

Systematic Review

Revisão Sistemática

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Screening tools for dysphagia: a systematic review

Instrumentos de rastreio em disfagia: uma revisão sistemática

ABSTRACT

Purpose: To perform a systematic review of screening instruments for dysphagia available in the literature. **Methods:** For the selection of studies, the following descriptors were used: “questionários”, “questionnaires”, “transtornos de deglutição”, “deglutition disorders”, “programas de rastreamento”, and “mass screening”. The online databases used for the research were Virtual Health Library (LILACS, IBECs, MEDLINE, Cochrane Library, SciELO) and PubMed. The research was performed from April to June 2013. Selection criteria articles in English, Portuguese, and Spanish, regardless of the year of publication, whose title, abstract, or text had any relation to the purpose of the research. After reading the articles in their entirety, identification data and method of the articles were extracted for later analysis. **Results:** The research carried out from the proposed descriptors produced 1,012 articles. After reviewing the titles, summaries, and fully reading the articles, 20 studies were chosen. The publications on instruments for the identification of dysphagic patients started in 1999, and 50% of the analyzed studies were carried out in the USA. The methods used on the instruments were questionnaires, observation of patient’s clinical signals and symptoms, the request for execution of some orofacial movements, and swallowing test with water or food. **Conclusion:** Screening instruments in dysphagia are fairly heterogeneous and have been developed for different audiences with the main objective of identifying patients with swallowing disorders.

RESUMO

Objetivo: Realizar a revisão sistemática dos instrumentos de rastreio em disfagia disponíveis na literatura. **Estratégia de pesquisa:** Para a seleção dos estudos, foram utilizados os seguintes descritores: “questionários”, “questionnaires”, “transtornos de deglutição”, “deglutition disorders”, “programas de rastreamento” e “mass screening” e foram utilizadas as bases de dados: Biblioteca Virtual em Saúde (LILACS, IBECs, MEDLINE, Biblioteca Cochrane, SciELO) e PubMed. A busca foi realizada no período entre abril e junho de 2013. **Critérios de seleção:** Foram selecionados artigos em Inglês, Português e Espanhol, independentemente do ano de publicação, que possuíam no título, resumo ou corpo do artigo relação com o objetivo da pesquisa. **Análise dos dados:** Após a leitura dos artigos na íntegra, foram extraídos dados de identificação e métodos dos artigos para posterior análise. **Resultados:** A pesquisa realizada a partir dos descritores propostos, nas bases de dados utilizadas, gerou o total de 1.012 artigos. Após a análise dos títulos, resumos e leitura dos artigos na íntegra, foram selecionados 20 estudos. As publicações sobre instrumentos para identificação de pacientes disfágicos iniciaram em 1999 e 50% dos artigos analisados foram desenvolvidos nos Estados Unidos. Os métodos empregados nos instrumentos foram: questionários, a observação de sinais e sintomas clínicos do paciente, a solicitação da execução de alguns movimentos orofaciais, teste de deglutição com água ou alimentos. **Conclusão:** Os instrumentos de rastreio em disfagia são bastante heterogêneos e foram desenvolvidos para diferentes públicos com o objetivo principal de identificar os pacientes com distúrbios de deglutição.

Study carried out at the Irmandade Santa Casa de Misericórdia de Porto Alegre, Universidade Federal de Ciências da Saúde de Porto Alegre – UFCSPA – Porto Alegre (RS), Brazil.

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INTRODUCTION

Normal swallowing requires the coordinated action of muscles of the mouth, pharynx, larynx, and esophagus, which are innervated by the central and peripheral nervous systems⁽¹⁾. The swallowing process is generally divided into phases (oral, pharyngeal, and esophageal), which are modified during normal development due to anatomical and physiological maturation⁽²⁾. The coordination between the upper digestive and respiratory systems during swallowing is also essential for a safe and efficient feeding process⁽³⁾. A lack of coordination of the feeding and breathing processes can result in dysphagia, which includes changes in the swallowing process^(4,5).

Swallowing disorders, also called dysphagia, are not considered a disease, but a symptom of some underlying disease. They are associated with increased morbidity and mortality, and may lead to a variety of clinical complications, including dehydration, malnutrition, and aspiration pneumonia⁽⁶⁻⁹⁾. Thus, an early assessment of dysphagia by a speech therapist is essential to prevent future medical complications and should have a high priority in health-care practices⁽¹⁰⁾. Some hospitals have instruments such as screenings for early detection of adult dysphagic patients, and refer them for speech evaluation^(11,12).

These instruments, denominated in the literature as screenings, triages, and questionnaires are designed to identify a disease or an unrecognized risk factor through the patient's clinical history, physical examination, laboratory testing, or other procedure that can be applied quickly⁽¹³⁾. Screening for dysphagia should have high sensitivity and specificity to identify individuals with an accurate aspiration, so they can be referred for evaluation, while not selecting individuals without dysphagia for intervention⁽¹⁴⁾. The use of a systematic screening for dysphagia can result in a significant decrease in cases of aspiration pneumonia and improvement in the patient's general condition⁽¹⁵⁾.

The screening can be done by questionnaires, observations, physical evidence, among others. Questionnaires have been increasingly used to collect data to characterize symptoms and disorders⁽¹⁶⁾. When identified by the screening tool, the patient should be referred for diagnosis of swallowing disorders, conducted from clinical evaluation and supplemented, when necessary, by objective tests⁽¹⁷⁾.

Clinical assessment has an important role in the evaluation of patients with dysphagia and aims to determine its presence, severity, changes that it may cause, and the rehabilitation plan⁽¹⁸⁾. Unlike the evaluation protocols, screening tests are generally designed to be faster (15–20 minutes), relatively non-invasive, and pose little risk to the patient, while identifying the signs and/or symptoms needed for diagnosis⁽¹⁹⁾.

PURPOSE

The purpose of this study was systematically review the literature on the dysphagia screening tools, and to identify the characteristics and the methods used.

RESEARCH STRATEGY

For this systematic review, the precepts of the *Cochrane Handbook*⁽²⁰⁾, which involve the formulation of the research question and the location, selection, and critical assessment of scientific articles, were followed. The research question used was: what are the characteristics and methods of screening instruments for dysphagia?

The research was conducted by four researchers, two of which made the search for articles independently and blindly, whereas the other two were instituted as reviewers, being consulted in cases of doubt to establish an agreement between the ideas.

For the selection of studies, the following descriptors were used: “*questionários*”, “questionnaires”, “*transtornos de deglutição*”, “deglutition disorders”, “*programas de rastreamento*”, and “mass screening”. These were selected according to the following lists: Descriptors in Health Sciences (DeCS) and Medical Subject Headings (MeSH). The following online databases were used for the research: PubMed and Virtual Health Library (VHL), which consists of LILACS, IBECs, MEDLINE, Cochrane Library, and SciELO. The search was conducted between April and June 2013, from the intersection between the elected descriptors.

SELECTION CRITERIA

Articles in English, Portuguese, and Spanish, regardless of the year of publication, involving human beings, whose title, abstract, or text had any relation to the purpose of the research, were selected. Repeated articles and those that did not have the abstract or full text, review articles, dissertations, and theses were excluded. Besides these, articles containing validation of a tool in a country other than the source of the study, articles containing screening instruments to identify only esophageal dysphagia, instruments that used functional assessment of swallowing with food in three consistencies, and those with insufficient information on the instrument used were excluded. No search filters were applied.

DATA ANALYSIS

From the selection of the abstracts of studies found, relevant to the proposed question, the retrieval of the literature in full text was conducted. After reading the articles in full, the following data were extracted: authors' names, year of publication, country where the study was conducted, screening instrument used, characterization of the instrument, method of evaluation, research subjects, sample size, search results, Cronbach's α value, and sensitivity and specificity of the instrument. Although the last three items were observed in the articles, it was not possible to conduct statistical methods to summarize the results.

RESULTS

The search conducted from the proposed descriptors, in the databases used, returned 1,012 articles. The search for

“Questionnaires” and “deglutition disorders” in the VHL yielded 404 articles and, in PubMed, 435; similarly for “mass screening” and “deglutition disorders”, 83 studies were found in the PubMed database and 90 in VHL.

After analyzing the titles and abstracts of articles from the inclusion and exclusion criteria adopted, 81 studies were selected. Of these, 39 articles were also excluded because they were available in more than one database, leaving 42 articles for analysis in full. After going through these articles and the exclusion of those who did not meet the inclusion criteria, 20 studies were selected for the analysis (Table 1). It was not possible to perform meta-analysis because of the diversity of studies.

Analyzing the selected articles, it was observed that articles on tools to identify patients with dysphagia started to be published in 1999⁽¹⁹⁾. Of the published studies, 50% were carried out in the USA and 20% in the UK. Others were conducted in countries such as Israel, Japan, the Netherlands, and Italy. It may also be noted that 70% of the publications were from the year 2008, which can be justified by the growing presence of speech-language pathologists in the health-care area and the concern with the early identification of dysphagia to ensure a safe and effective feeding, and to avoid respiratory and nutritional complications, thereby decreasing the cost of hospital stay.

Considering the instruments used, two studies made use the 3-ounce water swallow test, two used the Sydney

Chart 1. Studies found

Study	Authors	Year	Country	Instrument used	Instrument method
A screening procedure for oropharyngeal dysphagia	Logemann et al. ⁽¹⁹⁾	1999	USA	Northwestern Dysphagia Patient Check Sheet	Questionnaire containing items related to clinical history, signs and symptoms, and clinical conditions; swallowing test with foods of different viscosities
Analysis of a physician tool for evaluating dysphagia on an inpatient stroke unit: the modified Mann Assessment of Swallowing Ability	Antonios et al. ⁽²¹⁾	2010	USA	The Modified Mann Assessment of Swallowing (MMASA)	Observation of clinical signs and symptoms; request to perform orofacial movements
A feasibility study of the sensitivity of emergency physician dysphagia screening in acute stroke patients	Turner-Lawrence et al. ⁽²²⁾	2009	USA	Emergency Physician Dysphagia Screen	Observation of clinical signs and symptoms; swallowing test with water
The DYMUS questionnaire for the assessment of dysphagia in multiple sclerosis	Bergamaschi et al. ⁽²³⁾	2008	Italia	Dysphagia in Multiple Sclerosis: DYMUS	Questionnaire in which the patient responds “yes” or “no” for each item
Validity and Reliability of the Eating Assessment Tool (EAT-10)	Belafsky et al. ⁽²⁴⁾	2008	USA	The Eating Assessment Tool (EAT-10)	Questionnaire in which the patient responds in a range of intensity for each item
Dysphagia in patients with Duchenne muscular dystrophy evaluated with a questionnaire and videofluorography	Hanayama et al. ⁽²⁵⁾	2008	Japan	Questionnaire used to elicit symptoms related to swallowing	Questionnaire in which the patient responds in a range of intensity for each item
The 3-ounce (90-cc) water swallow challenge: a screening test for children with suspected oropharyngeal dysphagia	Suiter et al. ⁽²⁶⁾	2009	USA	3-ounce (90-cc) water swallow test	Swallowing test with water
Patients' awareness of symptoms of dysphagia	Boczko ⁽²⁷⁾	2006	USA	Symptoms of dysphagia	Questionnaire in which the patient responds “yes” or “no” for each item
The Massey Bedside Swallowing Screen	Massey and Jedlicka ⁽²⁸⁾	2002	USA	Massey Bedside Swallowing Screen	Observation of clinical signs and symptoms. Request to perform orofacial movements; swallowing test with water
A novel emergency department dysphagia screen for patients presenting with acute stroke	Schrock et al. ⁽²⁹⁾	2011	USA	MetroHealth Dysphagia Screen	Observation of clinical signs and symptoms
Bedside assessment of swallowing: a useful screening tool for dysphagia in an acute geriatric ward	Sitoh et al. ⁽³⁰⁾	2000	UK	Bedside Swallowing Assessment Protocol	Swallowing test with water

Continue...

Chart 1. Continuation

Study	Authors	Year	Country	Instrument used	Instrument method
Detecting dysphagia in inclusion body myositis	Cox et al. ⁽³¹⁾	2009	Netherlands	Questionnaire	Questionnaire completed by the patient
Clinical utility of the 3-ounce water swallow test	Suiter and Leder ⁽³²⁾	2008	USA	3-ounce water swallow test	Swallowing test with water
Validation of a Swallowing Disturbance Questionnaire for detecting dysphagia in patients with Parkinson's disease	Manor et al. ⁽³³⁾	2007	Israel	Swallowing Disturbance Questionnaire	Questionnaire in which the patient responds in a range of intensity for each item and "yes" or "no" for the last question
Prevalence of dysphagia among community-dwelling elderly individuals as estimated using a questionnaire for dysphagia screening	Kawashima et al. ⁽³⁴⁾	2004	Japan	Dysphagia Screening Questionnaire	Questionnaire in which the patient responds in a range of intensity for each item
Development and preliminary validation of a patient-reported outcome measure for swallowing after total laryngectomy (SOAL questionnaire)	Govender et al. ⁽³⁵⁾	2012	UK	Swallow Outcomes After Laryngectomy (SOAL)	Questionnaire in which the patient responds in a range of intensity for each item
Prevalence and symptom profiling of oropharyngeal dysphagia in a community dwelling of an elderly population: a self-reporting questionnaire survey	Holland et al. ⁽³⁶⁾	2011	UK	Sydney Swallow Questionnaire (SSQ)	Questionnaire in which the patient responds in a range of intensity for each item
Validation of the Sydney Swallow Questionnaire in a cohort of head and neck cancer patients	Dwivedi et al. ⁽³⁷⁾	2010	UK	Sydney Swallow Questionnaire (SSQ)	Questionnaire in which the patient responds in a range of intensity for each item
Swallowing Disturbance Questionnaire for detecting dysphagia	Cohen and Manor ⁽³⁸⁾	2011	Israel	Swallowing Disturbance Questionnaire (SDQ)	Questionnaire in which the patient responds in a range of intensity for each item and "yes" or "no" for the last question
Accuracy of a bedside dysphagia screening: a comparison of registered nurses and speech therapists	Weinhardt et al. ⁽³⁹⁾	2008	USA	Dysphagia Screening Tool	Observation of clinical signs and symptoms; swallowing test with foods of different viscosities

Swallow Questionnaire (SSQ), two the Swallowing Disturbance Questionnaire (SDQ), and the others used different instruments.

Among the selected articles, it was found that most of the instruments covered the oral and pharyngeal signs and symptoms and dysphagia together, involving items that analyzed the presence or absence of dysphagia, for example, extraoral loss of food and pain or cough during or after swallowing. In general, the screening instruments for dysphagia were developed to identify patients who meet the criteria, but few tools are designed to identify patients with or without alterations in the oral phase, pharyngeal delay, and problems in the pharyngeal phase of swallowing⁽¹⁹⁾. These criteria help explain the diversity of screening instruments found in the literature.

Regarding the research subjects, the samples were quite varied and involved children, adults, and elderly persons. The sample size ranged from 25 to 3,000 participants. The article with 3,000 participants⁽³²⁾ reported a very heterogeneous population, with individuals of both genders, aged between 2 and 105 years, and with various pathologies. Chart 2 shows the characteristics relating to the underlying pathology for each study population selected.

The reason behind a large number of articles containing screening instruments designed to identify dysphagia patients who had a cerebrovascular accident (stroke) may be related to the high rate of prevalence in this population, which can be up to 67% because these patients have limitations for a safe intake of food and fluids, with increased risk for malnutrition and dehydration and/or related to aspiration pneumonia^(40,41). There is evidence that early detection of dysphagia in stroke patients reduces not only these complications, but also the length of the hospital stay and the total expenditure on health⁽⁴²⁾.

By reading and analyzing the articles on screening devices, we observed the procedures used in each of them. Some studies^(23-25,27,31,33-38) used questionnaires that contained items that should be answered by the subjects themselves in affirmative or negative, or marking on intensity scales; others^(21,28,29) used instruments with items in which the examiner observed the patient's clinical signs and symptoms and/or asked the patient to perform some movements, and then marked the response on the instrument. Generally, a failure in one of the issues analyzed indicates a risk for swallowing disorders. There are also studies^(26,30,32) that used instruments that involved only the

Chart 2. Underlying pathologies

Underlying pathologies	Articles
Cerebral vascular accident	Antonios et al. ⁽²¹⁾ ; Turner-Lawrence et al. ⁽²²⁾ ; Massey and Jedlicka ⁽²⁸⁾ ; Schrock et al. ⁽²⁹⁾ ; Weinhardt et al. ⁽³⁹⁾
Multiple sclerosis	Bergamaschi et al. ⁽²³⁾
Duchenne muscular dystrophy	Hanayama et al. ⁽²⁵⁾
Inclusion body myositis	Cox et al. ⁽³¹⁾
Head and neck cancer	Govender et al. ⁽³⁵⁾ ; Dwivedi et al. ⁽³⁷⁾
Parkinson's disease	Manor et al. ⁽³³⁾
Heterogeneous etiologies (neurological disorders, head and neck cancer, esophageal abnormalities, respiratory and heart problems, among others)	Logemann et al. ⁽¹⁹⁾ ; Belafsky et al. ⁽²⁴⁾ ; Suiter et al. ⁽²⁶⁾ ; Boczko ⁽²⁷⁾ ; Sitoh et al. ⁽³⁰⁾ ; Suiter and Leder ⁽³²⁾ ; Kawashima et al. ⁽³⁴⁾ ; Holland et al. ⁽³⁶⁾ ; Cohen and Manor ⁽³⁸⁾

swallowing test with water for screening. In these studies, the patient had to ingest the liquid and some signs were observed during and after the intake. There were also articles that showed screening instruments with two procedures^(17,22,28,39), containing one observational part and the other a swallowing test using water or food of different viscosities.

The procedures used in screening instruments were quite varied, showing various possibilities. Children and adults or elderly with some neurological or motor deficits may have limitations in following orders or collaborating on any task requested by the screening instrument. For example, in the study involving children, the instrument of choice was the one that used only the swallowing test with water, perhaps because of the inability of the child to answer questions or perform movements requested by the examiner; studies involving patients who had strokes generally used instruments with two procedures: the first being observational, and the request to perform orofacial movements, and the second being a swallowing test with water or food of different viscosities. This finding can be explained by the possibility of stroke patients to be restricted to orofacial movements and/or presenting speech and language impairment, which can influence or compromise their feeding performance. Therefore, these should be checked before a test that uses food.

It was found that three articles used only one instrument based on the swallowing test with water as a method of screening; the other, which contained swallowing tests, previously used an observational part and the request to perform orofacial movements. Instruments that involve rapid and continuous consumption of water, such as the 3-ounce water swallow test, may put the patient at risk in case they aspire and introduce a large amount of water in their respiratory tract⁽¹⁹⁾. The authors of the Northwestern Dysphagia Patient Check Sheet, which uses the swallowing test with foods of different consistencies, suggest that the use of this instrument poses no risk to patients, because the intake of the different types of food occurs in small quantities, or, if the patient does not ingest food, observation it can be performed with the swallowing of saliva⁽¹⁹⁾. However, one must consider that dysphagia is a symptom, and it is essential that it is included in the screening instrument to verify the patient's complaints and the risk of aspiration and to identify subjects who require an assessment and referral for diagnosis of dysphagia^(21,24).

There is no consensus in the researched literature on the best or most correct procedure to be applied; it is up to the professionals to choose the instrument that suits the requirements of their activity, the operation of the service, and the profile of the patients that will be screened.

To verify the reliability of the instruments for the detection of patients with dysphagia, most studies used some method of assessment for data comparison. The Videofluoroscopia Swallow Study was used in five articles^(19,25,29,31,35); clinical assessment of swallowing was reported in five^(21,22,27,30,37); fiberoptic endoscopic evaluation of swallowing (FEES) was reported in three papers^(26,32,38), and clinical evaluation and FEES were reported in one⁽³³⁾. Another study⁽²⁸⁾ conducted the follow-up of patients for a specific time-period and included indicators such as consultation with a speech-language pathologist; special type of diet, and clinical symptoms of aspiration pneumonia to verify the presence of dysphagia. The remaining articles did not use any method of evaluation to compare the results.

Clinical evaluation of swallowing is a subjective evaluation that aims to identify possible causes of dysphagia and evaluate the safety of swallowing or aspiration hazard, decide on the method of feeding (oral versus alternative), and clarify the need for objective evaluation (FEES or videofluoroscopia)⁽¹⁷⁾. It should contain the following: clinical history data; assessment of cognition and communication skills; assessment of physiology and anatomy; and oral, pharyngeal and laryngeal functions, with special focus on the examination of the cranial nerves and evaluation of oral intake^(43,44). Videofluoroscopia is the main assessment tool that provides a dynamic image of the oral, pharyngeal, and upper esophageal phases of swallowing. One of the purposes of this examination is to define the pharyngeal phase of swallowing and not only to determine the existence of aspiration. This examination shows structural and functional findings that may be related to various swallowing disorders. When aspiration occurs, the speech-language pathologist should check the time and the consistency with which it occurs, in order to plan the intervention⁽⁴⁵⁾. FEES, which is performed through an endoscope, aims to evaluate the oral and pharyngeal phases of swallowing. Food coloring is used in the food used for assessment, and the events that occur before and after pharyngeal swallowing are analyzed, such as waste in the vallecula and piriform recesses, aspiration, reduction of pharyngolaryngeal

sensitivity, change of glottal closure, early rear food loss, and nasal regurgitation^(12,45). Knowing that the access of the population to these swallowing tests is restricted, especially in developing countries, the screening instruments capable of accurately detecting dysphagia patients have high importance in clinical and hospital settings, accelerating the process of identification and diagnosis of swallowing disorders.

The indicators or sensitivity, which is the proportion of people with the disease who present a positive test, and specificity, which is the proportion of individuals without the disease who have a negative test result⁽⁴⁶⁾, were observed in 10 studies^(19,21,22,26-29,32,33,38). Most presented the final value of sensitivity and specificity related to the instrument and showed specific values to each item of the questionnaire. An ideal screening tool should have high sensitivity and specificity so that the number of physiological swallowing tests and the costs involved can be reduced^(19,21). For the indicator of sensitivity, the value ranged between 79.70%⁽³⁸⁾ and 100%^(26,28). Regarding specificity, described minimum value was 51%⁽²⁶⁾ and the maximum value was 100%⁽²⁸⁾. The study that had higher sensitivity and specificity, both 100%⁽²⁸⁾, presented a screening instrument with two steps: the first one was observational, and the request to perform some orofacial movements, and the second was a swallowing test with water in two different volumes. In the first phase, the examiner observed and marked “yes” or “no” in response to the following questions: alertness, dysarthria, aphasia, dental occlusion, lip occlusion, facial symmetry, position of the tongue and uvula in the midline, gag reflex, voluntary cough, swallowing of secretions, and swallowing reflex. If any of the answers was “no”, the screening was interrupted. After this initial phase, the patient underwent the evaluation with water, ingesting a tablespoon of water, and then 60 cc water, and the following signs are observed: coughing during or after swallowing, change in voice quality, and extraoral fluid loss. If the patient had any of these symptoms, the application of the instrument was interrupted.

Another fact observed in some articles was the Cronbach's α coefficient, which estimates the reliability of a questionnaire in a study. In general, a survey instrument is considered satisfactory if it obtains a ≥ 0.70 ⁽⁴⁷⁾. Of the articles analyzed, six^(23,24,34,35,37,38) used Cronbach's α coefficient, with the lowest value being 0.80⁽³⁸⁾ and the highest value being 0.96^(24,35). Despite the variation between values, all instruments can be considered satisfactory for the purpose of identifying patients with dysphagia.

With the analysis of instruments used in each article, the occurrence of certain issues related to the signs, symptoms, and clinical consequences of dysphagia, such as cough during or after ingestion of liquids or foods; globus sensation in the pharynx; difficulty in swallowing food or liquids; nasal regurgitation; need for multiple swallowing; choking during feeding with liquids or foods; difficulty swallowing secretions; weight loss or difficulty in gaining weight and occurrence of aspiration pneumonia can be observed. Screening procedures for dysphagia must focus on the signs and/or symptoms (cough or hoarseness, change in voice quality, multiple swallowing, and oral stasis of food), whereas diagnostic procedures should analyze the anatomy and physiology of swallowing^(19,48).

CONCLUSION

Screening instruments in dysphagia are very heterogeneous and were developed for different groups of people — children, adults, and elderly; healthy or with some underlying pathology — with the main objective of identifying swallowing disorders.

In the research literature, there is no consensus on the best or most correct method to be applied; it is up to the professional to choose the instrument that suits the requirement of their activity, the operation of the service, and the profiles of the patients that will be screened.

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