational achievement (28.18%, n=1,614; 28%, n=1,600 respectively).

When questioned what they would do if they had a wound/ulceration lasting longer than 3 weeks, most participants

answered they would go to see their primary care physician (62.8%; n=3,597) and less than one quarter of the sample (23.8%; n=1,371) would seek consultation with their dentist. Self-treatment (1.8%) is the reported behaviour predominant among those circulating an alternative path (11.5%) to diagnosis/treatment (table 4).

Table 4. Attitudes towards a non-healing ulceration after three weeks (n=5727).

Attitude	Responses	
	n (%)	95%CI
See my primary care physician	5754 (65.6)	(64.3 - 66.8)
See my dentist	1386 (24.2)	(23.1 - 25.3)
See my physician or my dentist	90 (1.6)	(1.2 - 1.9)
Self-treatment	104 (1.8)	(1.5 - 2.1)
I would do nothing about it	95 (1.7)	(1.4 - 2.0)
Ask at the chemists'	8 (0.1)	(0.05 - 0.15)
Go to the hospital's emergency room	92 (1.6)	(1.3 - 1.9)
See a specialist	86 (1.5)	(1.2 - 1.8)
See an otorhinolaryngologist	8 (0.1)	(0.05 - 0.15)
Consult with someone	12 (0.2)	(0.1 - 0.3)
I don't know what I would do	9 (0.1)	(0.05 - 0.15)
Ask at the chemist's or other places	78 (1.4)	(1.1 - 1.7)

Values in absolute cases and percentages in brackets

The distribution of these attitudes according to the socio-demographic variables considered in the study is summarised in table 5. This table shows males predominate among those who would ask a physician (67.2%), whereas females preponderate in the group choosing to visit a dentist (26.8%). The same phenomenon occurs for the elder and younger groups of participants and for the lowest and highest educated volunteers in the sample: elder (73.5%) and less educated (70.9%) interviewees would rather see a physician in case of a long-standing oral ulceration.

Table 5. Distribution of attitudes towards a long-standing oral ulceration.

	N	Ask primary care physician ^a	Ask dentist	Ask physician / dentist ^a	Ask other physicians	Self-treatment	Ask at chemist's or other ^a	Do nothing / I don't know	p-value
GENDER									p<0.001
Male	2726	1832 (67.2)	582 (21.3)	46 (1.7)	91 (3.3)	62 (2.2)	49 (1.7)	64 (2.3)	
Female	2994	1920 (64.1)	804 (26.8)	56 (1.9)	95 (3.1)	42 (1.4)	37 (1.2)	40 (1.3)	
AGE									p<0.001
18-34	1650	1060 (64.2)	421 (25.5)	38 (2.3)	48 (2.9)	33 (2.0)	20 (1.2)	30 (1.8)	
35-44	1208	734 (60.8)	336 (27.8)	20 (1.6)	38 (3.1)	23 (1.9)	37 (3.0)	20 (1.6)	
45-64	1725	1122 (65.0)	429 (24.9)	31 (1.8)	64 (3.7)	35 (2.0)	21 (1.2)	23 (1.3)	
64+	1137	836 (73.5)	200 (17.6)	13 (1.1)	36 (3.1)	13 (1.1)	8 (0.7)	31 (2.7)	
TOBACCO									p<0.001
Former smoker	852	543 (63.1)	201 (24.4)	22 (2.5)	40 (4.6)	12 (1.4)	16 (1.8)	18 (2.1)	
No	3054	2027 (66.3)	769 (25.2)	50 (1.6)	84 (2.7)	54 (1.7)	31 (1.0)	39 (1.3)	
Yes	1700	1091 (64.1)	403 (23.7)	29 (1.7)	60 (3.5)	38 (2.2)	39 (2.3)	40 (2.3)	
ALCOHOL									p<0.001
Daily	485	355 (73.2)	76 (15.7)	6 (1.2)	9 (1.8)	14 (2.9)	1 (0.2)	24 (4.9)	
Almost daily	875	586 (66.9)	173 (19.8)	16 (1.8)	35 (4.0)	26 (2.9)	18 (2.0)	21 (2.4)	
Never	1509	999 (66.2)	357 (23.6)	43 (2.8)	54 (3.5)	20 (1.3)	12 (0.8)	24 (1.6)	
Once month	a 1029	663 (64.4)	269 (26.1)	11 (1.0)	31 (3.0)	21 (2.0)	20 (1.9)	14 (1.3)	
Once week	a 1716	1057 (61.6)	507 (29.5)	25 (1.4)	55 (3.2)	23 (1.3)	35 (2.0)	14 (0.8)	
EDUCATION									p<0.001
Compulsory	1599	1134 (70.9)	271 (16.9)	17 (1.0)	64 (4.0)	49 (3.0)	17 (1.0)	47 (2.9)	
Vocational training	981	658 (67.0)	234 (23.8)	15 (1.5)	26 (2.6)	18 (1.8)	26 (2.6)	4 (0.4)	
High School	1614	1027 (63.6)	429 (26.6)	33 (2.0)	56 (3.4)	21 (1.3)	27 (1.6)	21 (1.3)	
University	1417	838 (59.1)	448 (31.6)	36 (2.5)	38 (2.7)	16 (1.1)	16 (1.1)	25 (1.7)	
AWARE OF ORAL CANCER									p<0.001
No	1537	1056 (68.7)	291 (18.9)	25 (1.6)	58 (3.7)	39 (2.5)	23 (1.5)	45 (2.9)	
Yes	4189	2698 (64.4)	1095 (26.1)	77 (1.8)	128 (3.0)	65 (1.5)	63 (1.5)	59 (1.4)	

Values in absolute cases and percentages in brackets.

Females have more chances to go to a dentist when experiencing a long-lasting oral ulceration (OR= 1.23; 95% CI: 1.08 – 1.40), as occurs with participants regularly using dental services (OR= 1.24; 95% CI: 1.08 – 1.42). Chances to go to a dentist also increase with the participants’ educational level (Fig 3).

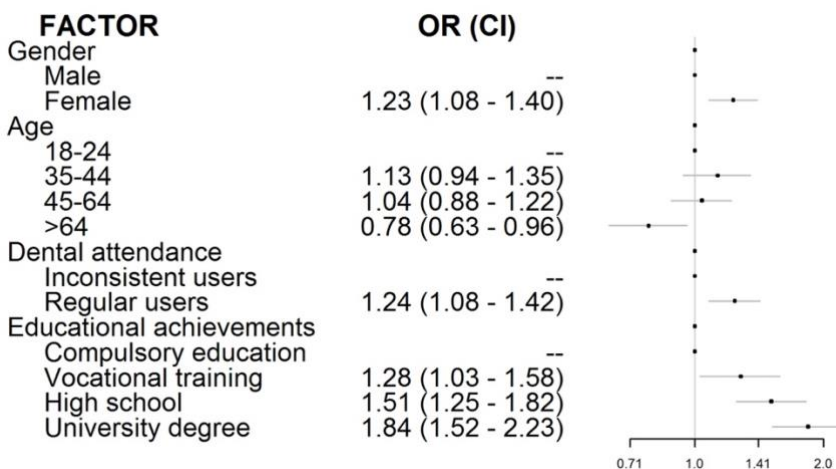


Fig 3. Logistic regression analysis of help-seeking attitudes (primary care physician vs. dentist).

Knowledge about the existence of oral cancer also seems to influence the reported behaviour towards a long-standing mouth ulceration: people reporting no knowledge on oral cancer would choose to visit a physician (68.7% vs. 31.3%) and seem to be more prone to stoic or risky behaviours (table 5).

3.2.3 Discussion

3.2.3.1 Strengths and weaknesses of the study

Our quota-sampling approach resulted in an equitable balance of age and gender in the sample, and face-to-face interviews permitted a better feeling for people’s responses than would be possible through mail (Rogers et al, 2011b) or by telephone interview, this latter also

limited by the growing number of homes using only mobile phones (Hertrampf et al, 2012). To the best of our knowledge, this is the largest population-based study on this topic with a high participation rate. In addition, the method for volunteer recruitment (at the busiest commercial and administrative areas in the region during several months at different times), combined with knowledgeable, specifically trained interviewers, may have well contributed to increase the external validity of the study. However, this kind of studies always depend on self-reported data and some variations have to be expected regarding actual attitudes. In this particular situation -where there is no “right” answer- and the reported responses are consistent with data from actual cancer patients (Santos et al, 2010), this limitation is highly unlikely to have conditioned our results.

Our research might have been affected by a hypothetical selection bias, where pedestrians with lower health literacy may have refused to participate in the survey more frequently than other people. As health literacy is somehow related to educational achievements (Protheroe et al, 2017) and most participants in the sample were in the compulsory education group in a proportion similar to their weight in the general population of the region (Scott et al, 2009). This hypothetical bias, if existed, may have had a minor influence on our results.

Considering the issues discussed above and the large size of the sample in a region where their capital cities are well communicated with their metropolitan areas, we understand our results offer reliable data on this topic, which may well be extrapolated to elsewhere in Spain.

3.2.3.2 Justification for the research model

Recognition of a symptom as a potential danger is a challenge for patients, and the absence of pathognomonic oral cancer signs and symptoms could explain long diagnostic delays attributed to the patient. Symptom’s persistence seems to be paramount in the patient’s decision-making processes of seeking help (Scott et al, 2009). In this sense, an unexplained ulceration in the oral cavity >3 weeks is red-flag symptom in the new NICE head and neck cancer guidelines, with a

higher positive predictive value than the red or red and white patches for oral cancer diagnosis (Tikka et al, 2012).

Besides, oral ulcerations represent the most frequent clinical sign of oral cancer, and this subtype is usually (up to 60%) diagnosed at later stages with implications in poor survival, although available evidence remains equivocal (Seoane-Romero et al, 2012).

3.2.3.3 Reported attitudes towards a non-healing ulceration

Reports on the prevalence of oral ulcerations in the general adult population in Southern Europe have described frequencies somewhere between 2.5%-10% (García-Pola et al, 2002; Pentenero et al, 2008), mostly due to local trauma, iatrogenia, aphthae, infections, haematological disorders, malabsorption states, cutaneous diseases, or connective diseases (Scully & Shotts, 2000). This relatively high prevalence of oral ulcerations, and the large proportion of people who had ever experienced one (Gill & Scully, 2007) may anticipate knowledge of the natural history of a typical oral ulcer and could explicate the high proportion (> 88%) of participants who would consult with a primary care professional about a long-standing one.

On the other hand, stoicism, self-medication or erratic navigation through the healthcare system, are attitudes some participants (11.5%) would take probably due to a reinterpretation of symptoms (signs) as minor conditions, which could cause a delay in the diagnosis of a potential neoplasm (Scott et al, 2009; Weller et al, 2012).

Primary care physicians consistently are the first choice for patients with oral ulcerations both in our study and in the literature (Rogers et al, 2011b), only behind traditional remedies in certain countries, which have been proved to increase the risk for presenting with advanced disease stage at diagnosis (Kerdpon & Sriplung, 2001). Studies on cancer patients confirm the preference for physicians (Grafton-Clarke et al, 2019), with the only exception of Japan, where dentists are reported to be the clinician of choice (Onizawa et al, 2003).

This physician preference is particularly marked in our study for those males, < 64, unaware of oral cancer, and with compulsory education as their highest educational achievement. Almost a third of university graduates would choose a dentist in a first instance. This may

well represent a spurious relationship linked to an association of the variables education and income and to the very little oral healthcare for adults provided by the Spanish National Health System: the subgroup of younger, highly educated people would visit a dentist more frequently than their fellow participants as most dental treatments are provided on a private basis (Bravo et al, 2015).

The preference for physicians over dentists when experiencing an oral mucosal problem raises concern on aspects such as the concept population has about dentists' competence on issues "beyond the tooth territory".

3.2.3.4 Physician vs. dentist

Professional (primary care) diagnostic delay is strongly related to tumour stage at the time of diagnosis (Gómez et al, 2009). Despite the aforementioned patient preference for physicians, information on their competence for early oral cancer diagnosis is scarce (Gómez et al, 2010). Some reports have hypothesized about a relationship between diagnostic delay and the qualifications of the clinicians particularly among dentists and physicians with equivocal results (Gómez et al, 2010). However, some studies reporting on general medical practitioners' awareness of risk factors and clinical appearance of oral cancer state their performance is poorer than that of dentists (Carter & Ogden, 2007).

3.2.3.5 Clinical implications and recommendations

Self-medication, either by over-the-counter formulations or traditional remedies, have been reported to increase diagnostic delay, as well as the participation of off-clinical counsellors (Varela-Centelles et al, 2012), who should also be considered in any oral cancer-related educational intervention. In this vein, oral cancer patients have indicated the potential usefulness of drastic visual aids on posters and leaflets in dental and general medical practitioners' offices and pharmacies (Rogers et al, 2011). Previous reports have described a high oral cancer diagnostic ability for Spanish dentists (Seoane et al, 2010) but no information is available for physicians on this topic. In this sense, studies on the competence of Spanish general medical

practitioners in diagnosing oral cancer are needed in view of our results, as well as potential educational interventions targeted to these professionals. Besides, barriers to dental care for patients experiencing red-flag symptoms and signs should be identified and removed.

Oral cancer does not seem a frequent topic on health promotion activities (Shimpi et al, 2018) and oral cancer survivors find that lay public should be encouraged to undertake regular medical and dental check-ups and to seek advice on oral symptoms as soon they have even the slightest concern.

3.3 CHAPTER 3

The research results contained in this chapter have been published in the following paper:

ONLINE AUDIO-VISUAL INFORMATION ON ORAL CANCER FOR SPANISH-SPEAKING LAYPERSONS. A CROSS-SECTIONAL STUDY.

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Author's contributions

All authors contributed equally to this investigation. Ms Ulloa-Morales conceived the study and designed the investigation. She also

coordinated the acquisition of data and focused on data analysis and interpretation. The manuscript was drafted by Ms Ulloa-Morales. All authors critically reviewed all drafts of the manuscript and approved its final version.

3.3.1 Introduction

Oral cancer (OC) is estimated to account for 2% of all new cancer cases worldwide and for about the same proportion of neoplasms-related deaths. It is the most frequent cancer by incidence in Afghanistan, Papua-New Guinea, India, Pakistan, and Sri Lanka, and the most common type of cancer mortality for males in the latter three countries (Bray et al, 2018).

While the worldwide projected age-standardised rate for this neoplasm is 4.0 cases per 100.000 inhabitants, in the geographical realm of Spanish language, oral cavity (and lip) cancer exhibits wide variations in incidence, ranging from 6.2 cases in the Caribbean region in 2018 to 1.4 in Central America (International Agency for Research on Cancer, 2021). Female population experience a considerably lower incidence with the exception of Central America, where incidences are similar for both genders (Bray et al, 2018). Projections indicate important increments in incidence and mortality in the period 2020-2040, ranging from 32.1% and 36.6% for Spain to 118.5% and 122.2% for Equatorial Guinea (International Agency for Research on Cancer, 2021).

Most OC cases are diagnosed at advanced stages (Scully & Kirby, 2014), which is reported to have an impact on survival. In fact, survival to this neoplasm has not greatly improved for decades (Scully, 2011) despite the undeniable efforts of the scientific community. However, significant ameliorations may come from the side of early diagnosis, as survival rates may increase by about 30% if advanced OCs had been diagnosed at earlier stages (Silverman, 2010), and diagnostic delay has proved to be a risk factor for advanced stage and mortality (Seoane et al, 2016).

Among the many actors and processes influencing diagnostic delay, the patients' appraisal time interval represents the major component of waiting times since the detection of a bodily change to

the definitive diagnosis of OC (Varela-Centelles et al, 2018). This phenomenon has been attributed to a general lack of knowledge and awareness of this disorder among the general public (Petti & Scully, 2007). This statement is particularly true for Spain, where 28% of the population had not even heard of OC (Varela-Centelles et al, 2018b) and 47% could not mention an OC-related sign or symptom, but also for many other Spanish-speaking populations (Morelato et al, 2007; Cruz-Moreira et al, 2017; Patino et al, 2018).

This century has witnessed an enormous surge of the Internet, with a large proportion of the Spanish-speaking population accessing this network despite wide regional differences ranging from 26% in Equatorial Guinea to 91% in Spain (The World Bank, 2021). The ubiquitous presence of smartphones and similar mobile devices has made information readily available in a cost-free manner, and health-related information is not an exception. In fact, 75% of Internet users are reported to look for health/medical information and 58% report to have visited a website which provides information or support for a specific medical condition (Infoplease, 2017). Besides, about 54% of patients with head and neck cancer rely on the Internet to find information about their treatment and collateral effects (Rogers et al, 2012). The importance gained by online resources as suppliers of health-related information has raised concerns about the so-called “*Dr Google*” phenomenon and the quality of the information patients can obtain (Burke et al, 2020). In addition to quality, another worry about the use of online resources to disseminate health information is whether laypersons are able to understand it, as a certain level of literacy and reading comprehension is required. This proved to be a real barrier in the particular case of oral cancer-related websites (Irwin et al, 2011; Varela-Centelles et al, 2015). However, these difficulties disappear when the information is presented in an audio-visual format. This effortless access to information and the attraction of video clips, have put these resources 16th among all Internet activities, with 56% of users accessing the Internet with this purpose and 52% reaching these resources through public video repositories (Infoplease, 2017). Among Spanish-speaking countries, Mexicans ranked first (88%) watching online video content in 2018 (Statista, 2018).

Unfortunately, most health-related videos lack validity for supporting the public in making health decisions (Haslam et al, 2019). A recent study on the information about oral cancer available from YouTube® in English language unveiled a wide range of authors and contents with the most useful videos ranking late on the viewing list (Hassona et al, 2016b) and, therefore, with less chances to be viewed by the public. However, and despite Spanish is the second most spoken language in the world by native users and the third most used on the Internet (Instituto Cervantes, 2017), no reports on the quality and usefulness of Spanish-language audio-visual resources about oral cancer available through online public video repositories could be retrieved. Therefore, the aims of this investigation were to disclose the type of information about oral cancer are available through the main video-sharing online platforms, and whether the information they provide may be a useful contribution to shorten the patients' appraisal time-interval in their path to a diagnosis of symptomatic oral cancer.

3.3.2 Methods and materials

To achieve the aforementioned objectives, a cross-sectional study was designed, whose results are reported following the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) guidelines (von Elm et al, 2007).

Audio-visual online information about oral cancer in Spanish was retrieved from the arguably three most popular video-sharing sites: YouTube® (www.youtube.com), Dailymotion® (www.daylimotion.com), and Vimeo® (www.vimeo.com) using the following key words: “*cáncer de boca*” and “*cáncer oral*”. The search was undertaken on October, 13th 2019 and the first 100 results in each viewing list (one search per key word per platform) were retrieved and their links copied into a spreadsheet.

Exclusion criteria included videos on oral cancer in animals, videos in languages other than Spanish, videos with no sound or headings, irrelevant videos (other topics or different types of cancer), advertisements, videos addressed to a specialized audience or presenting the findings of a research project.

Three researchers with different backgrounds analysed each clip of video: a final-year dental student (FN-M), a PhD student (YU-M), and a lecturer expert on oral cancer (JS-R). Demographical data (platform, title, publication date, length, number of views, and author) for each video were recorded as well as the interaction index suggested by Hassona et al (2016b) (number of likes – number of don't likes, divided by the number of views and multiplied by 100) and the viewing rate (number of views, divided by the number of days since upload, and multiplied by 100). For the analysis of the contents of the films, six dimensions were considered (aetiology, risk factors, prevention, early detection, treatment, and prognosis). For a video to include a dimension, it should be expounded or, at least, mentioned. The usefulness of the contents of each video was assessed using a score system (Hassona et al, 2016b) that considers whether the video mentions the main risk factors for oral cancer (smoking, alcohol consumption, tobacco chewing, and HPV) allocating 1 point for each item. If the clip includes the main signs/symptoms of oral cancer (oral ulceration, colour change -white/red-, lump) receives another point per item mentioned. Additional points are allocated if representative images of oral cancer and/or potentially malignant disorders are included, and also when the video promotes prevention through early detection/avoidance of risk factors (Hassona et al, 2016b).

The presence of non-scientifically supported information was also assessed. Disagreements between reviewers were solved by consensus.

A descriptive analysis was undertaken, and results are presented as absolute and relative frequencies. The median was chosen as a central trend measure and the interquartile range as a spread indicator. Comparison between groups were undertaken using the Kruskal-Wallis test. The significance level chosen for the study was 5%. Relationships between variables were explored using the Spearman correlation test.

3.3.3 Results

The YouTube® search permitted the retrieval of the intended 100 records per keyword, as occurred for Dailymotion® and Vimeo® for “*cáncer oral*”. Searches for “*cáncer de boca*” resulted in 74 hits in

Vimeo® and 36 in Dailymotion.® The process of the selection of videos for the study is synthesized in figure 4.

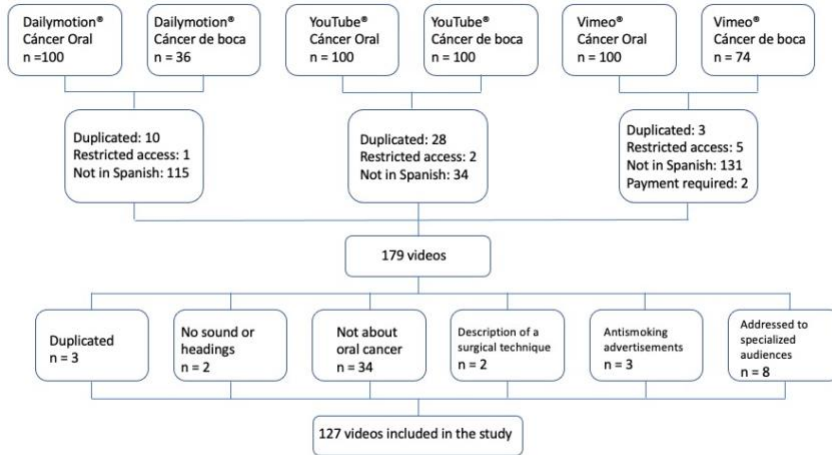


Fig 4. Flow chart of the study.

Most of the 127 finally selected clips were retrieved from YouTube® (92.2%; n=117), with minor contributions from other repositories (DailyMotion®: 4.7% (n=6); Vimeo® 3.1% (n=4)). These videos were produced mainly by mass-media (46.5%; n=59), followed by individuals who identified themselves as healthcare professionals (21.2%; n=27), and laypersons (15.7%; n=20). Educational (7.9%; n=10) and healthcare (6.3%; n=8) institutions completed the sample, together with associations, enterprises, and other public institutions, each of them contributing with a single video.

Regarding their origin, most of them were published from Spain (29.92%; n=38), followed by Mexico (18.11%; n=23) and Chile (7.87%; n=10). Argentina and Colombia contributed with 9 videos each (7.09%), and Peru and the USA with 8. Creators from Ecuador and Paraguay uploaded another 5 and 3 videos respectively. Costa Rica and Panama contributed with 2 videos each, and El Salvador, Guatemala,

Dominican Republic, Venezuela and the UK completed the list with one video each. The length of the clips included in the study ranged from 0.28 to 105.38 minutes (median 4.15 minutes; IQR: 2.34-9.67) and achieved a median visualization rate of 165.57 (IQR: 22.76-891.87).

The most viewed video (10,599,765 views; visualization rate 726,508.9) was 27.9 minutes long and it was uploaded to YouTube® by a US television channel, scoring 0 both in usefulness and comprehensiveness. The most useful video (10 points in usefulness) was uploaded by a Mexican healthcare professional and scored 5 in the 0-6 comprehensiveness scale and gathered 44,119 views (visualization rate 2,033.13).

Generally speaking, online OC videos in Spanish did not provide comprehensive information on oral cancer, with a median of two OC dimensions considered (IQR: 1.00-4.00) and a median usefulness score of 5.00 (IQR: 3.00-7.00). The interaction index (median 0.36; IQR: 0.19-0.74) was analysed only for those clips published in YouTube® because the other two repositories do not provide the information required for its calculation.

Table 6. Scores by video origin.

Origin	Visualization rate	p-value	Comprehensiveness	p-value	Usefulness	p-value	Interaction index*	p-value
Laypersons	2015.0 (56.6 - 11412.8)	0.057 -	1.0 (0.0 - 2.2)	0.002	2.5 (0.0 - 6.0)	0.150	0.37 (0.21 - 0.79)	0.049
Educational institutions	160.7 (54.4 - 755.6)		3.0 (3.0 - 4.0)		6.5 (5.0 - 7.7)		0.43 (0.29 - 0.95)	
Mass media	99.6 (14.1 - 573.9)		3.0 (1.0 - 4.0)		5.0 (3.0 - 7.0)		0.31 (0.04 - 0.45)	
Healthcare professionals	188.4 (76.6 - 1166.8)	-	2.0 (1.5 - 4.0)		5.0 (3.0 - 7.5)		0.56 (0.28 - 0.93)	

Values represent medians and interquartile ranges. p-value calculated using the Kruskal-Wallis test.

*Only for YouTube® videos

Despite being the most viewed group, those videos uploaded by laypersons resulted to be the less useful ones and the least comprehensive (table 6) of all clips studied. The most useful videos resulted to be those authored by educational institutions, which also offered the widest perspective of the issue and a higher interaction index, despite being the less viewed only after those authored by mass media.

Mass media videos were focused mainly on risk factors, particularly on tobacco smoking and alcohol consumption but included non-scientific information more frequently than other producers ($p < 0.001$) (table 7). Interestingly, laypersons-produced clips mention non-scientifically supported information less frequently than any other group and include more representative images than the largest uploader (mass media). The main strengths of the videos produced by educational institutions (the most useful in the study) were the inclusion of representative images ($p = 0.005$), the mention of tobacco chewing ($p = 0.257$), the inclusion of ulceration as a suspicious symptom ($p = 0.271$), and the explicit recommendation for check-ups ($p = 0.263$) and avoiding risk factors ($p = 0.160$) (table 7).

Table 7. Items considered by video origin.

Items n (%)	Layperson (n=20)	Educational institution (n=10)	Mass media (n=59)	Healthcare professional (n=27)	p- value
Dimensions					
Aetiology	8 (40.0)	8 (80.0)	41 (69.4)	18 (66.6)	0.071
Risk factors	10 (50.0)	8 (80.0)	48 (81.3)	19 (70.3)	0.049
Prevention	4 (20.0)	9 (90.0)	35 (59.3)	12 (44.4)	0.001
Early detection	3 (15.0)	8 (80.0)	27 (45.7)	14 (51.8)	0.005
Treatment	4 (20.0)	4 (40.0)	23 (38.9)	14 (51.8)	0.177
Prognosis	3 (15.0)	2 (20.0)	23 (38.9)	8 (29.6)	0.192
Items in usefulness score					
Tobacco smoking	11 (55.0)	7 (70.0)	48 (81.3)	17 (62.9)	0.090
Alcohol consumption	10 (50.0)	7 (70.0)	45 (76.2)	17 (62.9)	0.159
Tobacco chewing	0 (0.0)	2 (20.0)	10 (16.9)	4 (14.8)	0.257
Mentions HPV	7 (35.0)	4 (40.0)	26 (44.0)	15 (55.5)	0.542
Ulceration as suspicious symptom	9 (45.0)	8 (80.0)	32 (54.2)	17 (62.9)	0.271
White patch as suspicious sign	5 (25.0)	3 (30.0)	23 (39.0)	11 (40.7)	0.638
Lump as suspicious sign	3 (15.0)	4 (40.0)	23 (39.0)	13 (48.1)	0.125
Include representative images	8 (40.0)	8 (80.0)	14 (23.7)	11 (40.7)	0.005
Clearly mention avoiding risk factors	3 (15.0)	5 (50.0)	23 (39.0)	11 (40.7)	0.160
Explicitly recommend check-ups	7 (35.0)	6 (60.0)	35 (59.1)	16 (59.2)	0.263
Include non-scientific information	3 (15.0)	7 (70.0)	47 (79.6)	19 (70.3)	<0.001
Absolute frequencies (relative frequencies) p-value calculated using the Kruskal-Wallis test					

A highly significant positive correlation (0.643; $p < 0.001$) could be observed between usefulness and comprehensiveness of the videos,

together with negative correlations between the visualization rate and usefulness (-0.186; $p < 0.05$), and visualization rate and comprehensiveness (-0.183; $p < 0.05$).

3.3.4 Discussion

Public video repositories behave as social networks by sharing audio-visual contents, and the importance of these platforms becomes evident when considering that the most popular among them (YouTube®, San Bruno, CA, USA) has more than two billion registered users (YouTube, 2021). This privileged situation offers such a tremendous potential for health promotion and education and training that some scientific journals already run their own channels in these platforms (Vance et al, 2009). Conversely to what occurs with online written information (Health on the Net Foundation, 2021), and to the best of our knowledge, there are no certifications or seals to endorse the quality of health-related audio-visual resources available on the Internet, with the subsequent risk for dissemination of misleading and unreliable information. In order to quantify this problem, the current study has focused on identifying the contents and categorise the usefulness of OC videos in Spanish language.

Our study has some limitations inherent to its cross-sectional design and the “snapshot” approach to data collection (Hassona et al, 2016b), which does not permit obtaining a stable picture of the situation. In addition, the selected keywords -despite being among the most popular terms to describe this neoplasm- may also have conditioned the search results. On the other hand, this is the first investigation of OC videos in Spanish and its main strengths include the breadth of the search undertaken at three repositories and the participation of three reviewers with different backgrounds to ensure an adequate assessment of the variables studied.

Audio-visual information about OC available through the Internet in Spanish is usually incomplete: only a handful of videos managed to upload a comprehensive video about oral cancer, reaching the best performers median comprehensiveness scores of 3 (in a range 0-6). This information is of limited usefulness, and it can even be misleading in certain cases (table 7). Besides, as most resources were produced by

mass media (many are actually part of television programmes), it can be presumed that their main aim was other than to increase public's knowledge of this neoplasm, which may explain their scores in the different items assessed in the current study. In addition, the source of videos that gathered most views (uploaded by laypersons) ranked the lowest in comprehensiveness and usefulness (tables 6 & 7) despite including non-scientifically supported less frequently than their counterparts.

It is somehow surprising the relatively low scores attained by the group of clips produced by healthcare professionals, particularly in terms of usefulness (matching media produced clips) and comprehensiveness (lower than mass media's), as they seem to be more focused than other creators on OC treatment, HPV, and OC warning signs (table 7) while paying less attention to OC prevention and to less-known risk factors, such as smokeless tobacco. Furthermore, and according to our results, up to 70.3% of these videos include information not supported by scientific evidence. In these circumstances, it is worth questioning whether these authors are really healthcare professionals. It is in the nature of public video repositories on the Internet to allow free uploading of materials without checking the accuracy of their contents and the qualifications of their producers. In fact, this seems to be one of the reasons for their somehow astonishing success, but this strength easily turns into weakness when it comes to health-related information. This issue is even more relevant because this group of videos obtained the highest score in the interaction index, which may well have translated into individual exchange of inaccurate information with the audience that could well do more harm than good in some cases.

A similar study undertaken five years ago for English language resources about OC in the most popular repository (Hassona et al, 2016b) found that the most useful videos ranked late on the viewing list but failed to find a significant correlation between usefulness and viewing rate, which we could identify in the case of Spanish-language resources. Both studies agree on that clips produced by individual users were less useful than those produced by educational institutions and healthcare professionals.

The problem of the validity of health-related videos created for the public was addressed by Haslam et al (2019) through an integrative review of papers reporting on studies about YouTube® videos on different health topics. They found that about one third of these papers allocated a good validity to this source of information for patients, while half of the studies recognised a poor validity of the clips studied. However, and considering that about 30 million of health-related videos are watched each day (Zhou et al, 2016) just in the most popular repository, these platforms seem to be powerful instruments for patient education and action is needed from the Spanish-speaking oral health community to seize this means to deliver adequate and accurate messages to promote early diagnosis of oral cancer.

Since the implementation of quality seals (Boyer et al, 1998) for health-related information in public video repositories seems highly unlikely, it appears mandatory to guide prospective viewers to sound information by other means. Unfortunately, and according to our results, the self-identification as healthcare professionals is not sufficient and perhaps a better outcome may come from the creation of videos endorsed by professional boards, universities, and national health services. In addition, and considering both that relevant clips are consistently ranked late in visualization lists (Hassona et al, 2016b) and that the position of a given video in a visualization list is influenced by the number of views (which negatively correlates with its usefulness and comprehensiveness), efforts should be made to take advantage of current knowledge about the attributes that make videos highly accessible in public repositories namely (Haslam et al, 2019) *selecting adequate keywords*, which may be obtained from reviewing existing popular videos; *choosing short, attractive titles and using end cards*; as well as *exploiting creator's networks* for broad social sharing to gain “first-discovery advantage” to increase the likelihood of the video moving to a prominent place in the visualization lists. Also, *promoting interaction with the audience*, by opening the comments section and responding to viewers' comments; and *producing fast-paced videos* or short videos, to keep viewers watching to the end are important issues. Additional points suggested by Haslam et al (2019) include *evoking emotions*, as these videos are more frequently shared, as well as

including storytelling, which makes videos more relatable, sustains viewers' interest and increases popularity. *Re-uploading the video* after certain time maintains the perception of relevance which, in combination with the *supporting information for creators* available from relevant Internet companies (Haslam et al, 2019), would contribute to increase the impact of these contributions.

3.3.5 Ethics

No approval from the ethics committee is required for this investigation.

4 DISCUSSION

There is a widespread consensus on the importance of oral cancer awareness for prevention and control of oral cancer as well as on the paramount role of awareness in early diagnosis. Nevertheless, the questions about how it should be measured how these results should be interpreted seem to remain open for discussion: Are open questions asking whether the interviewee is familiar with oral cancer without prompting possible answers more useful than close ones where the participant is offered a range of options to choose from? Are the responses to any of those types of questions meaningful without an associated assessment of knowledge about different aspects of this neoplasm? Whatever the approach considered the most appropriate, our results show a poor awareness among the Galician population with one fifth of the volunteers mentioning oral cancer when presented with an open question without prompting responses, while one third of them acknowledged having a relative or an acquaintance with oral cancer. This percentage rises to almost three quarters when the term “oral cancer” was included in the question. Regarding knowledge, less than three fifths reported positive attitudes towards prevention and about half of the participants did not recognize the main risk factors. The most frequent presentation of oral cancer (non-healing ulceration) was identified by less than one quarter when presented with an open question; this proportion reached 85% when offered several options to choose from.

Recognition of a symptom as a potential danger is a challenge for patients, and the absence of pathognomic oral cancer signs and symptoms could explain long diagnostic delays attributed to the patient. Symptom’s persistence seems to be paramount in the patient’s decision-making processes of seeking help (Santos et al, 2010). In this sense, an unexplained ulceration in the oral cavity >3 weeks is red-flag symptom in the new NICE head and neck cancer guidelines, with a higher positive predictive value than the red or red and white patches

for oral cancer diagnosis (Tikka et al, 2016). Besides, oral ulcerations represent the most frequent clinical sign of oral cancer, and this subtype is usually (up to 60%) diagnosed at later stages with implications in poor survival, although available evidence remains equivocal (Protheroe et al, 2017). Our results show that more than 90% interviewees would seek consultation with a healthcare professional if experiencing a long-lasting oral ulceration, and about 4% described attitudes potentially resulting in a delay of diagnosis. These in the latter group are mostly less-schooled, elder people unaware of oral cancer. Our attempt to analyse oral cancer information easily and effortlessly accessible to these people focused on online, public video repositories which behave as social networks by sharing audio-visual contents. Audio-visual information about OC available through the Internet in Spanish is usually incomplete: only a handful of videos managed to upload a comprehensive video about oral cancer, reaching the best performers median comprehensiveness scores of 3 (in a range 0-6). This information is of limited usefulness, and it can even be misleading in certain cases (Table 2).

The importance of these platforms becomes evident when considering that the most popular among them (YouTube®, San Bruno, CA, USA) has more than two billion registered users (YouTube, 2021). This privileged situation offers such a tremendous potential for health promotion and education and training that some scientific journals already run their own channels in these platforms (Vance et al, 2009). Conversely to what occurs with online written information (Health on the Net Foundation, 2021), and to the best of our knowledge, there are no certifications or seals to endorse the quality of health-related audio-visual resources available on the Internet, with the subsequent risk for dissemination of misleading and unreliable information. In order to quantify this problem, the current study has focused on identifying the contents and categorise the usefulness of OC videos in Spanish language.

4.1 STRENGTHS AND WEAKNESSES OF THE CURRENT INVESTIGATION

Our research approach permitted a reasonable balance of age and gender in the sample and a better feeling for people's responses than is

possible with a postal survey (Rogers et al, 2011b) or by telephone interview, with a clear advantage over this latter method given the growing number of homes using only mobile phones (Hertrampf et al, 2012). Conversely, our study is limited by the fact of not having reached the intended sample size. In this circumstance, the precision of the study was recalculated for the sample size finally achieved (5,727) considering it an infinite population. It resulted a probability for a precision error of 1.16 in the estimation of a proportion by asymptotic 95% bilateral confidence interval, assuming an expected proportion of 28%. In addition, the recruitment method (at the busiest commercial and administrative areas in the four provinces of the region during several months at different times) and the participation of knowledgeable, specifically trained interviewers, may have contributed to counterweigh this drawback. However, the limitation of relying on self-reported data is inherent to this kind of studies (West et al, 2006) and may have influenced responses on habits and attitudes, as with knowledge items there is no objective criteria against which responses could be validated.

Our research might have been affected by a hypothetical selection bias, where pedestrians with lower health literacy may have refused to participate in the survey more frequently than other people. As health literacy is somehow related to educational achievements (Protheroe et al, 2017) and most participants in the sample were in the compulsory education group in a proportion similar to their weight in the general population of the region. This hypothetical bias, if existed, may have had a minor influence on our results and would only highlight the importance of our findings.

However, this kind of studies always depend on self-reported data and some variations have to be expected regarding actual attitudes. In this particular situation -where there is no “right” answer- and the reported responses are consistent with data from actual cancer patients (Santos et al, 2010), this limitation is highly unlikely to have conditioned our results.

Considering the issues discussed above and the large size of the sample in a region where their capital cities are well communicated with their

metropolitan areas, we understand our results offer reliable data on this topic, which may well be extrapolated to elsewhere in Spain.

Our study on online audio-visual contents has some obvious limitations inherent to its cross-sectional design and the “snapshot” approach to data collection (Hassona et al, 2016), which does not permit obtaining a stable picture of the situation. In addition, the selected keywords - despite being among the most popular terms to describe this neoplasm - may have also conditioned the search results. On the other hand, this is the first investigation of OC videos in Spanish and its main strengths include the breadth of the search undertaken at three repositories and the participation of three reviewers with different backgrounds to ensure an adequate assessment of the variables studied.

4.2 INTERPRETATION OF THE RESULTS OBTAINED

The fact of having used the methodology suggested by Rogers et al (2011b) permitted interesting comparisons: 3% of our sample mentioned oral cancer in their first unprompted answer vs 1% in the Rogers’ group paper. The participants mentioning oral cancer in their first three or first ten responses (table 1) double the percentages described in 2011 for the Mersey region (4% and 11% respectively) in England (Rogers et al, 2011b) but are far from the 56% reported for the whole Great Britain in 1999 through face-to-face interviews (Warnakulasuriya et al, 2011b) or from the 95.6% identified by a postal survey undertaken all over Britain later in 2006 (West et al, 2006).

A similar study in the Portuguese city of Oporto in 2016 found that only 23.7% of the participants had heard of oral cancer (Monteiro et al, 2016), a finding that almost mimics our results (20.3%). Awareness can be related to prevalence, as persons should be more aware of the disorders more frequently found in their communities: oral cancer was ranked in 11th position by awareness by our sample while it is the 13th most incident cancer (including lip) in the region.

The proportion of people aware of oral cancer significantly decreased in the elder group of participants (Warnakulasuriya et al, 1999; West et al, 2006; Monteiro et al, 2016).

As occurred in previous studies (Warnakulasuriya et al, 1999; West et al, 2006; Rogers et al, 2011b; Hertrampf et al, 2012; Monteiro et al,

2016), tobacco was the most frequently acknowledged risk factor (55.5%); the same as reported from Oporto (Portugal, 2015) (Monteiro et al, 2016), but far from the percentages reported from Northern Europe (84.7% in Great Britain (2006) (West et al, 2006); 76% in Schlesweiss-Holstein (Germany, 2012) (Hertrampf et al, 2012); or 74% in the Mersey Region (UK, 2011)). Elder smokers recognized this risk less frequently: either they are less willing to accept their behaviour carries risk, or individuals recognizing the risk of smoking are more likely to stop (West et al, 2006). Our results indicate there is still a long way both in divulging the part of tobacco in oral cancer and in smoking cessation campaigns, particularly when current smokers are significantly more aware of the deleterious effect of tobacco smoking (Humphries et al, 2004; Rogers et al, 2011b; Monteiro et al, 2016).

Alcohol consumption and its synergistic effect with tobacco smoking (Blow, 1992), seems to be less known to the public (Hertrampf et al, 2012; Monteiro et al, 2016) as only 12.5% interviewees are aware this risk in contrast to the 19.4% reported for Great Britain (West et al, 2006), 21% for the Mersey region (Rogers et al, 2011b), to the 24.6% registered in Oporto (Monteiro et al, 2016); or the 50% in Schlesweiss-Holstein (Hertrampf et al, 2012). This finding is particularly alarming, as one quarter of participants reported to consume alcohol on a daily or almost daily basis. Alcohol consumers were more likely to identify alcohol intake as a risk factor than smoking. This may be a matter of concern, as could be the lower probability for regular dental attenders to recognize both risk factors.

Although few participants included diet among oral cancer risk factors, more than two thirds of the sample reported to consume five or more servings (pieces) of fruit per day. The Portuguese sample (11%) doubled our percentage of participants recognising the part of fruit intake in preventing oral cancer, but the number of people reporting to eat 5 pieces of fruit is three-fold larger in our sample. However, both samples are far from the 32% of Germans identifying a part for diet on risk for oral cancer (Hertrampf et al, 2012).

Recognition of oral signs and symptoms is the start point in the pathways to treatment of oral symptomatic cancer. In this vein, the probability for recognizing early signs of oral cancer increases with

age, with elder groups more likely to identify them. This apparently positive circumstance -oral cancer is largely a disease of elderly people (Hussein et al, 2017)- does not apply to red patches, where participants over 64 are less likely to recognize this sign of alarm with higher risk for malignant transformation (Villa et al, 2011). The poor active knowledge on potential oral cancer symptoms -particularly white and red patches (West et al, 2006; Monteiro et al, 2016)- increased significantly when a response was prompted (Rogers et al, 2011b), but the low performance of individuals in the risk group may point at many precancerous lesions failing to be recognized along with opportunities to diagnose invasive carcinomas being missed (West et al, 2006).

The number of years of education completed has an effect on health-related outcomes (Brunello et al, 206). University graduates scored significantly higher percentages of correct answers (Hertrampf et al, 2012). Although our survey did not analyse the socio-economic status of the participants -which has been linked to risk for oral cancer (Dalton et al, 2008; Conway et al, 2008)- education is usually linked to employment and income (Hertrampf et al, 2012) so our findings for the group with compulsory education as their highest educational achievement are particularly interesting.

Regular use of dental services also seems to have a negative influence on the recognition of the main oral cancer warning signs. Although it was not the aim of this study, and cross-sectional designs do not permit causal inferences, our results may well point at a low performance of dental clinics in educating patients for oral health (McConaught et al, 1995) which may be worth of further investigation. Reasons for this low performance may include patient resistance, lack of time, lack of reimbursement mechanisms, and absence of readily accessible patient education materials (Allard, 2000).

Interpretation of a symptom may be influenced by its prevalence. Reports on the prevalence of oral ulcerations in the general adult population in Southern Europe have described frequencies somewhere between 2.5%-10% (García-Pola Vallejo et al, 2002; Pentenero et al, 2008), mostly due to local trauma, iatrogenia, aphthae, infections, haematological disorders, malabsorption states, cutaneous diseases, or connective diseases (Scully & Shotts, 2000). This relatively high

prevalence of oral ulcerations, and the large proportion of people who had ever experienced one (Gill & Scully, 2007) may anticipate knowledge of the natural history of a typical oral ulcer and could explicate the high proportion (> 88%) of participants who would consult with a primary care professional about a long-standing one.

On the other hand, stoicism, self-medication or erratic navigation through the healthcare system, are attitudes some participants (11.5%) would take probably due to a reinterpretation of symptoms (signs) as minor conditions, which could cause a delay in the diagnosis of a potential neoplasm (Scott et al, 2009; Weller et al, 2012).

Primary care physicians consistently are the first choice for patients with oral ulcerations both in our study and in the literature (Rogers et al, 2011b), only behind traditional remedies in certain countries, which have been proved to increase the risk for presenting with advanced disease stage at diagnosis (Kerdpon & Sriplung, 2001). Studies on cancer patients confirm the preference for physicians (Grafton-Clarke et al, 2019), with the only exception of Japan, where dentists are reported to be the clinician of choice (Onizawa et al, 2003).

This physician preference is particularly marked in our study for those males, < 64, unaware of oral cancer, and with compulsory education as their highest educational achievement. Almost a third of university graduates would choose a dentist in a first instance. This may well represent a spurious relationship linked to an association of the variables education and income and to the very little oral healthcare for adults provided by the Spanish National Health System: the subgroup of younger, highly educated people would visit a dentist more frequently than their fellow participants as most dental treatments are provided on a private basis (Bravo et al, 2015).

The preference for physicians over dentists when experiencing an oral mucosal problem raises concern on aspects such as the concept population has about dentists' competence on issues "beyond the tooth territory".

Professional (primary care) diagnostic delay is strongly related to tumour stage at the time of diagnosis (Gómez et al, 2009). Despite the aforementioned patient preference for physicians, information on their competence for early oral cancer diagnosis is scarce (Gómez et al,

2010). Some reports have hypothesized about a relationship between diagnostic delay and the qualifications of the clinicians particularly among dentists and physicians with equivocal results (Gómez et al, 2010). However, some studies reporting on general medical practitioners' awareness of risk factors and clinical appearance of oral cancer state their performance is poorer than that of dentists (Carter & Ogden, 2007).

Patients often seek information about a sign of symptom before requesting consultation with a healthcare professional (Burke et al, 2020). In the particular case of oral cancer, most online resources in Spanish are produced by mass media (many are actually part of television programmes), and thus it can be presumed that their main aim was other than to increase public's knowledge of this neoplasm, which may explain their scores in the different items assessed in the current study. In addition, the most viewed videos by source (uploaded by laypersons) ranked the lowest in comprehensiveness and usefulness (Tables 1 & 2) despite including non-scientifically supported less frequently than their counterparts.

It is somehow surprising the relatively low scores attained by the clips produced by healthcare professionals, particularly in terms of usefulness (matching media produced clips) and comprehensiveness (lower than mass media's), as they seem to be more focused than other creators on OC treatment, HPV, and OC warning signs (Table 2) while paying less attention to OC prevention and to less-known risk factors, such as smokeless tobacco. Furthermore, and according to our results, up to 70.3% of these videos include information not supported by scientific evidence. In these circumstances, it is worth questioning whether these authors are really healthcare professionals. It is in the nature of public video repositories on the Internet to allow free uploading of materials without checking the accuracy of their contents and the qualifications of their producers. In fact, this seems to be one of the reasons for their somehow astonishing success, but this strength easily turns into weakness when it comes to health-related information. This issue is even more relevant because this group of videos obtained the highest score in the interaction index, which may well have

translated into individual exchange of inaccurate information with the audience that could well do more harm than good in some cases.

A similar study undertaken five years ago for English language resources about OC in the most popular repository (Hassona et al, 2016) found that the most useful videos ranked late on the viewing list but failed to find a significant correlation between usefulness and viewing rate, which we could identify in the case of Spanish-language resources. Both studies agree on that clips produced by individual users were less useful than those produced by educational institutions and healthcare professionals.

4.3 CLINICAL AND HEALTH POLICY REPERCUSSIONS OF THE RESULTS OBTAINED

Our results highlight the need for educational interventions to promote oral cancer knowledge specifically addressed to the elder subgroup of the population. The use of awareness campaigns to promote early diagnosed of oral cancer can increase both knowledge and the number of patients presenting at healthcare clinics in the short term (mainly those at lesser risk), but with limited evidence of long-term effectiveness (Macpherson, 2018). This seems to be valid for both individual and community-based interventions (Austoker et al, 2009), with tailored printing information as the most effective medium for the former, and small groups and printed information for the latter. Mass-media campaigns have proved their usefulness in increasing cancer awareness (Wakefield et al, 2010), as well as the engagement of celebrities in delivering health-related messages (Casey et al, 2013). Self-medication, either by over-the-counter formulations or traditional remedies, have been reported to increase diagnostic delay, as well as the participation of off-clinical counsellors (Varela-Centelles et al, 2012), who should also be considered in any oral cancer-related educational intervention. In this vein, oral cancer patients have indicated the potential usefulness of drastic visual aids on posters and leaflets in dental and general medical practitioners' offices and pharmacies (Rogers et al 2011). Previous reports have described a high oral cancer diagnostic ability for Spanish dentists (Seoane et al, 2010) but no information is available for physicians on this topic.

In terms of information, the problem of the validity of health-related videos created for the public was addressed by Haslam et al (2019) through an integrative review of papers reporting on studies about YouTube® videos on different health topics. They found that about one third of these papers allocated a good validity to this source of information for patients, while half of the studies recognised a poor validity of the clips studied. However, and considering that about 30 millions of health-related videos are watched each day (Zhou et al, 2016) just in the most popular repository, these platforms seem to be powerful instruments for patient education and action is needed from the Spanish-speaking oral-health community to seize this means to deliver adequate and accurate messages to promote early diagnosis of oral cancer.

Since the implementation of quality seals (HON, 2000) for health-related information in public video repositories seems highly unlikely, it appears mandatory to guide prospective viewers to sound information through other means. Unfortunately, and according to our results, the self-identification as healthcare professionals is not sufficient and perhaps a better outcome may come from the creation of videos endorsed by professional boards, universities, and national health services.

In addition, and considering both that relevant clips are consistently ranked late in visualization lists (Hassona et al, 2016) and that the position of a given video in a visualization list is influenced by the number of views (which negatively correlates with its usefulness and comprehensiveness), efforts should be made to take advantage of current knowledge about the attributes that make videos highly accessible in public repositories namely (Haslam et al, 2019) *selecting adequate keywords*, which may be obtained from reviewing existing popular videos; *choosing short, attractive titles and using end cards*; as well as *exploiting creator's networks* for broad social sharing to gain “first-discovery advantage” to increase the likelihood of the video moving to a prominent place in the visualization lists. Also, *promoting interaction with the audience*, by opening the comments section and responding to viewers' comments; and *producing fast-paced videos* or short videos, to keep viewers watching to the end are important issues.

Additional points suggested by Haslam et al (2019) include *evoking emotions*, as these videos are more frequently shared, as well as *including storytelling*, which makes videos more relatable, sustains viewers' interest and increases popularity. *Re-uploading the video* after certain time maintains the perception of relevance which, in combination with the *supporting information for creators* available from relevant Internet companies (Haslam et al, 2019), would contribute to increase the impact of these contributions.

4.4 FUTURE RESEARCH

Considering the main contribution to diagnostic delays of oral carcinomas comes from the patients' side and also that most of this time is consumed in the so-called appraisal period, patient education seems to be crucial. However, different education campaigns and interventions alike have proved a limited usefulness worldwide with minor success in terms of early detection of oral neoplasms (Macpherson, 2018; Hertrampf et al, 2020).

Despite every patient is entitled to receive health education at most healthcare services, oral cancer does not seem to be a usual topic in these activities -not even for the at-risk subgroups of the population- in view of the results of research on public knowledge and awareness of this neoplasm. When patients request consultation with their formal healthcare advisors for oral cancer-related issues, accurate information is not always granted because of the gaps of knowledge identified among physicians (García-Martín et al, 2020), nurses (Siriphant et al, 2001), dentists (López-Jornet et al, 2010), or hygienists (López-Jornet, 2007). In this vein, additional efforts are needed to improve knowledge about oral cancer among healthcare professionals which should be accompanied with research aimed at assessing whether these gaps have been actually filled and the stability of the gained knowledge.

Previous research has also identified off-clinic, informal counsellors who may receive information requests from the public (ie: herbalists, “alternative medicine” therapists, etc) who may also cause undesired delays in the diagnosis of oral cancer (Varela-Centelles et al, 2012), and initiatives from both health authorities and policymakers to tackle this issue may have a positive impact on this problem.

Future oral cancer awareness programs should be tailored to the target audience and based on longer-term, multi-faceted approaches (Macpherson, 2018) that consider the social determinants of the disease and include adequate instruments for assessment. Systematised, opportunistic health education in clinical settings may also offer advantages over individual conventional approaches (Casey et al, 2013).

Studies on the competence of Spanish general medical practitioners in diagnosing oral cancer are needed in view of our results, as well as potential educational interventions targeted to these professionals. Besides, barriers to dental care for patients experiencing red-flag symptoms and signs should be identified and removed.

Oral cancer does not seem a frequent topic on health promotion activities (Shimpi et al, 2018) and oral cancer survivors find that lay public should be encouraged to undertake regular medical and dental check-ups and to seek advice on oral symptoms as soon they have even the slightest concern.

Patients may also seek information from other sources. Traditionally, mass media have enjoyed a privileged position to deliver messages to the public. Newspapers have been a reference for centuries and the presence of health-related issues in their pages is not infrequent, either as news, entertainment articles, or divulgation of particular topics. In fact, oral cancer was the subject of 239 articles in a three-year period in the UK (Johnson, 2016) but these pieces rarely detailed information on signs and symptoms, or where to seek early professional help as they were focused on journalistic presentation of research results, legal issues, or survivor stories. These stories often involve emotional and dramatic matters frequently related to celebrities (Kelly et al, 2016) and these articles can be seen as an opportunity to save lives if brief, clear, relevant information is introduced along with the journalistic text. Unfortunately, no reports could be retrieved on how oral cancer is treated in Spanish printed press although adequate baseline data may offer a stepping-stone to introduce some kind of media guidance for responsible reporting of oral cancer (Kelly et al, 2016). The same is true for radio stations and television broadcasters, whose usefulness in patient education is widely recognised (Nielsen & Sheppard, 1988).

A growing difficulty when researching on delivering health messages through mass media is their audience: not so long ago topics presented by conventional communication means were common matters of social discussion; nowadays, the boom of online media and social networks has made researchers wonder whether the “audience” as such is terminated and whether this concept should be replaced by the term “user”, which seems to allow for a range of ways of engagement and emphasizes the idea of an individual rather than a collectivity as the target of the communication (Livingstone, 2003). Therefore, different approaches are required to deliver adequate health messages to the public through these new means and to seize the opportunity of selecting specific population subgroups. In addition, the community of Spanish-speaking oral health professionals should improve their efforts in assessing information in Spanish in the most popular social networks, as well as in producing high-quality relevant contents together with striving for implementing some kind of scheme for endorsing online oral health-related information to help patients to identify reliable contents.

5 CONCLUSIONS

1. It is concluded that general population has low awareness of oral cancer with poor knowledge of risk factors and main alarm signs. In addition, laypersons in the risk group scored lower values in the main variables analysed; even those highly educated showed insufficient awareness and knowledge of oral cancer. Thus, there is a clear need for educational interventions tailored to the target audience and aimed at increasing knowledge and awareness of oral cancer to promote primary prevention of oral cancer and minimising the time interval of patients with symptomatic oral cancer in their path to treatment.
2. General Galician population would seek professional consultation about a long-standing oral ulceration, relying mostly on primary care physicians. Those neglecting these lesions are elderly, less-schooled people and unaware of oral cancer.
3. Online audio-visual material about oral cancer in Spanish is incomplete, of limited usefulness, and often includes non-scientifically supported information. Most of these resources are produced by mass media and healthcare professionals, with minor contributions from educational and healthcare institutions. Visualization rates negatively correlated with the usefulness and comprehensiveness of the contents in these digital objects.

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7 ATTACHMENTS



CUESTIONARIO SOBRE ALERTA COCE

Facultad de Medicina y Odontología
Departamento de Estomatología

(1) ZONA: C(1) L(2) O(3) P(4)

(2) N° ENCTA:

Buenos días, soy alumno/a de la Facultad de Medicina y Odontología de la Universidad de Santiago. Estamos haciendo una encuesta muy breve (3 minutos) sobre el cáncer, y le agradecería que me contestase a unas preguntas. Las respuestas son anónimas, y nunca se podrá saber quién contestó las preguntas.

PREGUNTA FILTRO: ¿Vive Vd. en Galicia? Sí (CONTINUAR) No (AGRADECER Y TERMINAR ENCUESTA)

En primer lugar, nos gustaría saber algunas cosas sobre usted:

(MARCAR CON ASPA LA RESPUESTA SELECCIONADA)

1 (3). **Sexo:** Hombre (1) Mujer (2)

2 (4). Diría que vive en un **entorno** rural (1) o urbano (2)

3 (5). Grupo de **Edad:**

18-34	35-44	45-64	65+
(1)	(2)	(3)	(4)

→ **COMPROBAR EN HOJA DE RECUESTO SI EL CUPO DE EDAD ESTÁ YA CUBIERTO. SI FUERA ASÍ: AGRADECER Y TERMINAR**

4 (6). ¿Cuál es su **situación laboral**?

Estudiante (1)	Cuidado familia/casa (4)	Funcionario (7)
Paro (2)	Trabaja a tiempo parcial (5)	Incapacidad permanente (8)
Jubilado (3)	Trabaja a tiempo completo (6)	Otros (9) ESPECIFICAR

Ahora le voy a hacer unas preguntas sobre el cáncer

5. ¿Qué **cánceres** conoce? (ANOTAR POR ORDEN Y PARAR EN 10, SI SE LLEGA)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.



(7) COCE Sí (1) No (2)

(8) Puesto 1-10

¿HA MENCIONADO EL COCE? (**OJO**. DEBE ESTAR **EN** LA CO)

6 a. (9) ¿Tiene algún familiar, amigo, o conocido que haya tenido cáncer en la boca? → 6 b. (10) ¿Ha oído hablar del cáncer de boca?

Sí (1) No (2) Ns/Nc (3)

No (2) Sí (1) Ns/Nc (3)

7. (11) ¿Ha oído hablar del cáncer de cuello de útero? Sí (1) Ns/Nc (3) No (2)

Explicar: Es un crecimiento canceroso en una parte del aparato reproductor femenino.

Explicar: Es un crecimiento canceroso en una parte del aparato reproductor femenino.

8. (12) ¿Diría Vd que el cáncer de boca es más **común**, menos, o igual que el de cuello de útero?

Más común (1)

Igual de común (2)

Menos común (3)

9. (13) ¿Cree Vd. que hay algo que aumente el **riesgo** de tener cáncer de boca?

Sí (1)

No (2)

Ns/Nc (3)

10. (14) ¿El qué?

ESCRIBIRLOS POR ORDEN

10. _____

11. ¿De qué forma cree que **se nota** el cáncer de boca?

No EVOCAR. MARCAR LOS QUE DIGA (15)

12. ¿Alguno de éstos tiene que ver con el cáncer de boca? (LEÉRSELOS)

NS/NC	(1)	Sí (1)	No (2)
Herida que no cura	(2)	(16)	
Mancha blanca en la boca	(3)	(17)	
Molestias en la boca o la lengua	(4)	(18)	
Flemón o bulto	(5)	(19)	
Limitación para abrir la boca	(6)	(20)	
Dentaduras flojas/que irritan	(7)	(21)	
Hinchazón en la boca	(8)	(22)	
Mancha roja en la boca	(9)	(23)	
Dolor en la boca	(10)	(24)	
Dientes flojos/móviles	(11)	(25)	
Encías que sangran	(12)	(26)	
Otros (13)			

13 (27). Si tuviera una **úlcer**a que molesta en la boca durante más de **3 semanas**, ¿Qué haría?

.....
 Para dar sentido a esta información, necesitaríamos saber algo más sobre Vd. Podría decirnos si...

14 (28). ¿Fuma? Sí (1) No (2) Exfumador (3)

15 _____ → (29) ¿Cuánto?

16 (30). ¿Bebe **alcohol**?

Nunca (1) 1 vez al mes (aprox) (2) 1 vez por semana (aprox) (3) Casi a diario (4) A diario (5)

17 (31). ¿Cuántas piezas de **fruta** come al día?

Cinco o más (1)

Menos de 5 (2)

18 (32). ¿Qué **estudios ha completado?**

Obligatoria (1) Bachillerato (2) FP (3) Título universitario (4)

19 (33). ¿Cada cuánto tiempo va al **dentista?**

Cada 6 meses (1) Cada año (2) Cuando duele (3) Cuando hace falta (4)



DITAME DO COMITÉ DE ÉTICA DA INVESTIGACIÓN DE SANTIAGO-LUGO

Juan Manuel Vázquez Lago, Secretario do Comité de Ética da Investigación de Santiago-Lugo

CERTIFICA:

Que este Comité avaliou na súa reunión do día 17/12/2014 o estudo:

Título: Conocimientos sobre cáncer oral y enfermedad periodontal en Galicia

Promotor: Pablo Ignacio Varela Centelles

Tipo de estudo: Outros

Versión:

Código do Promotor:

Código de Rexistro: 2014/600

E, tomando en consideración as seguintes cuestións:

- A pertinencia do estudo, tendo en conta o coñecemento dispoñible, así coma os requisitos legais aplicables, e en particular a Lei 14/2007, de investigación biomédica, o Real Decreto 1716/2011, de 18 de novembro, polo que se establecen os requisitos básicos de autorización e funcionamento dos biobancos con fins de investigación biomédica e do tratamento das mostras biolóxicas de orixe humana, e se regula o funcionamento e organización do Rexistro Nacional de Biobancos para investigación biomédica, a ORDE SAS/3470/2009, de 16 de decembro, pola que se publican as Directrices sobre estudos Posautorización de Tipo Observacional para medicamentos de uso humano, e a Circular nº 07/2004, investigacións clínicas con produtos sanitarios.
- A idoneidade do protocolo en relación cos obxectivos do estudo, xustificación dos riscos e molestias previsibles para o suxeito, así coma os beneficios esperados.
- Os principios éticos da Declaración de Helsinki vixente.
- Os Procedementos Normalizados de Traballo do Comité.

Emita un **INFORME FAVORABLE** para a realización do estudo polo/a investigador/a do centro:

Centros	Investigadores Principais
C.S. Praza do Ferrol	Pablo Ignacio Varela Centelles

En Santiago de Compostela, a 18 de decembro de 2014
 O secretario

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Emítese informe procedente condicionado a que se solucionen os seguintes aspectos:

1.- Aspectos metodolóxicos:

1.a.- Segundo a base teórica para a realización de grupos focais e extracción das ideas e conclusións que surxan dos grupos, recoméndase a realización do número de grupos focais necesarios ata alcanzar a saturación da información que aportan os individuos; sen embargo unicamente plantexan realizar un grupo focal por patoloxía e dentro do eido urbán. Deberíase de xustificar e/ou incorporar un apartado de limitacións onde se explique por que só se realiza un grupo e por que se exclúe o eido rural, onde os factores de risco poden ser mais prevalentes e asociados a condutas e comportamentos que non se identifiquen no eido urbán.

2. Aspectos ético-legais:

2.a. Na parte cualitativa infórmase que para compensar aos participantes está prevista unha gratificación de 20 €, sen embargo na folla de información ao participante, se indica que non se retribuirá a participación. Débese homoxenizar esa información.

3.- Folla de Información ao participante e Consentimento Informado (FIP e CI):

3.a.- Débese de incorporar o título do estudo na folla de firmas do CI e eliminar o texto en azul.

3.b.- Infórmase na FIP que os datos se gardaránd e xeito anonimizado, mentras que no protocolo se informa que se gardarán codificados. Débese de correxir e homoxenizar esa información.

**Resolución del Comité de Evaluación de las Ayudas de Proyectos de Investigación Biomédica
en la Xerencia de Xestión Integrada de Lugo, Cervo y Monforte.**

De acuerdo con las bases de la convocatoria, se constituye el Comité de Evaluación el día 07 de noviembre de 2014, formado por los siguientes miembros:

- José Castillo Sánchez, Director Científico del Instituto de Investigación Sanitaria de Santiago (IDIS), Presidente.
- M^ª Rosaura Leis Trabazo, nombrada por el Presidente de la Comisión.
- Juan Jesús Gómez-Reino, nombrado por el Presidente de la Comisión.
- Felipe Casanueva Freijo, nombrado por el Presidente del patronato de la Fundación Ramón Domínguez.
- Fernando Fernández Lamela, nombrado por el Vice-Presidente de la Fundación Ramón Domínguez.
- María Gómez-Reino Garrido, Directora de la Fundación Ramón Domínguez, Secretaria.

Una vez analizada toda la documentación aportada por los candidatos y consideradas las evaluaciones individuales y consensuadas de los miembros de la comisión, se decide por unanimidad conceder las ayudas a los siguientes candidatos:

CANDIDATOS	TÍTULO DEL PROYECTO	PUNTUACIÓN TOTAL
Carlos González Juanatey	Utilidad de la ecografía carotídea en el diagnóstico de enfermedad arterial coronaria y su posible valor pronóstico en pacientes con dolor torácico sometidos a ecocardiografía de esfuerzo.	103,8
Pablo Ignacio Varela Centelles	Conocimientos sobre cáncer oral y enfermedad periodontal en Galicia.	90,2
Rafael Golpe Gómez	Repercusión cardiovascular y respiratoria de la exposición al humo de biomasa (estudio LAREIRA).	80,4

Santiago de Compostela, 25 de noviembre de 2014



Instituto de Investigación Sanitaria
SANTIAGO DE COMPOSTELA

José Castillo Sánchez

Director Científico IDIS

Presidente de la Comisión de Evaluación



María Gómez-Reino Garrido

Directora Fundación Ramón Domínguez

Secretaria de la Comisión de Evaluación

Valencia, 12 de Diciembre del 2021

Como director de la revista Medicina Oral Patología Oral y Cirugía Bucal,

CERTIFICO QUE LOS ARTICULOS SIGUIENTE SE HAN PUBLICADO EN NUESTRA REVISTA Medicina Oral Patología Oral y Cirugía Bucal:

1. People would rather see a physician than a dentist when experiencing a long-standing oral ulceration. A population-based study in Spain. Varela-Centelles P, Seoane J, Ulloa-Morales Y, Estany-Gestal A, Blanco-Hortas A, García-Pola MJ, Seoane-Romero JM. Med Oral Patol Oral Cir Bucal. 2020 Jul 1;25(4):e455-e460. doi:10.4317/medoral.23292. PMID: 32388529

2. Online audio-visual information on oral cancer for Spanish-speaking laypersons. A cross-sectional study. Ulloa-Morales Y, Negreira-Martínez F, Blanco-Hortas A, Patiño-Castiñeira B, San-Román-Rodríguez E, Varela-Centelles P, Seoane-Romero JM. Med Oral Patol Oral Cir Bucal. 2021 Nov 1;26(6):e795-e801. doi:10.4317/medoral.24770. PMID: 34162818

3. Oral cancer awareness in North-Western Spain: a population-based study. Varela-Centelles P, Seoane J, Ulloa-Morales Y, Estany-Gestal A, Blanco-Hortas A, García-Pola MJ, Seoane-Romero JM. Med Oral Patol Oral Cir Bucal. 2021 Jul 1;26(4):e518-e525. doi: 10.4317/medoral.24401. PMID: 34162825

Asimismo, **AUTORIZAMOS** que se utilicen para incluirlos en la tesis doctoral de D^a Yaima Ulloa.

Atentamente,

JOSE VICENTE|
BAGAN|SEBASTIAN

Firmado digitalmente por JOSE VICENTE|BAGAN|
SEBASTIAN
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Profesor Jose V. Bagan
Editor Med Oral Patol Oral Cir Bucal



Papers included in this PhD Thesis

1. People would rather see a physician than a dentist when experiencing a long-standing oral ulceration. A population-based study in Spain. Varela-Centelles P, Seoane J, Ulloa-Morales Y, Estany-Gestal A, Blanco-Hortas A, García-Pola MJ, Seoane-Romero JM. *Med Oral Patol Oral Cir Bucal*. 2020 Jul 1;25(4):e455-e460. doi:10.4317/medoral.23292. PMID: 32388529

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Oral cancer awareness in North-Western Spain: a population-based study

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Abstract

Background: An early diagnosis depends greatly on patient awareness. Thus, the aim of this study was to investigate general awareness of oral cancer and knowledge about its risk factors, signs and symptoms.

Material and methods: Cross-sectional population-based survey of randomly selected respondents conducted from March 1, 2015 to 30 June 2016.

Results: A total of 5,727 people entered the survey (response rate: 53%). When asked what cancers participants had heard about, 20.3% mentioned oral cancer. Regarding risk factors, tobacco was mentioned by 55.3% of the sample (n=3,169), followed by alcohol (12.5%; n=708), poor oral hygiene (10.8%; n=618), diet (6.5%; n=377), and genetics (4.5%; n=248).

Conclusions: General population has low awareness of oral cancer with poor knowledge of risk factors and main alarm signs. In addition, individuals in the risk group scored lower values in the main variables analysed; even those highly educated showed insufficient awareness and knowledge of oral cancer. In these circumstances, there is clear need for educational interventions tailored to the target audience and aimed at increasing knowledge and awareness of oral cancer to promote primary prevention of oral cancer and minimising the time interval of patients with symptomatic oral cancer in their path to treatment.

Key words: *Oral cancer, awareness, risk factors, surveys and questionnaires, Spain.*

Introduction

Oral cancer is considered a major public health problem, with variations in survival between countries and patient groups. Oral cancer represents the 11th most incident neoplasm (1), with over 202,000 with a male:female ratio 2:1 (2). In the particular case of Spain, oral cancer ranks 16th among all neoplasms by incidence and 19th by mortality (3).

Variations in survival between and within countries are multifactorial and complex in nature, but a growing body of research suggests disease stage at the time of treatment could explicate some of them. Unfortunately, a large proportion of patients present with advanced disease (stages III and IV) mainly due to delay in self-referral (4).

Diagnostic delay in oral cancer has been found to be related to advanced stage at diagnosis and to influence patient survival (5), conditioned by the biological characteristics of the tumour.

Considering the limited improvements on survival rates to this neoplasm evidenced in the last decades despite the important technological advances in diagnosis and treatments, more attention is being paid to the events occurring since the first cancer-related symptom is experienced until healthcare is sought. This time interval represents a major component of waiting times since symptoms detection to definitive diagnosis of oral cancer (6), and it is reported to be associated to low awareness of cancer symptoms and risk factors (7).

Oral cancer is largely preventable (8) by avoiding known risk factors and adopting healthy lifestyles. In addition, the oral cavity is easily accessible for self-examination to detect suspicious lesions. Both approaches may have an impact on patient survival, but they clearly depend on the degree of patient awareness, which is reported to be very variable throughout Europe, ranging from the 96.6% of patients reporting they had heard of oral cancer in the UK in 2005 (9) to the 23.7% in the city of Porto (Portugal) (10). No information about oral cancer awareness in Spain could be retrieved beyond a pilot study undertaken by our group in a single city, which showed 22% of the participants had ever heard about oral cancer (11).

Several campaigns to increase oral cancer awareness have been undertaken in Spain throughout the years with apparently poor results. Although lack of information on cancer causes and knowledge on signs and symptoms has often been linked to a late diagnosis (10), raising awareness through this kind of campaigns seems to make little difference to the delay of patients seeking help (12).

Therefore, the aim of this investigation was to investigate public awareness of oral cancer in Galicia (NW Spain), as well as knowledge of risk factors, signs and symptoms.

Material and Methods

This was a cross-sectional, community-based survey of randomly selected respondents from Galicia (North-western Spain) conducted from March 1, 2015 to 30 June 2016. The questionnaire was applied face-to-face by 14 specifically trained interviewers (postgraduate (n=7) and undergraduate dental students (n=2), 1 undergraduate medical student, 2 nurses, and 2 nurse assistants).

- Instrument development

We used a modification of the questionnaire originally developed by Rogers et al (12) in English language. The original instrument was translated into both Spanish and Galician and then back into English (double translation). Sociodemographic items in the instrument were adapted to the Galician environment, and an additional question on fruit intake was introduced in the questionnaire. The resulting questionnaire was piloted in a group of 5 clinicians and some items were reformulated, corrected, or deleted. This second draft was piloted in a group of 10 undergraduate dental students at the School of Medicine and Dentistry of the University of Santiago de Compostela and in a group of senior volunteers at a community centre of the Lugo city council.

- Participants and setting

Sample size was determined by quota sampling considering an accessible population of 5% and an expected percentage of response of 28% (12). The resulting sample size of 10,804 people permitted a power of 0.8% for estimating the proportion of oral cancer aware people, presuming a value of 25%.

Only people over 18 entered the study. The exclusion criteria were: (i) being mentally disabled and (ii) poor command of any of the official languages of the region (Galician or Spanish).

- Data collection

The study was undertaken in Galicia (North-western Spain), an autonomous region with 2,708,339 inhabitants unevenly distributed in 29,574.4 Km², whose annual gross domestic product per capita is 21,358 € and their life expectancy at birth is 82.78 years. Data were obtained in all four capitals of the Galician provinces at four different areas in each city. These zones included administrative areas, and affluent and average-income commercial streets and shopping centres, in a sort of pathfinder survey method, according to the quota sampling procedure suggested by Rogers et al (12). The instrument was applied face-to-face in the community to randomly selected individuals who were approached by the interviewers in different week days and times at each location. The interviewers participated in a 1 hour-long workshop which included discussion of the items in the instrument and their related ethical aspects, together with a role-playing session and a series of interviews to volunteer subjects (undergraduate dental students) under the supervision of a psychologist.

Data were coded and entered into a database. Each questionnaire was identified by a single number to permit an evaluation of the process of data coding and mechanization in a sample of randomly selected sets of data. Data were then transferred to statistical packages (R v3.3.2, MASS, and nnet) for analyses.

- Data analysis

Participants over 45, smokers and alcohol consumers, with a reported daily intake of less than 5 pieces of fruit per day were defined as “at risk” for the sake of data analysis. A descriptive analysis was undertaken, and results presented as frequencies and percentages. Bivariate analysis was undertaken using the Chi Square/Fisher’s exact test. Results are expressed in terms of odds ratio with their 95% confidence intervals [OR (IC95%)]. Logistic regression analyses were also undertaken to disclose the variables influencing oral cancer awareness and to identify factors conditioning the recognition of main alarm signs. The level of significance chosen for all test was 5%.

- Ethical considerations

The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600). This investigation complied with the Spanish regulations and the Helsinki Declaration on ethical principles for medical research involving human subjects.

The results obtained from this research protocol are reported following the STROBE guidelines (Strengthening The Reporting of OBServational studies in Epidemiology) (13).

Results

A total of 5,727 people accepted to participate in the survey (response rate: 53%). Participants were mostly in the 45-64 age group (30.2%; n=1,728), with a 47.7% of males (n=2,729).

- Oral cancer awareness

Participants were asked to mention all cancers they knew, and the first 10 responses were recorded. Breast (27.8%), lung (18.6%) and colorectal (12%) were the cancers most frequently mentioned as the first response. Oral cancer was mentioned by 3% of interviewees as their first response. It was recorded among the first three answers by 8.2% of the sample; 20.3% participants mentioned oral cancer amongst their responses in any position (Table 1). More than one third of participants (37.2%; n=415) had a relative or an acquaintance with oral cancer.

Active knowledge of oral cancer (unprompted mention) was shown by 1,024 individuals (17.95%). This percentage increased to about three quarters of the sample (73.1%; n=4,189) when specifically asked about this neoplasm (passive knowledge).

A logistic regression was performed (Fig. 1), and it was found that awareness had an OR=1.30 (1.14-1.48) in women regarding to men; we also found that all age ranges studied had a significant risk comparing to the reference category; and also that awareness increased with the educational level compared to compulsory education.

Table 1: Cancers the sample had heard about mentioned in the first ten positions. Open, unprompted question.

Cancer mentioned	Mentioned as first response	Mentioned in first 3 responses	Mentioned among the first 10 responses
Breast	1561 (27.8)	2674 (46.6)	3691 (64)
Colorectal	672 (12)	1834 (32.2)	2901 (50.5)
Prostate	386 (6.9)	1017 (17.7)	1724 (30)
Pancreas	225 (4)	885 (15.4)	1626 (28.4)
Skin	221 (3.9)	708 (12.3)	1588 (27.7)
Oral cancer	166 (3)	473 (8.2)	1172 (20.3)
Cervix	164 (2.9)	696 (12.1)	1252 (21.8)
Leukaemia	162 (2.9)	507 (8.8)	1242 (21.7)
Stomach	150 (2.6)	633 (11)	1324 (23.1)
Pharynx	125 (2.2)	486 (8.4)	1088 (18.9)
Liver	117 (2.1)	586 (10.2)	1343 (23.4)
Bone	81 (1.5)	312 (5.4)	937 (16.3)
Brain	84 (1.5)	291 (5)	778 (13.6)
Lymphoma	72 (1.3)	198 (3.4)	485 (8.4)
Kidney	60 (1.1)	212 (3.7)	608 (10.6)
Ovaries	60 (1.1)	343 5.9(670 (11.7)
Oesophagus	50 (0.9)	214 (3.7)	530 (9.2)
Larynx	34 (0.6)	104 (1.8)	242 (4.2)
Testis	30 (0.5)	121 (2.1)	300 (5.2)
Melanoma	19 (0.3)	55 (1)	134 (2.3)
Bladder	20 (0.3)	100 (1.7)	231 (4.1)
Bone marrow	12 (0.2)	34 (0.6)	83 (1.4)
Heart	8 (0.1)	49 (0.9)	118 (2)

Values in absolute cases and percentages in brackets

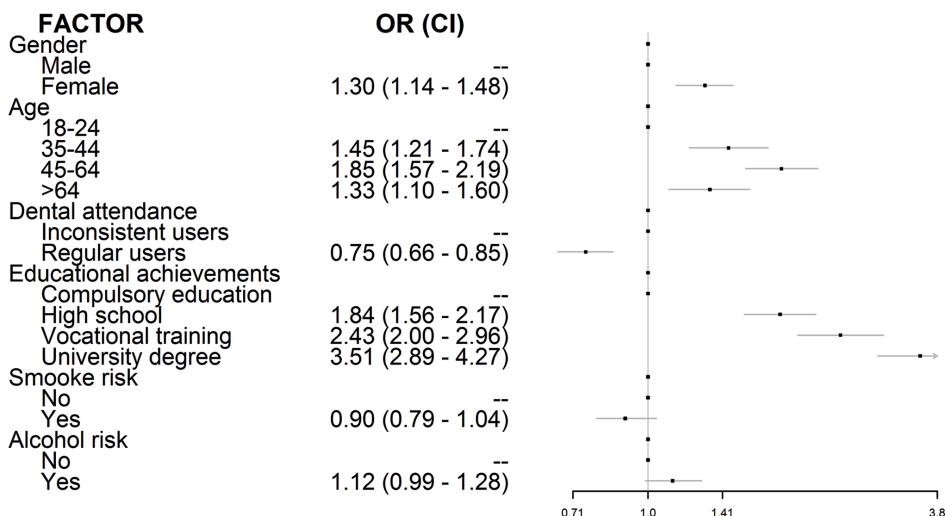


Fig. 1: Factors influencing oral cancer awareness. Logistic regression analysis.

- Preventive attitudes

Participants were asked about their daily intake of fruit and most of them reported to have 5 or more servings (pieces) of fruit per day (79.2%; n=4,538). When questioned about how frequently they attend their dentist, most interviewees (57.3%; n=3,281) reported to do it at least once a year. Regular dental visits were significantly associated with oral cancer awareness (77.9%; n=2,559 vs. 67.6%; n=1,576), with an adequate intake of fruits (23.4%; n=770 vs. 17.8%; n=416. p<0.001) and also with no smoking (59.9%; n=1,964 vs. 46.7%; n=1,092. p<0.001).

- Recognition of warning signs/symptoms

Responses on oral cancer symptoms (detailed in Table 2) ranked non-healing ulcerations as the most suggestive alarm sign, both prompted and unprompted, followed by mouth swelling as unprompted response, and sore tongue or mouth when prompted. Red or white patches gathered far lower percentages of participants connecting them with a possible oral neoplasm. Females recognized not-healing ulcerations as a potential symptom more frequently than their male counterparts (Table 3). Education also seems to have a part on this phenomenon: each step in the education ladder makes the participant 15% more likely of recognizing a red patch as an early cancer sign. In the case of white patches, each level beyond compulsory education increases the chances by one third the chances in the precedent level for acknowledging these lesions as potentially malignant. Volunteers with high school as their maxi-

um scholar achievement elicited the highest chances for recognizing a non-healing ulceration as a suspicious sign, three-fold higher than those having completed vocational training courses.

- Knowledge about risk factors

Regarding active knowledge on oral cancer risk factors, the most frequently identified one was tobacco (55.3%; n=3,169), followed by alcohol (12.5%; n=708), poor oral hygiene (10.8%; n=618), diet (6.5%; n=377), and genetics (4.5%; n=248).

Current smokers resulted to be significantly more aware of the part of tobacco as a risk factor, a circumstance that does not occur with daily alcohol consumers who identified tobacco or alcohol as risk factors in lower percentages (Table 3). Progress in educational achievements ensures significantly more knowledge about oral cancer, as shown in Table 3.

A new variable was constructed in order to explore the knowledge individuals at high risk have about oral cancer. This subgroup of participants was defined by those over 45, current smokers and alcohol consumers, with a reported daily intake of less than 5 pieces of fruit per day. These people (7.5%; n=431) were mainly males, younger than 64 with compulsory education as their highest academic achievement (36.6%; n=158). Participants in the risk group were less aware of oral cancer, and this difference reached statistical signification in terms of active knowledge (Table 3). They also elicited differences in terms of recognition of potential cancer symptoms (Table 2).

Table 2: Recognition of oral cancer warning signs/symptoms.

Symptom	Unprompted response	Prompted response
Non-healing wound/ulceration	1393 (24.3)	4597 (85.8)
Gumboil or swelling	1246 (21.7)	4096 (76.3)
Pain in the mouth	1112 (19.4)	4034 (75.1)
Discomfort in tongue or mouth	715 (12.5)	4118 (76.6)
Bump in the mouth	605 (10.5)	3818 (71.1)
White spot/patch in the mouth	443 (7.7)	3104 (58.9)
Red spot/patch in the mouth	423 (7.3)	3365 (62.6)
Bleeding gums	1116 (19.5)	2128 (39.5)
Limitation to mouth opening	334 (5.8)	2862 (53.1)
Loose teeth	389 (6.8)	2000 (37.1)
Loose/irritating dentures	216 (3.7)	2034 (37.7)

Values in absolute cases and percentages in brackets

Table 3: Characteristics of the sample and responses to key issues in the study.

	N	Mentions oral cancer unprompted	Mentions oral cancer prompted	Smoking as risk factor unprompted	Alcohol as risk factor unprompted	Non-healing ulcer as symptom unprompted	Non-healing ulcer as symptom prompted
GENDER							
Male	2729	421 (15.4) ^B	1904 (69.7) ^C	1468 (53.8) ^A	330 (12.1)	577 (21.1)	2159 (84.4) ^B
Female	2998	603 (20.1) ^B	2285 (76.2) ^C	1701 (65.7) ^A	392 (13.1)	816 (27.2)	2438 (87.2) ^B
AGE							
18-34	1651	359 (21.7) ^C	1146 (69.3) ^C	1027 (62.2) ^C	229 (13.8) ^C	385 (23.3)	1261 (81.9) ^C
35-44	1210	232 (19.2) ^C	947 (78.2) ^C	749 (61.9) ^C	180 (14.8) ^C	364 (30.1)	944 (87.3) ^C
45-64	1728	282 (16.3) ^C	1356 (78.4) ^C	984 (56.9) ^C	224 (12.9) ^C	439 (25.4)	1436 (87.7) ^C
64+	1138	151 (13.2) ^C	740 (65) ^C	409 (35.9) ^C	89 (7.8) ^C	205 (18.1)	956 (87.1) ^C
TOBACCO							
Former smoker	862	157 (18.2)	629 (72.9)	435 (50.4) ^C	91 (10.5)	211 (24.4)	728 (88.2)
No	3056	565 (18.5)	2283 (74.6)	1699 (55.5) ^C	415 (13.5)	746 (24.4)	2460 (85.3)
Yes	1701	296 (17.4)	1221 (71.7)	1017 (59.7) ^C	212 (12.4)	419 (24.6)	1316 (85.4)
ALCOHOL							
Daily	485	53 (10.9) ^C	338 (69.7) ^B	204 (42) ^C	47 (9.6) ^C	40 (9.4)	403 (84.3)
Almost daily	875	131 (14.9) ^C	613 (70) ^B	459 (52.4) ^C	94 (10.7) ^C	212 (24.2)	684 (86.1)
Never	1509	243 (16.1) ^C	1083 (71.7) ^B	763 (50.5) ^C	155 (10.2) ^C	384 (25.4)	1250 (88)
Once a month	1030	248 (24.1) ^C	788 (76.5) ^B	666 (64.6) ^C	156 (15.1) ^C	280 (27.1)	797 (83.5)
Once a week	1719	343 (19.9) ^C	1310 (76.2) ^B	1071 (62.3) ^C	266 (15.4) ^C	454 (26.4)	1363 (85.5)
Education							
Compulsory	1600	184 (11.5) ^C	963 (60.1) ^C	611 (38.1) ^C	132 (8.2) ^C	303 (18.9) ^C	1218 (83.4) ^B
High School	1614	320 (19.8) ^C	1186 (73.4) ^C	896 (55.5) ^C	192 (11.9) ^C	434 (26.8) ^C	1317 (87.4) ^B
Vocational training	983	199 (20.2) ^C	772 (78.5) ^C	638 (64.9) ^C	130 (13.2) ^C	253 (25.7) ^C	767 (83.9) ^B
University	1418	313 (22) ^C	1210 (85.3) ^C	1016 (71.6) ^C	263 (18.5) ^C	385 (27.1) ^C	1199 (87.8) ^B

Values in absolute cases and percentages in brackets. ^A 0.01<p<0.05, ^B 0.001<p<0.01, ^C p<0.001

In order to gain insight into the features conditioning the recognition of the most relevant oral cancer signs/symptoms and risk factors, additional logistic regression analyses were undertaken (Fig. 2), resulting that females consistently recognize them better and that regular dental attenders perform worse than erratic users of dental ser-

vices. The elder subgroup of participants is more likely to recognize tobacco and alcohol as risk factors or a red patch as an early sign of oral cancer than to identify white patches or non-healing ulcerations. Holding a university degree eases recognition of risk factors and early oral cancer signs with the exception of persistent ulcerations.



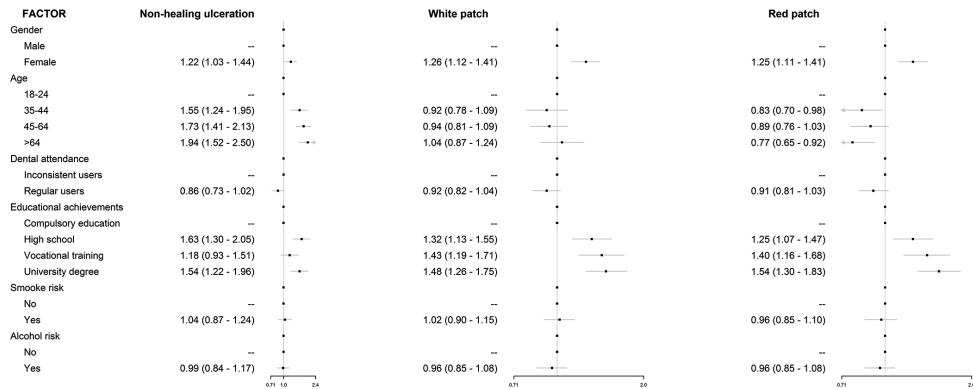


Fig. 2: Factors influencing the recognition of main oral cancer warning signs/symptoms. Logistic regression analyses.

Discussion

Our research approach permitted a reasonable balance of age and gender in the sample and a better feeling for people's responses than is possible with a postal survey (12) or by telephone interview, with a clear advantage over this latter method given the growing number of homes using only mobile phones (14). Conversely, our study is limited by the fact of not having reached the intended sample size. In this circumstance, the precision of the study was recalculated for the sample size finally achieved [5,727] considering it an infinite population. It resulted a probability for a precision error of 1.16 in the estimation of a proportion by asymptotic 95% bilateral confidence interval, assuming an expected proportion of 28%. In addition, the recruitment method (at the busiest commercial and administrative areas in the four provinces of the region during several months at different times) and the participation of knowledgeable, specifically trained interviewers, may have contributed to counterweigh this drawback. However, the limitation of relying on self-reported data is inherent to this kind of studies (9) and may have influenced responses on habits and attitudes, as with knowledge items there is no objective criteria against which responses could be validated.

Another hypothetical bias may come from self-selection of participants, as those with lower health literacy may have declined the invitation to enter the study more frequently than other people. This phenomenon, if occurred, would only highlight the important deficit disclosed by our results.

The fact of having used the methodology suggested by Rogers et al (12) permitted interesting comparisons: 3% of our sample mentioned oral cancer in their first unprompted answer vs 1% in the Rogers' group paper. The participants mentioning oral cancer in their first three

or first ten responses (Table 1) double the percentages described in 2011 for the Mersey region (4% and 11% respectively) in England (12) but are far from the 56% reported for the whole Great Britain in 1999 through face-to-face interviews (15) or from the 95.6% identified by a postal survey undertaken all over Britain later in 2006 (9).

A similar study in the Portuguese city of Oporto in 2016 found that only 23.7% of the participants had heard of oral cancer (10), a finding that almost mimics our results (20.3%). Awareness can be related to prevalence, as persons should be more aware of the disorders more frequently found in their communities: oral cancer was ranked in 11th position by awareness by our sample while it is the 13th most incident cancer (including lip) in the region.

As occurred in previous studies (9,10,12-15), tobacco was the most frequently acknowledged risk factor (55.5%); the same as reported from Oporto (Portugal, 2015) (10), but far from the percentages reported from Northern Europe (84.7% in Great Britain [2006] (9); 76% in Schlesweiss-Holstein (Germany, 2012) (14); or 74% in the Mersey Region (UK, 2011)). Elder smokers recognized this risk less frequently: either they are less willing to accept their behaviour carries risk, or individuals recognizing the risk of smoking are more likely to stop (9). Our results indicate there is still a long way both in divulging the part of tobacco in oral cancer and in smoking cessation campaigns, particularly when current smokers are significantly more aware of the deleterious effect of tobacco smoking (10,12,16).

Alcohol consumption and its synergistic effect with tobacco smoking (17), seems to be less known to the public (10,14) as only 12.5% interviewees are aware this risk in contrast to the 19.4% reported for Great Britain (9), 21% for the Mersey region (12), to the 24.6%

registered in Oporto (10); or the 50% in Schlesweiss-Holstein (14). This finding is particularly alarming, provided one quarter of participants reported to consume alcohol on a daily or almost daily basis. Alcohol consumers were more likely to identify alcohol intake as a risk factor than smoking. This may be a matter of concern, as could be the lower probability for regular dental attenders to recognize both risk factors.

Although few participants included diet among oral cancer risk factors, more than two thirds of the sample reported to consume five or more servings (pieces) of fruit per day. The Portuguese sample (11%) doubled our percentage of participants recognising the part of fruit intake in preventing oral cancer, but the number of people reporting to eat 5 pieces of fruit is three-fold larger in our sample. However, both samples are far from the 32% of Germans identifying a part for diet on risk for oral cancer (14).

Recognition of oral signs and symptoms is the start point in the pathways to treatment of oral symptomatic cancer. In this vein, the probability for recognizing early signs of oral cancer increases with age, with elder groups more likely to identify them. This apparently positive circumstance -oral cancer is largely a disease of elderly people (18)- does not apply to red patches, where participants over 64 are less likely to recognize this sign of alarm with higher risk for malignant transformation (19). The poor active knowledge on potential oral cancer symptoms -particularly white and red patches (9,10)- increased significantly when a response was prompted (12), but the low performance of individuals in the risk group may point at many precancerous lesions failing to be recognized along with opportunities to diagnose invasive carcinomas being missed (9).

The number of years of education completed has an effect on health-related outcomes (20). University graduates scored significantly higher percentages of correct answers (14). Although our survey did not analyse the socio-economic status of the participants -which has been linked to risk for oral cancer (21,22)- education is usually linked to employment and income (14) so our findings for the group with compulsory education as their highest educational achievement are particularly interesting.

Regular use of dental services also seems to have a negative influence on the recognition of the main oral cancer warning signs. Although it was not the aim of this study, and cross-sectional designs do not permit causal inferences, our results may well point at a low performance of dental clinics in educating patients for oral health (23) which may be worth of further investigation. Reasons for this low performance may include patient resistance, lack of time, lack of reimbursement mechanisms, and absence of readily accessible patient education materials (24).

The proportion of people aware of oral cancer significantly decreased in the elder group of participants (9,10,15). This finding, along with the known effects of age in health literacy, highlights the need for educational interventions specifically addressed to this population subgroup at increased risk. The use of awareness campaigns to promote early diagnosed of oral cancer can increase knowledge and the number of patients presenting at healthcare clinics in the short term (mainly those at lesser risk), but with limited evidence of long-term effectiveness (25). This seems to be valid for both individual and community-based interventions (26), with tailored printing information as the most effective medium for the former, and small groups and printed information for the latter. Mass-media campaigns have proved their usefulness in increasing cancer awareness (27), as well as the engagement of celebrities in delivering health-related messages (28).

In these circumstances, future oral cancer awareness programs should be tailored to the target audience and based on longer-term, multi-faceted approaches (25) that consider the social determinants of the disease and include adequate instruments for assessment. Systematised, opportunistic health education in clinical settings may also offer advantages over individual conventional approaches (29).

Conclusions

It is concluded that general population has low awareness of oral cancer with poor knowledge of risk factors and main alarm signs. In addition, laypersons in the risk group scored lower values in the main variables analysed; even those highly educated showed insufficient awareness and knowledge of oral cancer. Thus, there is a clear need for educational interventions tailored to the target audience and aimed at increasing knowledge and awareness of oral cancer to promote primary prevention of oral cancer and minimising the time interval of patients with symptomatic oral cancer in their path to treatment.

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Conflict of interest

The authors report no conflict of interest related to this study.

Ethics

The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600). This investigation complied with the Spanish regulations and the Helsinki Declaration on ethical principles for medical research involving human subjects.

Authors contributions

All authors contributed equally to this investigation. Drs Varela-Centelles, Seoane, Estany-Gestal, Blanco-Hortas, and Seoane-Romero conceived the study and designed the investigation with the collaboration of Dr García-Pola and Ms Ulloa-Morales. Data acquisition was coordinated by Drs García-Pola, Seoane, Seoane-Romero, and Ms Ulloa-Morales. Drs Seoane, Blanco-Hortas, Estany-Gestal, and Varela-Centelles focused on data analysis and interpretation with the participation of Ms Ulloa-Morales and Drs García-Pola and Seoane-Romero. The manuscript was drafted by Drs García-Pola, Seoane, Estany-Gestal and Varela-Centelles. All authors critically reviewed all drafts of the manuscript and approved its final version.

People would rather see a physician than a dentist when experiencing a long-standing oral ulceration. A population-based study in Spain

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Abstract

Background: Primary care physicians have been reported to be the first choice for patients with oral ulcerations. This study investigates the health-seeking behaviour of lay public in Galicia (North-western Spain) if experiencing a long-standing oral ulceration.

Material and Methods: Cross-sectional population-based survey of randomly selected respondents conducted from March 1, 2015 to 30 June 2016.

Results: A total of 5,727 pedestrians entered the study (response rate: 53%), mostly in the 45-64 age group (30.2%; n=1,728), 47.7% of them (n=2,729) were males. Most participants (42.1%; n=2,411) reported to visit their dentist once a year and had secondary or compulsory education as their highest educational achievement (28.18%, n=1,614; 28%, n=1,600 respectively).

When questioned what they would do if they had a wound/ulceration lasting longer than 3 weeks, most participants answered they would go to see their primary care physician (62.8%; n=3,597) and less than one quarter of the sample (23.8%; n=1,371) would seek consultation with their dentist.

Conclusions: General Galician population would seek professional consultation about a long-standing oral ulceration, relying mostly on primary care physicians. Those neglecting these lesions are elderly, less-schooled people and unaware of oral cancer.

Key words: Oral ulceration, oral cancer, patient attitudes, surveys and questionnaires, Spain.

Introduction

Oral cancer constitutes a public health problem for most countries with an average 5-year survival of 50-60%. A large proportion of patients (about 50%) had been diagnosed at late stages during the last four decades. In addition, lip, oral cavity, and pharyngeal cancers incidence is increasing worldwide and estimations point at 856,000 new cases by 2035 (1).

It has been suggested that early diagnosis is the most important prognostic factor for overall survival (2). Thus, long time intervals to oral cancer diagnosis seem to influence both advanced TNM-stage at diagnosis (2-fold risk) and survival to this tumour. Particularly, the patient and the primary care intervals are the longest time-periods in the path to diagnosis and they have proved to be a risk factor for advanced stage at diagnosis (3) and mortality from oral cancer (4). In this vein, detection of bodily changes and perception of reasons to discuss symptoms with a primary healthcare professional are paramount and define the appraisal and help-seeking intervals by the patient (5). Therefore, approaches to improve survival rates have to focus on the patient interval, and disclosing patients' attitudes when noticing the most frequently reported first oral cancer sign -an unexplained oral ulceration standing longer than three weeks- (6) seems to be a logical basis for any educational intervention on this issue.

Thus, the aim of this study was to investigate the health-seeking behaviour of lay people in Galicia (North-western Spain) if experiencing a long-standing oral ulceration.

Material and Methods

A cross-sectional, population-based study was designed using a questionnaire applied face-to-face to randomly selected members of the public in Galicia (North-western Spain) from 1 March 2015 to 30 June 2016, by 14 specifically trained interviewers (postgraduate (n=7) and undergraduate dental students (n=2), 1 undergraduate medical student, 2 nurses, and 2 nurse assistants).

The instrument used in the study was a modification of the questionnaire originally developed by Rogers *et al* (7) in English language. The original instrument was translated into both Spanish and Galician and then back into English (double translation). Some items in the instrument (employment, academic achievements, and registration with a dentist) were also modified to adapt them to the Galician sociocultural environment. The resulting instrument was piloted in a group of clinicians in a first instance and, after reformulations and corrections, was piloted again in a group of undergraduate dental students and senior volunteers at a community centre.

Sample size was determined by quota sampling considering an accessible population of 5% and an expected

percentage of response of 28% (7). The resulting sample size of 10,804 people permitted a power of 0.8% for estimating the proportion of oral cancer aware people, presuming a value of 25%.

Only pedestrians over 18 entered the study. The exclusion criteria were: being younger than 18, mentally disabled, or poor command of any of the official languages of the region (Galician or Spanish).

Galicia is an autonomous region with 2,708,339 inhabitants unevenly distributed in 29,574.4 Km², with a yearly gross domestic product per capita of 21,358 € and a life expectancy at birth of 82.78 years. The region is served by a public, free, universal health service, characterised by a strong and accessible primary care level. Data were obtained in all four capitals of the Galician provinces at four different commercial and administrative areas in each city on different days and times, in a kind of pathfinder survey method (8).

The interviewers participated in a 1 hour-long workshop which included discussion of the items in the instrument and their related ethical aspects, together with a role-playing session and a series of interviews to volunteer subjects (undergraduate dental students) under the supervision of a psychologist.

Each questionnaire was numbered, which permitted an assessment of the data coding and mechanization process, before transferring them to the R v3.3.2, MASS, and nnet statistical packages for analyses.

The results of the descriptive analysis are presented as frequencies and percentages. Bivariate analysis was undertaken using the Chi Square/Fisher's exact test. A logistic regression analysis to disclose the features of those choosing between a primary care physician and a dentist was also performed. The significance level chosen for all test was 5%.

The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600). This investigation complied with the Spanish regulations and the Helsinki Declaration on ethical principles for medical research involving human subjects. The results are presented according to the STROBE guidelines (Strengthening the Reporting of Observational studies in Epidemiology) (9).

Results

A total of 5,727 pedestrians entered the study (response rate: 53%), mostly in the 45-64 age group (30.2%; n=1,728), 47.7% of them (n=2,729) were males. Most participants (42.1%; n=2,411) reported to visit their dentist once a year and had secondary or compulsory education as their highest educational achievement (28.18%, n=1,614; 28%, n=1,600 respectively).

When questioned what they would do if they had a wound/ulceration lasting longer than 3 weeks, most participants answered they would go to see their pri-

primary care physician (62.8%; n=3,597) and less than one quarter of the sample (23.8%; n=1,371) would seek consultation with their dentist. Self-treatment (1.8%) is the reported behaviour predominant among those circulating an alternative path (11.5%) to diagnosis/treatment (Table 1).

The distribution of these attitudes according to the socio-demographic variables considered in the study is summarised in Table 2. This table shows males predominate among those who would ask a physician (67.2%), whereas females preponderate in the group choosing to visit a dentist (26.8%).

Table 1: Attitudes towards a non-healing ulceration after three weeks (n=5727).

Attitude	Responses	
	n (%)	95%CI
See my primary care physician	5754 (65.6)	(64.3 – 66.8)
See my dentist	1386 (24.2)	(23.1 – 25.3)
See my physician or my dentist	90 (1.6)	(1.2 – 1.9)
Self-treatment	104 (1.8)	(1.5 – 2.1)
I would do nothing about it	95 (1.7)	(1.4 – 2.0)
Ask at the chemists'	8 (0.1)	(0.05 – 0.15)
Go to the hospital's emergency room	92 (1.6)	(1.3 – 1.9)
See a specialist	86 (1.5)	(1.2 – 1.8)
See an otorhinolaryngologist	8 (0.1)	(0.05 – 0.15)
Consult with someone	12 (0.2)	(0.1 – 0.3)
I don't know what I would do	9 (0.1)	(0.05 – 0.15)
Ask at the chemist's or other places	78 (1.4)	(1.1 – 1.7)

Values in absolute cases and percentages in brackets

Table 2: Distribution of attitudes towards a long-standing oral ulceration.

	N	Ask a primary care physician	Ask a dentist	Ask a physician / dentist	Ask other physicians	Self-treatment	Ask at a chemist's or other	Do nothing / I don't know	p-value
GENDER									<i>p</i> <0.001
Male	2726	1832 (67.2)	582 (21.3)	46 (1.7)	91 (3.3)	62 (2.2)	49 (1.7)	64 (2.3)	
Female	2994	1920 (64.1)	804 (26.8)	56 (1.9)	95 (3.1)	42 (1.4)	37 (1.2)	40 (1.3)	
AGE									<i>p</i> <0.001
18-34	1650	1060 (64.2)	421 (25.5)	38 (2.3)	48 (2.9)	33 (2.0)	20 (1.2)	30 (1.8)	
35-44	1208	734 (60.8)	336 (27.8)	20 (1.6)	38 (3.1)	23 (1.9)	37 (3.0)	20 (1.6)	
45-64	1725	1122 (65.0)	429 (24.9)	31 (1.8)	64 (3.7)	35 (2.0)	21 (1.2)	23 (1.3)	
64+	1137	836 (73.5)	200 (17.6)	13 (1.1)	36 (3.1)	13 (1.1)	8 (0.7)	31 (2.7)	
TOBACCO									<i>p</i> <0.001
Former smoker	852	543 (63.1)	201 (24.4)	22 (2.5)	40 (4.6)	12 (1.4)	16 (1.8)	18 (2.1)	
No	3054	2027 (66.3)	769 (25.2)	50 (1.6)	84 (2.7)	54 (1.7)	31 (1.0)	39 (1.3)	
Yes	1700	1091 (64.1)	403 (23.7)	29 (1.7)	60 (3.5)	38 (2.2)	39 (2.3)	40 (2.3)	
ALCOHOL									<i>p</i> <0.001
Daily	485	355 (73.2)	76 (15.7)	6 (1.2)	9 (1.8)	14 (2.9)	1 (0.2)	24 (4.9)	
Almost daily	875	586 (66.9)	173 (19.8)	16 (1.8)	35 (4.0)	26 (2.9)	18 (2.0)	21 (2.4)	
Never	1509	999 (66.2)	357 (23.6)	43 (2.8)	54 (3.5)	20 (1.3)	12 (0.8)	24 (1.6)	
Once a month	1029	663 (64.4)	269 (26.1)	11 (1.0)	31 (3.0)	21 (2.0)	20 (1.9)	14 (1.3)	
Once a week	1716	1057 (61.6)	507 (29.5)	25 (1.4)	55 (3.2)	23 (1.3)	35 (2.0)	14 (0.8)	
EDUCATION									<i>p</i> <0.001
Compulsory	1599	1134 (70.9)	271 (16.9)	17 (1.0)	64 (4.0)	49 (3.0)	17 (1.0)	47 (2.9)	
Vocational training	981	658 (67.0)	234 (23.8)	15 (1.5)	26 (2.6)	18 (1.8)	26 (2.6)	4 (0.4)	
High School	1614	1027 (63.6)	429 (26.6)	33 (2.0)	56 (3.4)	21 (1.3)	27 (1.6)	21 (1.3)	
University	1417	838 (59.1)	448 (31.6)	36 (2.5)	38 (2.7)	16 (1.1)	16 (1.1)	25 (1.7)	
AWARE OF ORAL CANCER									<i>p</i> <0.001
No	1537	1056 (68.7)	291 (18.9)	25 (1.6)	58 (3.7)	39 (2.5)	23 (1.5)	45 (2.9)	
Yes	4189	2698 (64.4)	1095 (26.1)	77 (1.8)	128 (3.0)	65 (1.5)	63 (1.5)	59 (1.4)	

Values in absolute cases and percentages in brackets.

The same phenomenon occurs for the elder and younger groups of participants and for the lowest and highest educated volunteers in the sample: elder (73.5%) and less educated (70.9%) interviewees would rather see a physician in case of a long-standing oral ulceration.

Females have more chances to go to a dentist when experiencing a long-lasting oral ulceration (OR= 1.23; 95% CI: 1.08 – 1.40), as occurs with participants regularly using dental services (OR= 1.24; 95% CI: 1.08 – 1.42). Chances to go to a dentist also increase with the participants’ educational level (Fig. 1).

Knowledge about the existence of oral cancer also seems to influence the reported behaviour towards a long-standing mouth ulceration: people reporting no knowledge on oral cancer would choose to visit a physician (68.7% vs. 31.3%) and seem to be more prone to stoic or risky behaviours (Table 2)

Discussion

- Strengths and weaknesses of the study

Our quota-sampling approach resulted in an equitable balance of age and gender in the sample, and face-to-face interviews permitted a better feeling for people’s responses than would be possible through mail (7) or by telephone interview, this latter is also limited by the growing number of homes using only mobile phones (10). To the best of our knowledge, this is the largest population-based study on this topic with a high participation rate. In addition, the method for volunteer recruitment (at the busiest commercial and administrative areas in the region during several months at different times), combined with knowledgeable, specifically trained interviewers, may have well contributed to increase the external validity of the study. However, this

kind of studies always depend on self-reported data and some variations have to be expected regarding actual attitudes. In this particular situation -where there is no “right” answer- and the reported responses are consistent with data from actual cancer patients (11), this limitation is highly unlikely to have conditioned our results. Our research might have been affected by a hypothetical selection bias, where pedestrians with lower health literacy may have refused to participate in the survey more frequently than other people. As health literacy is somehow related to educational achievements (12) and most participants in the sample where in the compulsory education group in a proportion similar to their weight in the general population of the region. This hypothetical bias, if existed, may have had a minor influence on our results.

Considering the issues discussed above and the large size of the sample in a region where their capital cities are well communicated with their metropolitan areas, we understand our results offer reliable data on this topic, which may well be extrapolated to elsewhere in Spain.

- Justification for the research model

Recognition of a symptom as a potential danger is a challenge for patients, and the absence of pathognomic oral cancer signs and symptoms could explain long diagnostic delays attributed to the patient. Symptoms persistence seems to be paramount in the patient’s decision-making processes of seeking help (13). In this sense, an unexplained ulceration in the oral cavity >3 weeks is red-flag symptom in the new NICE head and neck cancer guidelines, with a higher positive predictive value than the red or red and white patches for oral cancer diagnosis (6).

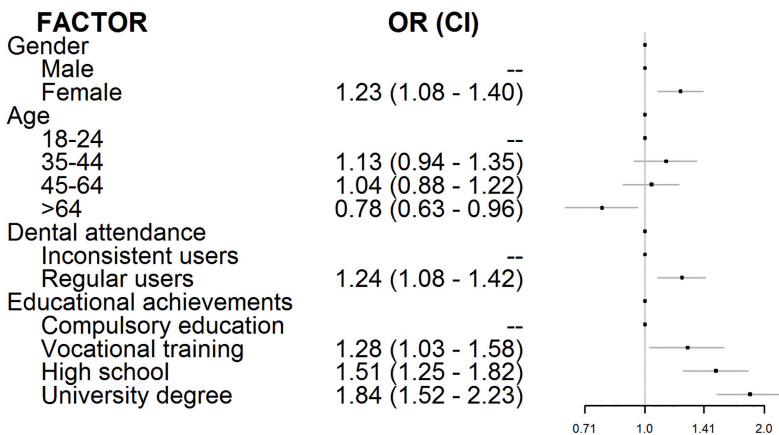


Fig. 1: Logistic regression analysis of help-seeking attitudes (primary care physician vs. dentist).



Besides, oral ulcerations represent the most frequent clinical sign of oral cancer, and this subtype is usually (up to 60%) diagnosed at later stages with implications in poor survival, although available evidence remains equivocal (14).

- Reported attitudes towards a non-healing ulceration

Reports on the prevalence of oral ulcerations in the general adult population in Southern Europe have described frequencies somewhere between 2.5%-10% (15,16), mostly due to local trauma, iatrogenia, aphthae, infections, haematological disorders, malabsorption states, cutaneous diseases, or connective diseases (17). This relatively high prevalence of oral ulcerations, and the large proportion of people who had ever experienced one (18) may anticipate knowledge of the natural history of a typical oral ulcer and could explicate the high proportion (> 88%) of participants who would consult with a primary care professional about a long-standing one. On the other hand, stoicism, self-medication or erratic navigation through the healthcare system, are attitudes some participants (11.5%) would take probably due to a reinterpretation of symptoms (signs) as minor conditions, which could cause a delay in the diagnosis of a potential neoplasm (5,13).

Primary care physicians consistently are the first choice for patients with oral ulcerations both in our study and in the literature (7), only behind traditional remedies in certain countries, which have been proved to increase the risk for presenting with advanced disease stage at diagnosis (19). Studies on cancer patients confirm the preference for physicians (20), with the only exception of Japan, where dentists are reported to be the clinician of choice (21).

This physician preference is particularly marked in our study for those males, < 64, unaware of oral cancer, and with compulsory education as their highest educational achievement. Almost a third of university graduates would choose a dentist in a first instance. This may well represent a spurious relationship linked to an association of the variables education and income and to the very little oral healthcare treatments for adults provided by the Spanish National Health System: the subgroup of younger, highly educated people would visit a dentist more frequently than their fellow participants as most dental treatments are provided on a private basis (22).

The preference for physicians over dentists when experiencing an oral mucosal problem raises concern on aspects such as the concept population has about dentists' competence on issues "beyond the tooth territory".

- Physician vs. dentist

Professional (primary care) diagnostic delay is strongly related to tumour stage at the time of diagnosis (3). Despite the aforementioned patient preference for physicians, information on their competence for early oral cancer diagnosis is scarce (23). Some reports have hy-

pothesized about a relationship between diagnostic delay and the qualifications of the clinicians particularly among dentists and physicians with equivocal results (22). However, some studies reporting on general medical practitioners' awareness of risk factors and clinical appearance of oral cancer state their performance is poorer than that of dentists (24).

- Clinical implications and recommendations

Self-medication, either by over-the-counter formulations or traditional remedies, have been reported to increase diagnostic delay, as well as the participation of off-clinical counsellors (25), who should also be considered in any oral cancer-related educational intervention. In this vein, oral cancer patients have indicated the potential usefulness of drastic visual aids on posters and leaflets in dental and general medical practitioners' offices and pharmacies (26). Previous reports have described a high oral cancer diagnostic ability for Spanish dentists (27) but no information is available for physicians on this topic. In this sense, studies on the competence of Spanish general medical practitioners in diagnosing oral cancer are needed in view of our results, as well as potential educational interventions targeted to these professionals. Besides, barriers to dental care for patients experiencing red-flag symptoms and signs should be identified and removed.

Oral cancer does not seem a frequent topic on health promotion activities (28) and oral cancer survivors find that lay public should be encouraged to undertake regular medical and dental check-ups and to seek advice on oral symptoms as soon they have even the slightest concern.

Conclusions

General Galician population would seek professional consultation about a long-standing oral ulceration, relying mostly on primary care physicians. Those neglecting these lesions are elderly, less-schooled people and unaware of oral cancer.

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None declared.

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The study protocol was approved by the Santiago-Lugo Committee for Ethics in Research (number 2014/600).

Authors contributions

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Conclusions: Online audio-visual material about oral cancer in Spanish is incomplete, of limited usefulness, and often includes non-scientifically supported information. Most of these resources are produced by mass media and healthcare professionals, with minor contributions from educational and healthcare institutions. Visualization rates negatively correlated with the usefulness and comprehensiveness of the contents in these digital objects.

Key words: *Oral cancer, diagnostic delay, patient education, internet, audio-visual resources, Spanish.*

Introduction

Oral cancer (OC) is estimated to account for 2% of all new cancer cases worldwide and for about the same proportion of neoplasms-related deaths. It is the most frequent cancer by incidence in Afghanistan, Papua-New Guinea, India, Pakistan, and Sri Lanka, and the most common type of cancer mortality for males in the latter three countries (1).

According to the latest data available from the International Agency for Research on Cancer, the worldwide projected age-standardised rate for this neoplasm is 4.0 cases per 100.000 inhabitants but in the geographical realm of Spanish language, oral cavity (and lip) cancer exhibits wide variations in incidence, ranging from 6.2 cases in the Caribbean region in 2018 to 1.4 in Central America. Female population experience a considerably lower incidence with the exception of Central America, where incidences are similar for both genders (1). Projections indicate important increments in incidence and mortality in the period 2020-2040, ranging from 32.1% and 36.6% for Spain to 118.5% and 122.2% for Equatorial Guinea.

Most OC cases are diagnosed at advanced stages (2), which is reported to have an impact on survival. In fact, survival to this neoplasm has not greatly improved for decades (3) despite the undeniable efforts of the scientific community. However, significant ameliorations may come from the side of early diagnosis, as survival rates may increase by about 30% if advanced OCs had been diagnosed at earlier stages (4), and diagnostic delay has proved to be a risk factor for advanced stage and mortality (5).

Among the many actors and processes influencing diagnostic delay, the patients' appraisal time interval represents the major component of waiting times since the detection of a bodily change to the definitive diagnosis of OC (6). This phenomenon has been attributed to a general lack of knowledge and awareness of this disorder among the general public (7). This statement is particularly true for Spain, where 28% of the population had not even heard of OC (8) and 47% could not mention an OC-related sign or symptom, but also for many other Spanish-speaking populations (9-11).

This century has witnessed an enormous surge of the Internet, with a large proportion of the Spanish-speaking population accessing this network despite very

wide regional differences. The ubiquitous presence of smartphones and similar mobile devices has made information readily available in a cost-free manner, and health-related information is not an exception. In fact, 75% of Internet users are reported to look for health/medical information and about 54% of patients with head and neck cancer rely on the Internet to find information about their treatment and collateral effects (12). The importance gained by online resources as suppliers of health-related information has raised concerns about the so-called "Dr Google" phenomenon and the quality of the information patients can obtain (13). In addition to quality, another worry about the use of online resources to disseminate health information is whether laypersons are able to understand it, as a certain level of literacy and reading comprehension is required. This proved to be a real barrier in the particular case of oral cancer-related websites (14,15). However, these difficulties disappear when the information is presented in an audio-visual format. In addition, dedicated online video-sharing sites have elicited enormous interest among social media users (16).

Unfortunately, most health-related videos lack validity for supporting the public in making health decisions (17). A recent study on the information about oral cancer available from YouTube® in English language unveiled a wide range of authors and contents with the most useful videos ranking late on the viewing list (18) and, therefore, with less chances to be viewed by the public. However, no reports on the quality and usefulness of Spanish-language audio-visual resources about oral cancer available through online public video repositories could be retrieved. Therefore, the aims of this investigation were to disclose the type of information about oral cancer are available through the main video-sharing online platforms, and whether the information they provide may be a useful contribution to shorten the patients' appraisal time-interval in their path to a diagnosis of symptomatic oral cancer.

Material and Methods

To achieve the aforementioned objectives, a cross-sectional study was designed, whose results are reported following the STROBE (STrengthening the Reporting of OBServational studies in Epidemiology) guidelines (19).

Audio-visual online information about oral cancer in Spanish was retrieved from the arguably three most popular video-sharing sites: YouTube® (www.youtube.com), Dailymotion® (www.daylimotion.com), and Vimeo® (www.vimeo.com) using the following key words: “cáncer de boca” and “cáncer oral”. The search was undertaken on October, 13th 2019 and the first 100 results in each viewing list (one search per key word per platform) were retrieved and their links copied into a spreadsheet.

Exclusion criteria included videos on oral cancer in animals, videos in languages other than Spanish, videos with no sound or headings, irrelevant videos (other topics or different types of cancer), advertisements, videos addressed to a specialized audience or presenting the findings of a research project.

Three researchers with different backgrounds analysed each clip of video: a final-year dental student (FN-M), a PhD student (YU-M), and a lecturer expert on oral cancer (JS-R). Demographical data (platform, title, publication date, length, number of views, and author) for each video were recorded as well as the interaction index suggested by Hassona *et al* (18) (number of likes – number of don't likes, divided by the number of views and multiplied by 100) and the viewing rate (number of views, divided by the number of days since upload, and multiplied by 100). For the analysis of the contents of the films, six dimensions were considered (aetiology, risk factors, prevention, early detection, treatment, and prognosis). For a video to include a dimension, it should be expounded or, at least, mentioned. The usefulness of the contents of each video was assessed using a score system (18) that considers whether the video mentions the main risk factors for oral cancer (smoking, alcohol consumption, tobacco chewing, and HPV) allocating 1 point for each item. If the clip includes the main signs/symptoms of oral cancer (oral ulceration, colour change -white/red-, lump) receives another point per item mentioned. Additional points are allocated if representative images of oral cancer and/or potentially malignant disorders are included, and also when the video promotes prevention through early detection/avoidance of risk factors (18).

The presence of non-scientifically supported information was also assessed. Disagreements between reviewers were solved by consensus.

A descriptive analysis was undertaken, and results are presented as absolute and relative frequencies. The median was chosen as a central trend measure and the interquartile range as a spread indicator. Comparison between groups were undertaken using the Kruskal-Wallis test. The significance level chosen for the study was 5%. Relationships between variables were explored using the Spearman correlation test.

Results

The YouTube® search permitted the retrieval of the intended 100 records per keyword, as occurred for Dailymotion® and Vimeo® for “cáncer oral”. Searches for “cáncer de boca” resulted in 74 hits in Vimeo® and 36 in Dailymotion®. The process of the selection of videos for the study is synthesized in Fig. 1.

Most of the 127 finally selected clips (Supplement 1) were retrieved from YouTube® (92.2%; n=117), with minor contributions from other repositories (DailyMotion®: 4.7% (n=6); Vimeo® 3.1% (n=4)). These videos were produced mainly by mass-media (46.5%; n=59), followed by individuals who identified themselves as healthcare professionals (21.2%; n=27), and laypersons (15.7%; n=20). Educational (7.9%; n=10) and healthcare (6.3%; n=8) institutions completed the sample, together with associations, enterprises, and other public institutions, each of them contributing with a single video.

Regarding their origin, most of them were published from Spain (29.92%; n=38), followed by Mexico (18.11%; n=23) and Chile (7.87%; n=10). Argentina and Colombia contributed with 9 videos each (7.09%), and Peru and the USA with 8. Creators from Ecuador and Paraguay uploaded another 5 and 3 videos respectively. Costa Rica and Panama contributed with 2 videos each, and El Salvador, Guatemala, Dominican Republic, Venezuela and the UK completed the list with one video each. The length of the clips included in the study ranged from 0.28 to 105.38 minutes (median 4.15 minutes; IQR: 2.34-9.67) and achieved a median visualization rate of 165.57 (IQR: 22.76-891.87).

The most viewed video (10,599,765 views; visualization rate 726,508.9) was 27.9 minutes long and it was uploaded to YouTube® by a US television channel, scoring 0 both in usefulness and comprehensiveness. The most useful video (10 points in usefulness) was uploaded by a Mexican healthcare professional and scored 5 in the 0-6 comprehensiveness scale and gathered 44,119 views (visualization rate 2,033.13).

Generally speaking, online OC videos in Spanish did not provide comprehensive information on oral cancer, with a median of two OC dimensions considered (IQR: 1.00-4.00) and a median usefulness score of 5.00 (IQR: 3.00-7.00). The interaction index (median 0.36; IQR: 0.19-0.74) was analysed only for those clips published in YouTube® because the other two repositories do not provide the information required for its calculation.

Despite being the most viewed group, those videos uploaded by laypersons resulted to be the less useful ones and the least comprehensive (Table 1) of all clips studied. The most useful videos resulted to be those authored by educational institutions, which also offered the widest perspective of the issue and a higher interaction index, despite being the less viewed only after those authored by mass media.

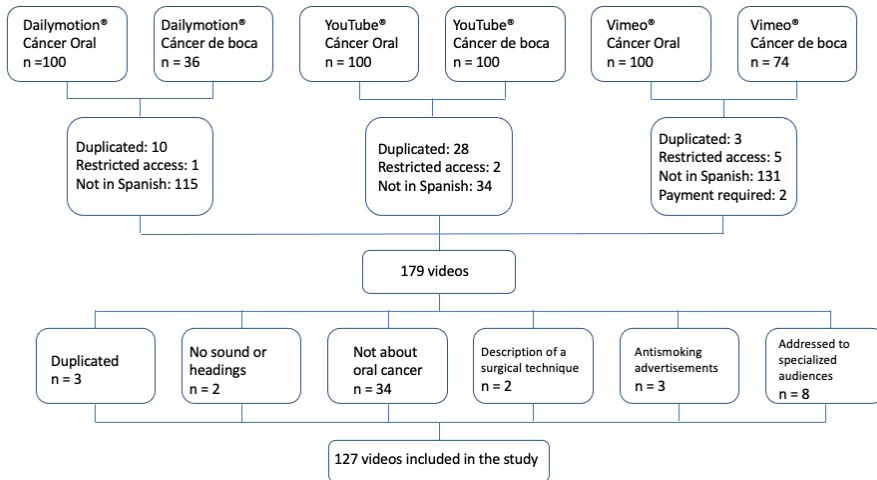


Fig. 1: Flow chart of the study.

Table 1: Scores by video origin.

Origin	Visualization rate	<i>p</i> value	Comprehensiveness	<i>p</i> value	Usefulness	<i>p</i> value	Interaction index*	<i>p</i> value
Laypersons	2015.0 (56.6 – 11412.8)	0.057	1.0 (0.0 – 2.2)	0.002	2.5 (0.0 – 6.0)	0.150	0.37 (0.21 – 0.79)	0.049
Educational institutions	160.7 (54.4 – 755.6)		3.0 (3.0 – 4.0)		6.5 (5.0 – 7.7)		0.43 (0.29 – 0.95)	
Mass media	99.6 (14.1 – 573.9)		3.0 (1.0 – 4.0)		5.0 (3.0 – 7.0)		0.31 (0.04 – 0.45)	
Healthcare professionals	188.4 (76.6 – 1166.8)		2.0 (1.5 – 4.0)		5.0 (3.0 – 7.5)		0.56 (0.28 – 0.93)	

Values represent medians and interquartile ranges. *p*-value calculated using the Kruskal-Wallis test. *Only for YouTube® videos

Mass media videos were focused mainly on risk factors, particularly on tobacco smoking and alcohol consumption but included non-scientific information more frequently than other producers ($p < 0.001$) (Table 2). Interestingly, laypersons-produced clips mention non-scientific information less frequently than any other group and include more representative images than the largest uploader (mass media). The main strengths of the videos produced by educational institutions (the most useful in the study) were the inclusion of representative

images ($p = 0.005$), the mention of tobacco chewing ($p = 0.257$), the inclusion of ulceration as a suspicious symptom ($p = 0.271$), and the explicit recommendation for check-ups ($p = 0.263$) and avoiding risk factors ($p = 0.160$) (Table 2).

A highly significant positive correlation (0.643; $p < 0.001$) could be observed between usefulness and comprehensiveness of the videos, together with negative correlations between the visualization rate and usefulness (-0.186 ; $p < 0.05$), and visualization rate and comprehensiveness (-0.183 ; $p < 0.05$).

Table 2: Items considered by video origin.

Items n (%)	Layperson (n=20)	Educational institution (n=10)	Mass media (n=59)	Healthcare professional (n=27)	p-value
Dimensions					
Aetiology	8 (40.0)	8 (80.0)	41 (69.4)	18 (66.6)	0.071
Risk factors	10 (50.0)	8 (80.0)	48 (81.3)	19 (70.3)	0.049
Prevention	4 (20.0)	9 (90.0)	35 (59.3)	12 (44.4)	0.001
Early detection	3 (15.0)	8 (80.0)	27 (45.7)	14 (51.8)	0.005
Treatment	4 (20.0)	4 (40.0)	23 (38.9)	14 (51.8)	0.177
Prognosis	3 (15.0)	2 (20.0)	23 (38.9)	8 (29.6)	0.192
Items in usefulness score					
Tobacco smoking	11 (55.0)	7 (70.0)	48 (81.3)	17 (62.9)	0.090
Alcohol consumption	10 (50.0)	7 (70.0)	45 (76.2)	17 (62.9)	0.159
Tobacco chewing	0 (0.0)	2 (20.0)	10 (16.9)	4 (14.8)	0.257
Mentions HPV	7 (35.0)	4 (40.0)	26 (44.0)	15 (55.5)	0.542
Ulceration as suspicious symptom	9 (45.0)	8 (80.0)	32 (54.2)	17 (62.9)	0.271
White patch as suspicious sign	5 (25.0)	3 (30.0)	23 (39.0)	11 (40.7)	0.638
Lump as suspicious sign	3 (15.0)	4 (40.0)	23 (39.0)	13 (48.1)	0.125
Include representative images	8 (40.0)	8 (80.0)	14 (23.7)	11 (40.7)	0.005
Clearly mention avoiding risk factors	3 (15.0)	5 (50.0)	23 (39.0)	11 (40.7)	0.160
Explicitly recommend check-ups	7 (35.0)	6 (60.0)	35 (59.1)	16 (59.2)	0.263
Include non-scientific information	3 (15.0)	7 (70.0)	47 (79.6)	19 (70.3)	<0.001

Absolute frequencies (relative frequencies) p-value calculated using the Kruskal-Wallis test

Discussion

Public video repositories behave as social networks by sharing audio-visual contents, and the importance of these platforms becomes evident when considering that the most popular among them (YouTube®, San Bruno, CA, USA) has more than two billion registered users according to its own data. This privileged situation offers such a tremendous potential for health promotion and education and training that some scientific journals already run their own channels in these platforms (20). Conversely to what occurs with online written information (21), and to the best of our knowledge, there are no certifications or seals to endorse the quality of health-related audio-visual resources available on the Internet, with the subsequent risk for dissemination of misleading and unreliable information. In order to quantify this problem, the current study has focused on identifying the contents and categorise the usefulness of OC videos in Spanish language.

Our study has some limitations inherent to its cross-sectional design and the “snapshot” approach to data collection (18), which does not permit obtaining a stable picture of the situation. In addition, the selected keywords -despite being among the most popular terms to describe this neoplasm- may also have conditioned the search results. On the other hand, this is the first investigation of OC videos in Spanish and its main strengths include the breadth of the search undertaken at three

repositories and the participation of three reviewers with different backgrounds to ensure an adequate assessment of the variables studied.

Audio-visual information about OC available through the Internet in Spanish is usually incomplete: only a handful of creators managed to upload a comprehensive video about oral cancer, reaching the best performers median comprehensiveness scores of 3 (in a range 0-6). This information is of limited usefulness, and it can even be misleading in certain cases (Table 2). Besides, as most resources were produced by mass media (many are actually part of television programmes), it can be presumed that their main aim was other than to increase public’s knowledge of this neoplasm, which may explain their scores in the different items assessed in the current study. In addition, the source of videos that gathered most views (uploaded by laypersons) ranked the lowest in comprehensiveness and usefulness (Tables 1, Table 2) despite including non-scientifically supported information less frequently than their counterparts.

It is somehow surprising the relatively low scores attained by the group of clips produced by healthcare professionals, particularly in terms of usefulness (matching media produced clips) and comprehensiveness (lower than mass media’s), as they seem to be more focused than other creators on OC treatment, HPV, and OC warning signs (Table 2) while paying less attention to OC prevention and to less-known risk factors, such as

smokeless tobacco. Furthermore, and according to our results, up to 70.3% of these videos include information not supported by scientific evidence. In these circumstances, it is worth questioning whether these authors are really healthcare professionals. It is in the nature of public video repositories on the Internet to allow free uploading of materials without checking the accuracy of their contents and the qualifications of their producers. In fact, this seems to be one of the reasons for their somehow astonishing success, but this strength easily turns into weakness when it comes to health-related information. This issue is even more relevant because this group of videos obtained the highest score in the interaction index, which may well have translated into individual exchange of inaccurate information with the audience that could well do more harm than good in some cases. A similar study undertaken five years ago for English language resources about OC in the most popular repository (18) found that the most useful videos ranked late on the viewing list but failed to find a significant correlation between usefulness and viewing rate, which we could identify in the case of Spanish-language resources. Both studies agree on that clips produced by individual users were less useful than those produced by educational institutions and healthcare professionals. The problem of the validity of health-related videos created for the public was addressed by Haslam *et al* (17) through an integrative review of papers reporting on studies about YouTube® videos on different health topics. They found that about one third of these papers allocated a good validity to this source of information for patients, while half of the studies recognised a poor validity of the clips studied. However, these platforms seem to be powerful instruments for patient education and action is needed from the Spanish-speaking oral health community to seize this means to deliver adequate and accurate messages to promote early diagnosis of oral cancer.

Since the implementation of quality seals for health-related information in public video repositories seems highly unlikely, it appears mandatory to guide prospective viewers to sound information by other means. Unfortunately, and according to our results, the self-identification as healthcare professionals is not sufficient and perhaps a better outcome may come from the creation of videos endorsed by professional boards, universities, and national health services. In addition, and considering both that relevant clips are consistently ranked late in visualization lists (18) and that the position of a given video in a visualization list is influenced by the number of views (which negatively correlates with its usefulness and comprehensiveness), efforts should be made to take advantage of current knowledge about the attributes that make videos highly accessible in public repositories namely (17) selecting adequate keywords,

which may be obtained from reviewing existing popular videos; choosing short, attractive titles and using end cards; as well as exploiting creator's networks for broad social sharing to gain "first-discovery advantage" to increase the likelihood of the video moving to a prominent place in the visualization lists. Also, promoting interaction with the audience, by opening the comments section and responding to viewers' comments; and producing fast-paced videos or short videos, to keep viewers watching to the end are important issues. Additional points suggested by Haslam *et al* (17) include evoking emotions, as these videos are more frequently shared, as well as including storytelling, which makes videos more relatable, sustains viewers' interest and increases popularity. Re-uploading the video after certain time maintains the perception of relevance which, in combination with the supporting information for creators available from relevant Internet companies (17), would contribute to increase the impact of these contributions.

Conclusions

Online audio-visual material about oral cancer in Spanish is incomplete, of limited usefulness, and often includes non-scientifically supported information. Most of these resources are produced by mass media and healthcare professionals, with minor contributions from educational and healthcare institutions. Visualization rates negatively correlated with the usefulness and comprehensiveness of the contents in these digital objects.

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Conflict of interest

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Ethics

No approval from the ethics committee is required for this investigation.

Authors contributions

All authors contributed equally to this investigation. Drs Varela-Centelles, Ulloa-Morales, Blanco-Hortas, and Seoane-Romero conceived the study and designed the investigation with the collaboration of Dr Patiño Castiñeira, San-Román-Rodríguez, and Mr Negreira-Martínez. Data acquisition was coordinated by Drs Ulloa-Morales, Seoane-Romero, and Mr Negreira-Martínez. Drs Seoane-Romero, Blanco-Hortas, Ulloa-Morales, and Varela-Centelles focused on data analysis and interpretation with the participation of Mr Negreira-Martínez, Dr Patiño Castiñeira, and Dr San-Román-Rodríguez. The manuscript was drafted by Drs Seoane-Romero, Ulloa-Morales, and Varela-Centelles. All authors critically reviewed all drafts of the manuscript and approved its final version.