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**The Exercise Stress Test – impact of communication strategies on
patient’s compliance and satisfaction**

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De acordo com o art.3 do capítulo “Tarefas a Realizar” do Regulamento do Mestrado em “Comunicação Clínica”, a presente Dissertação consta da apresentação de dois trabalhos distintos, a saber:

1. Realização de um artigo de revisão com publicação submetida em Revista científica.
2. Realização de um artigo de investigação com publicação submetida em Revista científica.
3. O conjunto dos dois artigos realizados e submetidos para publicação constituirá a matéria da dissertação para obtenção do Grau de Mestre.

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Abreviaturas

AA - Adherence Assessment

BMI - Body Mass Index

BBP - Baseline Blood Pressure

BP – Blood pressure

CA - Communication Assessment

CAD - Coronary Artery Disease

CASS - Coronary Artery Surgery Study

CBE - Clinical Breast Exams

CCU- Coronary Care Unit

CG – Control Group

CTG - Continuity Group

CI - Confidence Interval

DEE - Diabetes Eye Evaluation

ECG – Electrocardiogram

EF - Ejection Fraction

EST – Exercise Stress Test

FHCAD - Family History of Coronary Artery Disease

FOBT - Fecal Occult Blood Tests

FS - Flexible Sigmoidoscopy

G1 – Experimental Group 1

G2 – Experimental Group 2

G3 – Experimental Group 3

HBP - High Blood Pressure.

HP - Health Professional

HQS - High Quality Study (according to Wright, Brand, Dunn, & Spindler, 2007)

HR - Heart Rate

IG - Intervention Group

LQS - Low Quality Study (according to Wright, Brand, Dunn, & Spindler, 2007)

MCCQE2 - Medical Council of Canada national clinical skills examination

NYHA - New York Heart Association

Pap Test - Papaniculau Test

PSIAQ - Patient Satisfaction with the Interview Assessment Questionnaire

PT - Patient

RC - Routine Communication

SD – Standard deviation

SES - Socieconomic status

SPSS - Statistical Package for the Social Science

UCG - Usual Care Group

WC - Weight Circumference

PARTE I

ARTIGO DE REVISÃO

“Adherence to screening and diagnostic tests – a systematic review of the role of health professional’s communication”

Resumo

Introdução: A comunicação que se estabelece entre o profissional de saúde e o seu paciente é um fator essencial para uma boa qualidade dos cuidados prestados.

A capacidade do profissional de saúde para transmitir informação adequada, negociar e discutir recomendações e prescrições terapêuticas parece influenciar a adesão dos pacientes aos procedimentos propostos.

Contudo, poucos estudos abordaram o papel das estratégias de comunicação na adesão dos pacientes especificamente aos exames de diagnóstico e prevenção.

Métodos: Foi efetuada uma revisão sistemática dos estudos que relacionam a comunicação clínica com a *compliance* e adesão dos pacientes á prescrição de exames complementares de diagnóstico e prevenção, nas bases de dados PUBMED, SCOPUS e ISI-WEB OF KNOWLEDGE. Foi ainda realizada uma avaliação da qualidade científica e relevância das conclusões dos referidos estudos.

Resultados: Dos 11 estudos experimentais selecionados, quatro avaliaram estratégias de comunicação específicas e sete avaliaram a comunicação clínica habitual.

Discussão e Conclusão: A maioria dos estudos conclui que a aplicação de estratégias de comunicação centradas no paciente beneficia a aderência aos exames de diagnóstico e prevenção. Esta revisão apresenta um nível baixo de evidência científica, indicando a necessidade de novos estudos de maior qualidade de forma a confirmar e quantificar o efeito positivo detetado. Futuros trabalhos contribuirão também para identificar

estratégias de comunicação específicas capazes de beneficiar a aderência dos pacientes aos exames complementares de diagnósticos e prevenção.

Abstract

Introduction: Communication is an essential contributor to health professional-patient relationship and a core contributor to a good quality of the care provided. The professional's ability to provide information and to negotiate and discuss recommendations has been related with patient's adherence to clinical prescriptions. However, few studies address the role of communication skills in patient's adherence to screening and diagnostic tests.

Methods: Primary Studies relating clinical communication to patients' compliance and adherence to prescribed complementary exams were systematically reviewed in the PUBMED, SCOPUS and ISI-WEB OF KNOWLEDGE databases. An assessment of the quality of the studies was conducted.

Results: Of the eleven primary articles selected for inclusion in this review, four studies addressed specific communication strategies and seven studies evaluated routine communication procedures.

Discussion and Conclusions: The majority of the studies concluded that the application of patient-centred communication strategies benefits screening and diagnostic test adherence. The low-level evidence of the present review indicate the need for further studies conducted to confirm and quantify this positive effect, and identify specific advantageous communication skills.

Introduction

Communication skills in clinical settings have been related to more positive outcomes, patients' satisfaction and adherence to screening and diagnostic procedures (Di Palma & Herrera, 2012; Kissane et al., 2012; Ong, de Haes, Hoos, & Lammes, 1995; M. A. Stewart, 1995).

The relationship between patient compliance with health related procedures and patient-centred approaches has been widely observed (Harrington, Noble, & Newman, 2004; Mead & Bower, 2000; Ong et al., 1995; Robinson, Callister, Berry, & Dearing, 2008; Roumie et al., 2011; M. Stewart et al., 1999; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). This type of communication enhances the patient's cooperation, through the building of an empathic, supportive and collaborative partnership.

Compliance and adherence have been used indiscriminately, although they can be considered to refer to two different concepts. Compliance literally means following medical or other health professionals' recommendations and adherence means the patient's active involvement in his own treatment or health preventive procedures (Bissonnette, 2008; Fraser, 2010; Kyngas, Duffy, & Kroll, 2000). Adherence to a prescribed treatment involves a behavioural change. Cognitive, emotional and motivational aspects have been shown to influence the patients' ability to perform this change. Successful intervention procedures to improve adherence must therefore consider patients from a cognitive and emotional point of view and be applicable in daily clinical practice.

Recent meta-analyses shown that the use of specific communication skills such as motivational interviewing is effective in promoting behavioural change (alcohol and drug use, smoking, weight loss, reducing sexual risk behaviours) and useful for

improving adherence to treatment, screening and diagnostic procedures and preventive strategies (Martins & McNeil, 2009; Nekhlyudov & Braddock, 2009; Roumie et al., 2011).

The majority of the published studies address the role of communication skills in the context of a medical consultation. The use of communication skills and its implications for adherence to treatments such as medication, medical recommendations, and preventive strategies, has also been reported (Hahn, 2009; Harmon, Lefante, & Krousel-Wood, 2006; Heckman, Egleston, & Hofmann, 2010). In a review published in 2009, Bosch-Capblanch and co-workers (Bosch-Capblanch, Abba, Prictor, & Garner, 2007) studied patients' adherence to treatment, prevention and health promotion activities through the specific use of (verbal) contracts. The authors concluded that there was limited evidence that adherence can be improved by the use of contracts, mainly due to the lack of evidence from large, good quality studies.

The patient's adherence to diagnostic and screening tests is essential for effective health care and early identification of possible pathological conditions. The impact of health professional-patient communication on the patient's compliance with preventive strategies (prescribed diagnostic or screening tests) has been reported in a small number of articles (Epstein et al., 2005) but there is so far little evidence of the association between clinical communication strategies and patients' collaboration in screening and diagnostic tests.

The purpose of this study is to review published literature regarding clinical communication strategies applied to prescribed screening and diagnostic tests, and determine its influence on patients' adherence and compliance to these procedures.

Methods

Inclusion criteria:

To be included in the present review, a paper had to fulfil the following criteria: (1) to be a primary original article, (2) to examine the role of communication strategies in the adherence to complementary medical exams and (3) to be published in English, between January 1992 and December 2012. All forms of clinical communication (routine communication or specific/intentionally applied strategies) and study designs were included. Assessment of communication strategies included subjective patients' or health professionals' reports and objective assessment of communication strategies (standardized rating instruments, frameworks or checklists applied by observers).

Exclusion criteria were the absence of clinical communication strategies or of the health professional's communication competence evaluation in the context of screening and diagnostic tests. Articles addressing exclusively theoretical issues were also excluded, but the reference lists of these articles were reviewed in search of primary studies.

Search strategy:

The literature searched included the following databases: PUBMED, EBSCO, SCOPUS and ISI-WEB OF KNOWLEDGE. The search strategy was based on the following key concepts: for terms related to clinical communication (subject heading: "patient-centered communication", "health professional-patient communication", "clinical-patient communication", "patient communication"), AND screening and diagnostic tests (subject heading: "screening tests", "diagnostic exams", "diagnostic tests", "medical exams", "medical tests", "hospital exams", "screening tests", "preventive screening"), AND patient compliance and adherence (subject headings: "patient compliance",

“patient adherence”, “patient cooperation”, “patient co-operative behavior”). Reference lists of retrieved articles were reviewed in order to identify additional studies that our strategy may have missed (Figure 1).

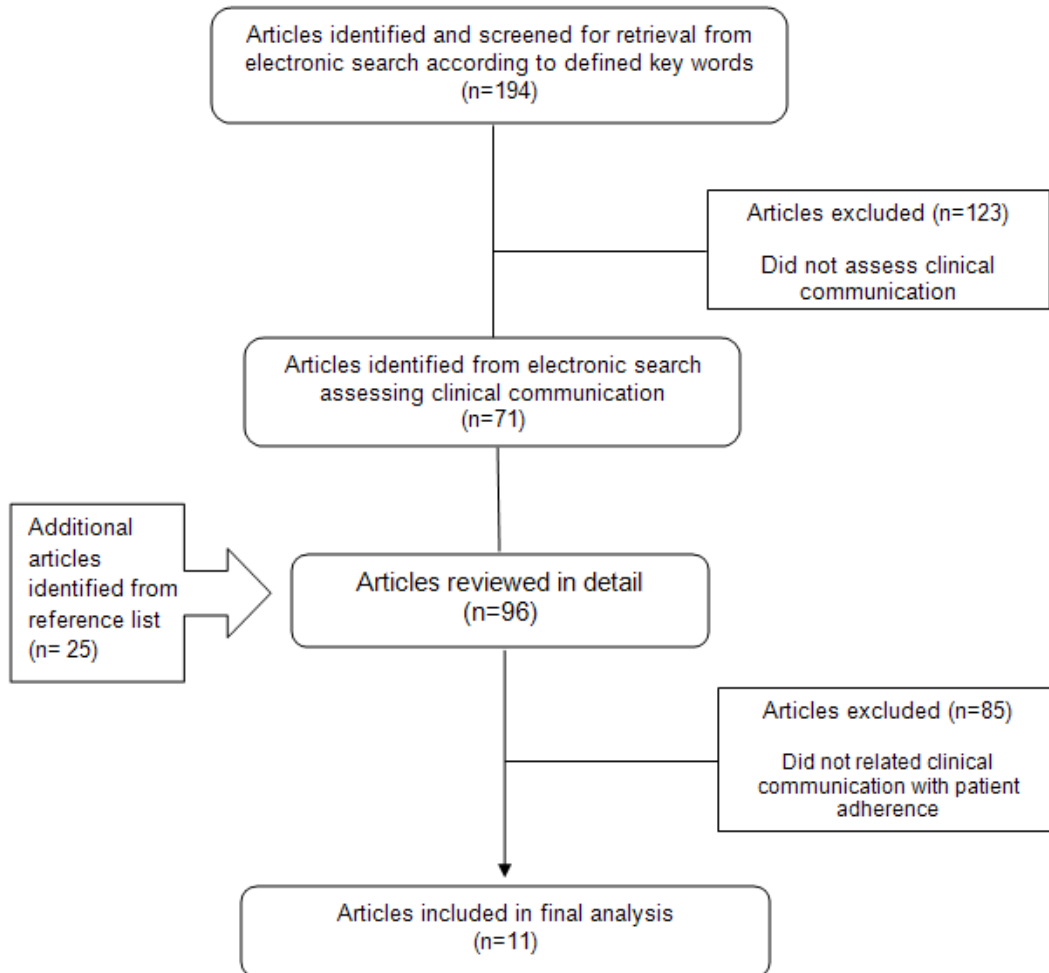


Figure 1 - Selection process of the studies included in the analysis.

Data extraction and quality assessment:

Data analysis was conducted between May 2012 and February 2013. The quality of the studies was assessed according to their classification at two levels: high evidence (randomized clinical trials and experimental studies without randomization) and low evidence (observational studies with or without control group) (Wright, Brand, Dunn, & Spindler, 2007). (Table 1)

Table 1 – Studies included in the Review.

Article/ Study type	Exam Clinical context	Population	Communication Strategies	Assessment	Results	Comments/ Recommendations to clinical practice
Kelly, R. <i>et al</i> 1992 Randomized Prospective study HQS	FS Colorectal cancer	HP: Physicians PT: <i>n</i> = 333	UCG IG: educational materials and phone reminders CTG: continuity with a physician	AA: exam attendance CA: original mailed questionnaires	30.3% adherence total sample. Increased adherence in the IG compared with the UCG. Comparing UCG and CTG the highest continuity had higher adherence (<i>p</i> < 0.001).	Adherence improved with physicians ability to provide information
Lerman, C. <i>et al</i> 1992 Randomized Prospective study HQS	Colposcopy Cervical cancer	PT: <i>n</i> =90 (low adherence group)	UCG (<i>n</i> =42) IG (<i>n</i> =48) structured telephone counseling protocol	AA: exam scheduled	IG - 67% complied with exam, compared with UCG (43%). IG - 74% adherence to treatment, compared with UCG (53%)	Information contributes to patient adherence. Brief, structured personal reminders (telephone contact) improve adherence.
Schecter, A. <i>et al</i> 1996 Observational Prospective study LQS	Cardiac catheterization CCU	HP: professionals in CCU PT: <i>n</i> =272	RC	AA: patient willingness to perform the exam	47% agreed to perform the exam, 17% probably agreed, 23% not sure, 5% probably not, and 7% definitely no. Patients with lower levels of education were less willing to perform the exam.	Tailored intervention regarding patient's educational level and preferences are needed.
Rimmer, B. <i>et al</i> 1999 Randomized Prospective study HQS	Pap tests and Mammography Breast and Cervical Cancer	PT: <i>n</i> =1318	IG1: Provider intervention IG2: Provider intervention and tailored print communications IG3: Provider intervention, tailored print communication and telephone counseling	AA: exam attendance	IG3 - higher compliance in Pap tests (<i>p</i> =0.05). Compliance with mammography (> 80%) similar in the three groups.	Brief, structured personal reminders are more effective than generic admonitions.

<p>Roberts, R. et al 2001 Randomized Prospective study HQS</p>	<p>Mammography and CBE Breast cancer</p>	<p>HP: Health care provider PT: $n=1850$</p>	<p>RC</p>	<p>AA: exam attendance CA: mailed questionnaires</p>	<p>Respondents who received mammography ($p = 0.018$) or CBE ($p=0.028$) were more satisfied with the information received.</p>	<p>Physicians' ability to provide Information and care significantly improved mammography rate.</p>
<p>Anderson R., et al 2003 Randomized Prospective study HQS</p>	<p>DEE Diabetes</p>	<p>PT: $n=132$</p>	<p>UCG: reminder letters before annual DEE IG: reminder letters and a phone call for those who did not scheduled a DDE within 10 days</p>	<p>AA: exam attendance</p>	<p>IG- higher adherence ($p=0.001$).</p>	<p>Brief, structured personal reminders (telephone contact) improve adherence.</p>
<p>Zapka, J. et al 2004 Observational Retrospective study LQS</p>	<p>Mammography and Pap test Cervical and breast cancer</p>	<p>PT: 2221 $n= 1134$ (Mammography) $n=1087$ (Pap test)</p>	<p>RC</p>	<p>AA: telephone questionnaires CA: telephone questionnaires</p>	<p>Inability to provide information significantly reduce adherence to mammography (when abnormal results were found) ($p= 0.02$).</p>	<p>Ability to provide information and recommendations is needed to improve adherence to the proper follow-up.</p>
<p>Engelman, K. et al 2006 Qualitative Retrospective study LQS</p>	<p>Mammography Breast Cancer</p>	<p>PT: $n=130$</p>	<p>RC</p>	<p>AA: not reported CA: interview assessment of patients' satisfaction and preferences</p>	<p>39 variables affecting satisfaction where identified, namely by the technologist's attitude, and ability to report results.</p>	<p>Technician's attitude and ability to provide information can improve mammography adherence and satisfaction.</p>
<p>Fox, S. et al 2009 Quantitative Retrospective study LQS</p>	<p>Mammography and FOBT Breast and colorectal cancer</p>	<p>HP: $n=63$ Physicians PT: $n=904$</p>	<p>RC</p>	<p>AA: mailed questionnaires CA: mailed questionnaires</p>	<p>Physician communication style had a positive effect on mammography ($p <$ 0.0001) and FOBT ($p < 0.0001$) adherence.</p>	<p>Discussion was the most important component of the communication effect in cancer screening. Communication can positively influence adherence in mammography and FOBT.</p>

Meguerditchian, A. et al 2012 Cohort Retrospective study LQS	Mammography Breast Cancer	HP: <i>n</i> = 413 Physicians PT: <i>n</i> =96708	RC	AA: exam attendance CA: MCCQE2	Physician's communication ability increased mammography adherence (<i>p</i> <0.0001). A 2 SD increase in physician communication ability increased the odds of mammography (30 % in urban areas and 6 % in rural areas)	Physician's communication ability influenced patient's adherence to mammography (particularly in urban areas).
Carney, P. et al 2009 Retrospective study LQS	Mammography Breast Cancer	HP: <i>n</i> = 257 Radiologists	RC	AA: not reported CA: original mailed questionnaires	47% RC when mammography were normal; <6% RC when mammography were either normal or abnormal; 77% often or always RC when mammography were abnormal; Female Radiologists were more likely to be frequent communicators compared to males (<i>p</i> =0 .02)	For abnormal results, good communication of both the results and the need for further tests improves receipt of appropriate follow-up care, reduces the anxiety associated with mammography and improves adherence.

Abbreviations: AA, Adherence Assessment; CA, Communication Assessment; CBE, Clinical Breast Exams; CCU, Coronary Care Unit; CTG, Continuity Group; MCCQE2, Medical Council of Canada national clinical skills examination; DEE, Diabetes Eye Evaluation; FOBT, Fecal Occult Blood Tests; FS, Flexible Sigmoidoscopy; HP, Health Professional; HQS, High Quality Study (according to Wright, Brand, Dunn, & Spindler, 2007); IG, Intervention Group; LQS, Low Quality Study (according to Wright, Brand, Dunn, & Spindler, 2007); Pap Test, Papaniculau Test; PT, Patient; RC, Routine Communication; SD, Standard deviation; UCG, Usual Care Group

Evidence synthesis:

Of the 194 identified references, 11 articles met the inclusion criteria. Of the selected articles, five contained randomized, prospective research, classified as high quality according to the previously referred quality assessment procedure. One observational prospective study and five retrospective studies were considered low quality studies. The majority of the studies retrieved ($n = 9$) considered screening and diagnostic test adherence in cancer screening and follow-up (Carney et al., 2009; Engelman, 2006; Fox et al., 2009; Kelly & Shank, 1992; Lerman et al., 1992; Meguerditchian et al., 2012; Rimer et al., 1999; Roberts & Birch, 2001; Zapka et al., 2004). One study addressed patients' acceptance of the physician's recommendation to have a cardiac catheterization (Schechter et al., 1996) another study addressed adherence rates to eye disease screening in diabetic patients (Anderson et al., 2003).

The population studied included a total of 102 844 patients. Insufficient information made it impossible to determine the exact number or professional groups of the health professionals enrolled in the studies. Nevertheless the number of professionals enrolled in three of the studies totalled 733 (Carney et al., 2009; Fox et al., 2009; Meguerditchian et al., 2012). Regarding professional characterization, physicians of different specialties, nurses and technicians were included. Just one of the studies addressed the health professional's perspective, involved a population of 257 radiologists (Carney et al., 2009).

1. Adherence assessment

Approximately half the studies collected objective information on adherence to diagnostic or screening tests and on the patients' perspective on how communication strategies contribute to their adherence (Fox et al., 2009; Kelly & Shank, 1992; Lerman

et al., 1992; Roberts & Birch, 2001; Zapka et al., 2004). Fox and co-workers detected a significant positive effect of physician communication on adherence to screening: when patients perceived their physicians “to be enthusiastic” they were more likely to perform a screening test.

Four of the studies addressed the adherence rate (Anderson et al., 2003; Meguerditchian et al., 2012; Rimer et al., 1999; Schechter et al., 1996). In two of these studies the assessment was evaluated by presence rates in scheduled exams (Anderson et al., 2003; Meguerditchian et al., 2012).

Engelman and co-workers examined only patients’ descriptions of variables influencing their adherence. The participants described 39 variables affecting their mammography adherence including the professional behaviour of the technicians and their ability to report results (Engelman, 2006).

As mentioned earlier, the study conducted by Carney appraised the health professionals’ subjective reports on their communication ability (Carney et al., 2009).

2. Communication strategies

Four of the studies retrieved evaluated the effect of intentionally implemented communication strategies on patients’ adherence to diagnostic tests (Anderson et al., 2003; Kelly & Shank, 1992; Lerman et al., 1992; Rimer et al., 1999). A variety of communication strategies was applied: written educational materials, reminders by phone and letter and telephone counselling. Routine communication procedures were reported in seven studies, (Carney et al., 2009; Engelman, 2006; Fox et al., 2009; Meguerditchian et al., 2012; Roberts & Birch, 2001; Schechter et al., 1996; Zapka et al., 2004) and were recognized to be a relevant factor in patients’ adherence to the screening tests studied. For example, physicians with better documented communication skills

were more successful at obtaining their patients' agreement to perform screening and diagnostic mammography (Meguerditchian et al., 2012). Physicians' enthusiasm for screening was also mentioned as a variable that influenced screening adherence and could be taught (Fox et al., 2009).

We considered the patient's continuity with a single physician (addressed in one study) to be a communication enhancing strategy. According to Martin and collaborators, the establishment of a stable patient-physician relationship "allows the health professional to understand elements that are crucial to the patient's adherence" (Martin, Williams, Haskard, & Dimatteo, 2005). In Kelly's study (Kelly & Shank, 1992) continuity with the same physician made a statistically significant contribution to the likelihood of adherence. Assessment of communication strategies using checklists rated by trained observers, standardized or original questionnaires, was performed in seven studies (Carney et al., 2009; Engelman, 2006; Fox et al., 2009; Kelly & Shank, 1992; Meguerditchian et al., 2012; Roberts & Birch, 2001; Zapka et al., 2004). In two studies professionals and patients perspectives on communication strategies was evaluated by questionnaires or interviews (Carney et al., 2009; Schecter et al., 1996).

Statistically significant improvement in adherence was reported in seven articles (Anderson et al., 2003; Fox et al., 2009; Kelly & Shank, 1992; Lerman et al., 1992; Meguerditchian et al., 2012; Roberts & Birch, 2001; Zapka et al., 2004) in which specific (Anderson et al., 2003; Kelly & Shank, 1992; Lerman et al., 1992) or routine communication (Fox et al., 2009; Meguerditchian et al., 2012; Roberts & Birch, 2001; Zapka et al., 2004) strategies were implemented. Four of the articles detected a positive impact of health professional' communication in adherence. Recommendations for the implementation of communication strategies were found in the reviewed articles addressing factors influencing adherence.

Discussion

The studies under review, addressing the impact of clinical communication strategies on patients' adherence to diagnostic and screening tests, used heterogeneous designs and methodologies. Considering that only about half the studies were classified as high-level evidence, the possibility of evaluating the impact of communication strategies on patients' adherence to screening and diagnostic tests is limited. This is in line with Wright and collaborators who stated that a review is considered to possess low-level evidence if it includes level III (retrospective cohorts) or level IV (case series) studies. Nevertheless "these reviews can be important preliminary studies, and may identify incidence of results and areas for future research" (Wright et al., 2007).

Statistically significant positive results relating communication strategies and adherence were detected in seven studies: three in which specific strategies were implemented (Anderson et al., 2003; Kelly & Shank, 1992; Lerman et al., 1992) and four where routine communication was employed (Fox et al., 2009; Meguerditchian et al., 2012; Roberts & Birch, 2001; Zapka et al., 2004). Not only do these results underscore the value of specific communication strategies but they also show that simple routine communication is important and can be optimized in order to improve adherence.

In general an association was detected between the use of communication strategies and enhanced screening and diagnostic test adherence.

The assessment of communication strategies varied. Subjective evaluation of communicational performance was obtained using questionnaires and/or interviews, and for objective evaluation standardized instruments rated by trained observers were used. In general objective measures (checklists, frameworks) rated by observers are considered to assess professionals' communication skills more accurately than subjective self reports (Guimond et al., 2003).

Adherence rates were assessed by exam attendance or by willingness to perform diagnostic or screening exams, according to the concept of adherence mentioned earlier - the patient's active involvement in his own treatment or health preventive procedures (Bissonnette, 2008; Fraser, 2010; Kyngas et al., 2000).

The majority of the studies retrieved concern cancer screening and follow-up (Carney et al., 2009; Engelman, 2006; Fox et al., 2009; Kelly & Shank, 1992; Lerman et al., 1992; Meguerditchian et al., 2012; Rimer et al., 1999; Roberts & Birch, 2001; Zapka et al., 2004). Reported results confirmed that cancer screening adherence was successfully increased by the use of educational materials, (Kelly & Shank, 1992; Rimer et al., 1999) client reminders, (Kelly & Shank, 1992) tailored print communications, (Rimer et al., 1999) and telephone counselling (Lerman et al., 1992; Rimer et al., 1999).

Communication in health care is essential for providing good quality care. Patient-centred approaches can enhance not only the communication with patients, but also the motivation to health promoting behaviours and physical care (Irwin, 2004). Evidence has been reported of the effect of patient-centred communication in improving patient adherence to clinical prescriptions (Clifford, Barber, Elliott, Hartley, & Horne, 2006; Robinson et al., 2008; Zolnierek & Dimatteo, 2009). Strategies such as open-ended questions, active listening, eliciting patient concerns, and allowing patients to express themselves (Howie, Heaney, & Maxwell, 2004) improve the adherence to medical consultations, (Kinnersley, Stott, Peters, & Harvey, 1999) prescribed medication (Harmon et al., 2006) and treatment regimes (Zolnierek & Dimatteo, 2009).

Thus the studies included in the present review revealed that various communication strategies can be used by health professionals to promote adherence to diagnostic or preventive screening tests. Routine communication with patients was studied in six studies, while in four of the articles the effect of specific procedures was examined.

Patient-centred approaches i.e. tailored information, opportunity for questioning, continuity with the same physician, telephone counselling and reminder letters, proved to be positively associated with improvement in patients' adherence to screening and diagnostic tests. These types of interventions were used in the studies that addressed cancer screening and eye disease screening in diabetic patients.

In the studies addressing routine procedures, communication between the patient and health professionals proved to be an important factor in preventive screening implementation (Engelman, 2006; Meguerditchian et al., 2012; Roberts & Birch, 2001; Zapka et al., 2004). In the one study that addressed the issue from the health professional's perspectives, conclusions underscore the valuable role of training communication programs for health care providers working with breast disease (Carney et al., 2009). Schechter and co-workers evaluated the routine communication with patients in coronary care units (Schechter et al., 1996) and reported that patients with lower levels of education were less willing to accept physicians' recommendations to undergo cardiac catheterization. These findings reinforce the usefulness of tailored communication, addressing individual information needs and taking into account educational and cultural background. On the other hand, a study of economical interventions using telephone reminders (Anderson et al., 2003) concluded that the personal contact by telephone proves effective in encouraging patients to adhere to the annual screening exam.

In summary, health care providers' communication ability can have a crucial role in patients' adherence to screening and diagnostic tests. Health professionals can create the opportunity for patients to express doubts, concerns and fears and they can adequately respond to them in a caring and considerate manner, making exams, procedures and their advantages simple and easy to understand (Engelman, 2006; Ohara, 2010). An

appropriate response to normal emotions can foster compliance and adherence to occasionally uncomfortable or painful procedures, and facilitate a collaborative attitude essential for a successful exam.

Limitations of the present review are: (1) the small number of studies that study the application of communication skills in health professionals other than physicians and nurses, (2) selected studies were methodologically heterogeneous, and only five studies presented a randomized prospective design. The inclusion of studies with a retrospective and observational design reduced the power of the review and (3) the methodology of communication assessment and the predefined strategies were not clearly described in some studies.

Conclusions

The present review covers a significant number of patients ($n = 102\ 844$). However, a large proportion of these come from a single study (Meguerditchian et al., 2012).

Results show the positive effect of the use of communication strategies on patient adherence to screening and diagnostic tests, even when only simple measures to improve health professional-patient communication are implemented.

Patients' perception of the quality of the healthcare they receive is highly dependent on the quality of their interactions with their healthcare providers (Clark, 2003; Wanzer, Booth-Butterfield, & Gruber, 2004). Furthermore positive interaction can ultimately improve the state of patients' health through more active participation in their care, through preventive screening, adherence to treatment, and self-management (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002; Renzi et al., 2001; Zachariae et al., 2003).

Our results also have implications for further research, underscoring the need for further and deeper investigation into the relationship between the use of communication skills and screening and diagnostic test adherence in different areas of health care.

Diagnostic and screening tests vary widely and are specific to medical specialities.

Specific areas could benefit from training in particular communication skills useful in screening and diagnostic exams. As an example, the CONNECT study (Lonsdale et al., 2012) developed a trial to test the effect of a communication training program for physiotherapists on their low back pain patients' adherence to rehabilitation recommendations. Also, as reported by Meguerditchian and co-workers, it is important to verify if early interventions to enhance physicians' competence in communication skills can increase their ability to provide patients with screening procedures with objective preventive value. Attention should be given to the communication abilities of health professionals in general. As stated by Melissa Wanzer "All hospital staff should

be trained in patient-centered communication, emphasizing immediacy, clarity, and listening in their interactions with patients and their families” (Wanzer et al., 2004).

In summary, our results suggest that the application of communication strategies can benefit the patient’s adherence and compliance to screening and diagnostic tests which are such crucial preventive strategies and diagnostic tools. Further studies should be conducted in order to confirm and extend the present findings to different exams, clarifying the role of specific and appropriate communication skills. This could ultimately lead to the implementation of communication skills training programs at under- or postgraduate levels, and benefit patients’ health outcomes.

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The manuscript “Adherence to screening and diagnostic tests – a systematic review of the role of health professional’s communication” was submitted to publication in the Journal of Health Communication.

PARTE II

ARTIGO DE INVESTIGAÇÃO

“The Exercise Stress Test – impact of communication strategies on patient’s compliance and satisfaction”

RESUMO

Introdução: A prova de esforço é frequentemente utilizada para o diagnóstico e prognóstico de patologias cardiovasculares. Para ser conclusivo este exame necessita de corresponder ao esforço máximo do paciente, tornando-o dependente da sua *compliance*. A capacidade de comunicar do profissional de saúde é reconhecida como um fator favorecedor da colaboração do paciente nos procedimentos diagnósticos e terapêuticos. O presente trabalho de investigação pretende avaliar o impacto da aplicação de estratégias de comunicação na duração da prova de esforço.

Desenho: Estudo clinico controlado randomizado.

Métodos: Trezentos pacientes admitidos para prova de esforço programada foram alocados aleatoriamente a quatro grupos: os grupos de intervenção 1 ($n=84$) e 2 ($n=79$) que receberam instruções padronizadas antes da realização do exame, na posição de pé (grupo 1) ou sentado (grupo 2). No grupo 3 ($n=66$) as instruções foram dadas com os pacientes sentados e uma pergunta aberta final permitiu elucidar as dúvidas dos pacientes. No grupo de controlo, 71 pacientes foram submetidos aos procedimentos de rotina. Após completarem a prova de esforço todos os participantes preencheram um questionário de satisfação adaptado e traduzido do *Patient Satisfaction with the Interview Assessment Questionnaire - PSIAQ*.

Resultados: Os pacientes incluídos nos grupos 2 e 3 apresentaram uma a prova de esforço estatisticamente significativamente mais longa ($p<0.00$). O nível de satisfação global mais baixo foi detetado no grupo de controlo ($p=0.035$).

Conclusões: Os resultados deste estudo revelam que estratégias específicas de comunicação, nomeadamente contacto ocular e oportunidade para colocar questões, aumentaram significativamente a duração da prova de esforço e conseqüentemente a acuidade de avaliação do mesmo. O nível de satisfação foi mais elevado nos três grupos de intervenção, independentemente da estratégia de comunicação implementada. Abordagens similares podem ser facilmente aplicadas pelos profissionais de saúde e incluídas como procedimentos padronizados, representando um acréscimo de tempo e esforço reduzido.

ABSTRACT

Background: The Exercise Stress Test (EST) is commonly used for the diagnosis and prognosis of cardiovascular pathologies. To be conclusive, the EST needs to be a maximal cardiovascular performance test, dependent of the patient's compliance. Health professional communicational ability is known to enhance patient's compliance to therapeutic and diagnostic procedures. The present study aims to evaluate the impact of communication strategies in EST duration.

Design: Randomized-controlled trial.

Methods: Three hundred patients admitted for programmed EST were randomly allocated to four groups: the intervention groups 1 ($n=84$) and 2 ($n=79$) standardized instructions were delivered with the patients standing up (group 1) or sitting down (group 2). In the group 3 ($n=66$) instructions were delivered with patients sitting down, and a final open question permitted to elicit patients doubts. In the control group 71 patients were submitted to the routine procedures. After completing the EST all participants fulfilled a satisfaction questionnaire adapted and translated from the Patient Satisfaction with the Interview Assessment Questionnaire - PSIAQ.

Results: Patients included in groups 2 and 3 presented significantly longer EST duration ($p<0.00$). Lower global satisfaction scores were found in the control group ($p=0.035$).

Conclusions: Present results revealed that specific communication strategies, namely eye contact and opportunity to ask questions, enhanced the EST duration and consequently the exam conclusiveness. Higher global satisfaction was detected in the three intervention groups, regardless of the communication strategies implemented. Similar approaches can be easily applied by health professionals and included as standardized exam procedures with reduced time and effort investment.

Abstract word count: 250

Key-words: exercise stress test; compliance; communication strategies; patient satisfaction.

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INTRODUCTION

The Exercise Stress Test (EST) is the most commonly used, non-invasive cardiovascular exam for the diagnosis and prognosis of cardiovascular pathologies, and a primary choice for the diagnostic of coronary artery disease (CAD).^{1, 2} The Bruce protocol is the most widely adopted.³⁻⁵ The protocol requires the realization of a maximal cardiovascular performance, with continuous recording of electrocardiogram (ECG), blood pressure (BP) assessment and monitoring of symptoms and clinical signs.⁶

Cardiovascular work depends of the exercise duration and for that reason the duration of the EST an excellent measure of the patient functional capacity.⁷ When the subject reaches 85% or more of the maximal predicted heart rate (HR) the exam is considered conclusive.⁸ An inability to exercise more than 6 minutes on the Bruce protocol, or an increase in HR lower than 85% of maximal predicted rate are significant indicators of increased risk of coronary events.⁹ Cardio-active medications may contribute to an altered rate response to exercise, reducing the ability to accurately predict maximal aerobic capacity.¹⁰

The suspension of the EST is determined by the presence of an interruption criteria or when the patient achieves is maximal capacity and declare he is enable to maintain the exercise.^{5, 11} Exercise duration is a consensual prognostic indicator, providing risk stratification in subjects with CAD.^{12, 13} The Coronary Artery Surgery Study (CASS) detected an association between EST duration and survival at 4 years in patients with CAD.¹⁴ An adequate level of effort (HR) identically enhances the diagnostic and prognostic value of the EST.^{15, 16} Both EST duration and HR depend of patient' motivation to achieve the maximal amount of exercise work.

It is known that an effective communication between health professionals and their patients improves adherence to medical recommendations and treatment regimens.¹⁷ The use of communication strategies is associated with more positive health outcomes and satisfaction.^{18, 19} Verbal and non verbal communication strategies, namely preparing the context, active listening, providing information, can be taught and learned.^{20, 21} Health professional ability to introduce him, stating his professional role, maintain privacy and confidentiality have been reported to influence clinician patient relationship and implement efficiency of care.²²⁻²⁴ Verbal strategies like open-ended questioning permit to elicit patient's feelings, expectations and doubts²⁵⁻²⁸ contributing to higher satisfaction and compliance.^{29,30} Health professional's ability to communicate and to develop a collaborative relationship with their patients is known to influence compliance and adherence to therapeutic procedures.^{31, 32} Regarding adherence to diagnostic and screening exams, however, the evidence is still scarce and there is a lack of scientific evidence for the use and value of their application to cardiovascular exams. Our aim was to study the application of specific communication strategies to the EST procedures. We postulate, according with the literature, that patient's compliance can be mirrored in EST duration.

METHODS

Participants

Three hundred and thirty six subjects of both sexes scheduled to perform a programmed EST were invited to participate in the present work. Subjects were recruited between August 2012 and June 2013 and the EST was performed in the Cardiology department of Centro Hospitalar de Vila Nova de Gaia/Espinho E.P. E. The sampled size was calculated using the GPower 3.1.4 program for F Test ANOVA. A list of random codes was generated using the Excell 2007 program and participants were coded and assigned to each of the four groups. The inclusion criteria were to be older than 18 years of age and that the EST (Bruce protocol) was interrupted by maximal effort.

Subjects assigned to another protocol or when the EST was interrupted by clinical criteria were excluded. From the original 336 participants, a sample of 300 patients was obtained and randomly distributed as follow: 84 in the experimental group 1 (G1), 79 in the experimental group 2 (G2), 66 in the experimental group 3 (G3) and 71 in the control group (CG).

Procedures

Information of the EST procedures was standardized (duration and contents) in the four groups, and delivered by the same professional. Mean total length of the provided information was 40.3 seconds.

- Group 1 (G1): the information on EST procedures was delivered before the exam with the patient standing up, dressed and maintaining eye contact, This step was followed by the electrode placement for ECG monitoring and physical measures.

- Group 2 (G2): the information on EST procedures was delivered before the exam with the patient sitting down and dressed and maintaining eye contact. This step was followed by the referred exam protocol.
- Group 3 (G3): the information on EST procedures was delivered before the exam with the patient sitting down and dressed and maintaining eye contact. This step was followed by the exam protocol. An open question (“*Do you have any questions or doubts concerning the exam?*”) permitted to elicit and respond to the patient’s doubts. This step was followed by the exam protocol. The duration of the question and answer was recorded.
- Control group (CG): the information on the EST procedures was delivered during the exam protocol.

Socio demographic information was collected after the EST, and clinical relevant data was obtained through the clinical records.

Instruments

To assess the patient satisfaction with health care, an adapted version of the *Patient Satisfaction with the Interview assessment Questionnaire*³³⁻³⁸ (PSIAQ) developed by Delvaux and his coworkers was used.³⁶ This instrument is designed to measure three important dimensions of clinical communication (presentation, information and support) and presents good psychometric qualities: for satisfaction with facilitating and listening factors a Cronbach’s α coefficient of 0.84 and for the satisfaction with informing and reassuring factors a value of 0.72. Questions are presented using a four-point Likert, and the maximum satisfaction score is 4. Patients fulfilled the PSIAQ after completing the EST (returned in a sealed envelope).

Participants flow, group allocation and data collection procedures are described in Figure 1.

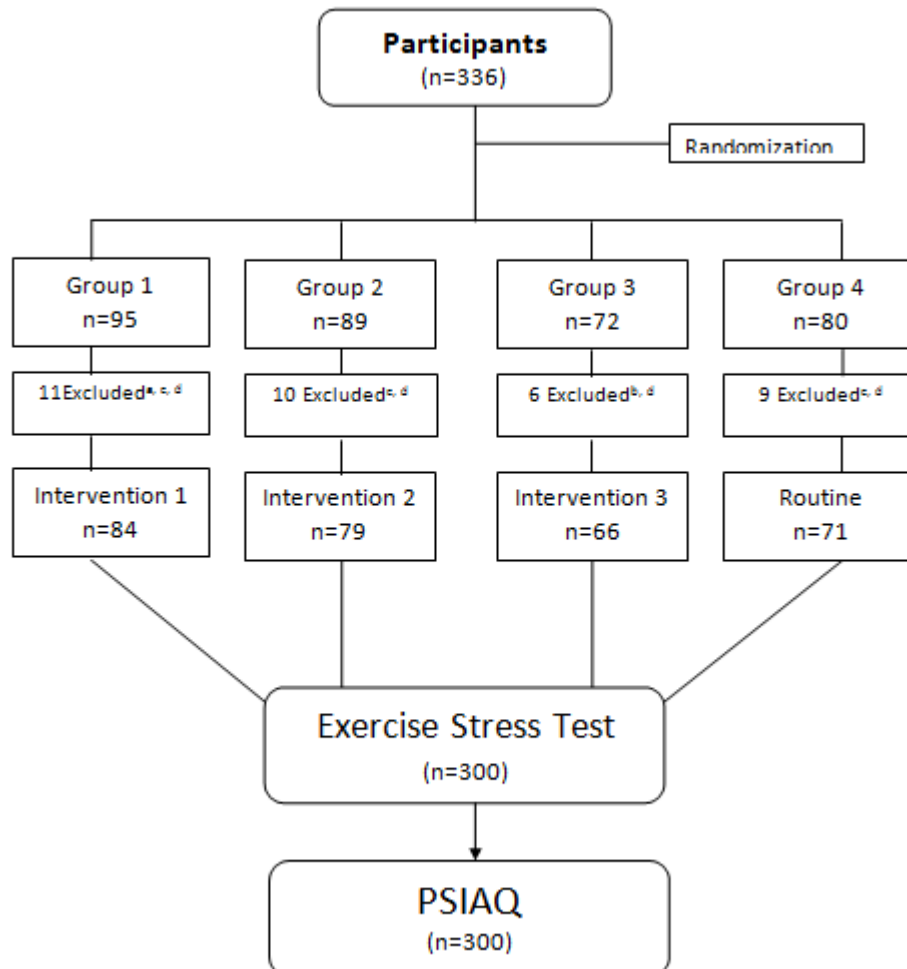


Figure 1. Participants selection Flowchart. ^a motor limitation, ^b contraindication to EST, ^c different protocol, ^d EST interrupted by clinical signs, symptoms, ECG or BP changes

Ethical considerations

This study was submitted to and approved by the Ethical Committee of the Hospital de Vila Nova de Gaia/Espinho Center (115/2012-1). Participants were informed of the study's goals, methods, expected benefits and discomfort after which they gave their written informed consent. The confidentiality and privacy of the collected data were

guaranteed during the data collection and analysis stages according to the Declaration of Helsinki.

Statistical analysis

The statistical analysis was undertaken using IBM *Statistical Package for the Social Science (SPSS)* for windows, version 20.0. A descriptive analysis of the variables was performed and the means, standard deviation and frequencies were calculated for nominal variables. The ANOVA, Chi-Square and Pos-hoc Turkey tests were used to assess statistically significant differences between the groups.

The p value ≤ 0.05 was used to determine statistically significant differences for all the conducted analyses.

RESULTS

1. Socio demographic characterization

The participant's socio demographic measures comprised age, sex, education and socio economic status. Participants had a mean age of 56.9 years (SD 12.7), and the majority were males (73.3%). Those included in the G2 and in G3 presented a statistically significant lower mean age ($p=.000$). No differences were detected in education, gender and socio economic status between the studied groups.

2. Clinical characterization

The Body Mass Index (BMI), weight circumference (WC), Ejection Fraction (EF) and ECG presented similar values in all subjects. Systolic BP at baseline revealed lower levels in G2 and G3 when compared with G1 and CG. Concerning New York Heart Association (NYHA) functional classification system participants were similarly distributed across the groups (Table 1).

Table 1. Sociodemographic and clinical characterization

Variables	Total n=300	Group 1 n=84	Group 2 n=79	Group 3 n=66	Group 4 n=71	p
Age (years), mean (SD)	56.9 (12.7)	59.1 (11.2)	53.5 (14.5)	53.6 (12.2)	61.3 (10.9)	0.000 ^a 3,2<4,1 ^b
Sex, n (%)						
- Male	220 (73.3%)	54 (18%)	62 (20.7%)	53 (17.7%)	51 (17%)	0.098 ^c
- Female	80 (26.7%)	30 (10%)	17 (5.7%)	13 (4.3%)	20 (6.7%)	
Education (n° years), mean (SD)	9.1 (4.0)	9.4 (3.9)	9.0 (4.2)	9.3 (4.0)	8.8 (3.8)	0.775 ^a
SES						
- I	3 (1.0%)	1 (0.3%)	0	1 (0.3%)	1 (0.3%)	
- II	39 (13%)	16 (5.3%)	10 (3.3%)	6 (2%)	7 (2.3%)	
- III	108 (36%)	28 (9.3%)	27 (9%)	28 (9.3%)	25 (8.3%)	0.846 ^c
- IV	123 (41%)	33 (11%)	33 (11%)	25 (8.3%)	32 (10.7%)	
- V	27 (9%)	6 (2%)	9 (3%)	6 (2%)	6 (2%)	
BMI, mean (SD)	31.1 (28.1)	34.1 (39.6)	30.6 (26.2)	31.0 (27.8)	28.1 (3.6)	0.625 ^a
WC, mean (SD)	88.5 (11.3)	89.8 (11.6)	88.7 (12.8)	87.6 (10.5)	87.8 (9.8)	0.602 ^a
NYHA						
- I	258 (86%)	69 (23%)	68 (22.7%)	58 (19.3%)	63 (21%)	0.643 ^c
- II	42 (14%)	15 (5%)	11 (3.7%)	8 (2.7%)	8 (2.7%)	
EF (%), mean (SD)	58.0 (7.2)	56.9 (6.9)	59.2 (6.7)	58.9 (6.6)	57.1 (8.2)	0.102 ^a
BBP (mmHg), Systolic/ Diastolic mean (SD)	126.3 (14.5) 76.0 (9.3)	127.1 (13.1) 76.4 (9.1)	125.3 (13.9) 75.3 (8.3)	122.4 (13.4) 74.9 (10.5)	129.9 (16.7) 77.3 (9.4)	0.021 ^a 3<4 ^b 0.424 ^a

^aANOVA Test; ^bPos Hoc Tukey Test; ^c Pearson Chi-Square Test; CI, Confidence Interval; SES, Socioeconomic status; BMI, Body Mass Index; WC, Waist Circumference; BBP, Baseline Blood Pressure; NYHA, New York Heart Association functional classification system; EF, Ejection Fraction.

3. Cardiovascular risk factors, cardiovascular diseases, Comorbidities and current medication

Cardiovascular risk factors were similar in all participants, with the exception of stress, more reported in G2 ($p=0.037$) (Table 2).

Approximately half of the subjects reported previous CAD and were submitted to similar CAD. Other cardiac pathologies, medical comorbidities and current medication were also similar in all the groups (data not shown).

Table 2. Cardiovascular risk factors

Variables	Total n=300	Group 1 n=84	Group 2 n=79	Group 3 n=66	Group 4 n=71	<i>p</i>
Diabetes ^d	57 (19%)	13(4.3%)	17 (5.7%)	10 (3.3%)	17 (5.7%)	0.429 ^c
Dyslipidemia ^d	148 (49.3%)	45 (15%)	40 (13.3%)	34 (11.3%)	29 (9.7%)	0.419 ^c
FHCAD ^d	42 (14%)	8 (2.7%)	11(3.7%)	9 (3%)	14 (4.7%)	0.343 ^c
HBP ^d	150 (50%)	44 (14.7%)	36 (12%)	32 (10.7%)	38 (12.7%)	0.747 ^c
Obesity ^d	78 (26%)	22 (7.3%)	23 (7.7%)	15 (5%)	18 (6%)	0.854 ^c
Sedentarism ^d	73 (24.3%)	22 (7.3%)	17 (5.7%)	12 (4%)	22 (7.3%)	0.313 ^c
Smoking ^d	99 (33%)	28 (9.3%)	25 (8.3%)	23 (7.7%)	23 (7.7%)	0.980 ^c
Stress ^d	3 (1%)	0	3 (1%)	0	0	0.037 ^c

^c Pearson Chi-Square Test; ^d n (%); FHCAD, Family History of Coronary Artery Disease; HBP, High Blood Pressure.

4. Exercise Stress Test

The total sample presented a mean EST time length of 531.5 seconds (SD 131.9). The G2 and G3 participants presented statistically significant longer EST duration when compared with G1 and CG ($p < 0.001$).

Regarding changes in the ECG recorded during the EST, 4.7% of the participants presented ST depression and 1% T wave pseudo-normalization, with no statically differences between the groups ($p=0.92$)(data not shown).

5. Age and EST length

A linear regression was performed to determine the statistical weight of age differences between the groups. Comparing the control group with G1, EST length was statistically significantly related with age ($r=0.373$; $p>0.001$). The comparison of EST length in G2 and CG revealed that both variables contributed to these results ($r=0.680$; $\beta=-0.312$; $p < .000$). When comparing G3 with the CG both variables contribute to the results, with a

statistically significant higher effect of the intervention on EST time. ($R=0.520$; $\beta=-0.381$; $p < 0.000$).

6. Participant's Satisfaction assessment - PSIAQ

The mean global score of the PSIAQ in the total sample was 3.83 (SD 0.4). The GC presented a statistically significant lower score when compared with the other groups ($p=0.035$).

DISCUSSION

Health professional's communication skills are recognized to influence patients adherence and compliance to therapeutic and diagnostic procedures.^{31, 32} Specific communication strategies can improve patient's compliance, and build an empathic relationship, through actively listening to the patient, give the patient opportunity to express doubts and concerns, and addressing emotional cues¹⁹. More over context variables namely patients and health professional position and privacy can interfere with the quality of the dialogue between the participants.^{39, 40} In the present study particular communication strategies were implemented and assessed to determine their influence on patient's compliance with the EST. We detected a significant longer length in the EST when participants were sitting down during exam preparation, and could clarify their doubts.

The EST diagnostic and prognostic value is associated with the execution of an adequate level of effort^{15, 16} therefore highly dependent of the patient's collaboration. This collaboration (most probably) relays on the knowledge he possess on exam procedures, namely the advantages of performing a maximal cardiovascular performance, and the building of a trustful relation with the health professional.

The physical context and the intervenient position (sitting or standing up) can alter the perception of the professional availability and consequently the level of patient satisfaction and trust.⁴¹ Accordingly in our study the G2 and G3 where the patient and health professional were sitting down had the longest EST time length ($p < 0.001$)⁴²

Sitting down identically favours eye contact with the patient⁴³ and active listening⁴⁴ permitting to be more attentive to the patient's non verbal and verbal communication..

When routine procedures are implemented (CG) the exam description is done without

eye contact with the patient. We detected the lowest EST time length and the lowest satisfaction level in this group of patients, confirming the importance of these communication strategies.

The opportunity to elicit doubts and concerns using open questions tailor the information provided and encourage the patient to speak openly. This facilitates a deeper understanding of the patient's illness, fosters better communication and reinforces a collaborative and therapeutic relationship.^{45, 46} This strategy was used exclusively in the G3, and permitted to elicit and clarify doubts in 27% of the participants. Furthermore the low socioeconomic status detected in the majority of our patients represented a challenge to the professional's ability to disclose technical information. This emphasizes the need of an approach aiming to clarify doubts and contribute to compliance. Results indicate that patient's concerns were successfully addressed. Communication strategies can diminish the patient's feelings of tension, apprehension and nervousness⁴⁷, and can be particularly useful when EST is performed for the first time, depending of the collaboration of the patient.

The concept of patient satisfaction is complex and incorporates several determinants, such as expectations, previous experience, personal character and psychosocial framework.⁴⁸ Satisfaction levels were lower in control group confirming that basic communication strategies can lead to satisfaction improvement, even when in general participants refer to be satisfied.

The intervention was designed to be easily and rapidly applicable (mean of 40.3 seconds), feasible by professionals submitted to limited time. The basic strategies applied have revealed to be efficient and adequate in improving patient's EST compliance.

Ultimately, address patient's point of view is fundamental to the establishment of a relation between the health professional and the patient that can lead to greater adherence and satisfaction, which are important markers of health care quality.⁴⁹

In summary, the present study confirms the positive effect on the use of basic patient-centered strategies in improving EST time, and reinforcing exam accuracy. The results point to the efficacy of brief and practicable strategies, with beneficial effects on the relationship with health professionals as well as in patient's levels of satisfaction.

These simple approaches can be easily applicable in different settings, and integrated in routine care.

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